THE STONE TOOL SEQUENCE AT LITTLE MUCK SHELTER, MIDDLE LIMPOPO VALLEY: PRE- AND POST-CONTACT FORAGER TECHNOLOGIES

By

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Declaration

I, Justin Pentz, student number 17012016, declare that this research project is my own work, based on my personal study and research, and that I have acknowledged all material and sources used in its preparation. It is hereby submitted for the degree of BA (Masters) in Archaeology at the University of Pretoria. This research project has not previously been submitted for assessment or examination for any other degree.

Initials: J.P. Date: 31 August 2023

Signature:

Abstract

The Later Stone Age of the middle Limpopo Valley is known through several excavated shelters and subsequent lithic analyses. Scholars have argued that it demonstrates a series of changes that appear linked to shifts in the local peopling of the region, in particular the arrival of farmer groups. Little Muck Shelter was one of the first excavated sites in the region with preserved forager material culture and it was studied because of its proximity to Leokwe Hill, an Iron Age site, with the intention of understanding local social relations. The shelter's occupation dates from the last centuries BC until AD 1300, with several notable changes. However, the sequence was not fully studied, contributing to the site's re-excavation in 2020. This report presents the first analysis of stone tools retrieved from this renewed interest in the site, with two primary goals in mind: first, to compare the assemblage to other assemblages around southern Africa of a similar age and assess if the site's stone toolkit is similar to other Wilton-period assemblages, including Amadzimba and Bambata, and second, to examine change in stone tools across the contact divide. This is achieved by examining the stone tools using comparable typologies and contrasting stone tool types between different periods and across southern Africa. The study shows that although a number of similar tool types in comparable frequencies were recovered from Little Muck, the site has certain differences to other Wilton assemblages. Of interest is a change in certain tool forms that occurs in the early first millennium AD, but which are morphologically consistent with Wilton tool types, when farmer groups appear in the region. The study concludes by arguing that forager toolkits were equipped to deal with shifts in behaviour and activity patterns in the middle Limpopo Valley.

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List of Acronyms

- Early Iron Age- EIA
- Late Iron Age- LIA
- Iron Age- IA
- Late Stone Age- LSA
- Shashe-Limpopo Confluence Area-SLCA
- Mapungubwe- MPG
- Central Cattle Pattern- CCP
- Small Flaking Debris- SFD
- Miscellaneously retouched piece- MRP
- Hunter-Gatherer Archaeological Research Project- HARP

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Chapter One: Introduction

Within the modern national borders of Botswana, South Africa, and Zimbabwe, at the confluence of the Limpopo and Shashe Rivers, is the middle Limpopo Valley. It is an area best known for its Iron Age archaeology, notably the Mapungubwe capital dating to the early second millennium AD, which has dominated research since the 1930s (Goodwin & Lowe 1929; van Riet Lowe 1936; Gardner 1955; Huffman 2000, 2007, 2009). Several sites have been excavated, studied, and published regarding developments in the region in terms of political, social, and economic complexity and the resulting trade networks (Figure 1). Comparatively less research has been committed to the local Later Stone Age (LSA) as well as forager-farmer interactions in the region. Contact between these groups has been discussed at length in other areas, such as in the Kalahari debate (see for example Denbow 1984; Denbow & Wilmsen 1986; Wilmsen 1989; Sadr 1997), which illustrates the various interpretations relating to such interactions and the importance in studying them. Moreover, in other parts of southern Africa, shifts in LSA technologies has been investigated and related to changing social relations, which includes not only farmers but also European settlement. Examining these shifts in the Mapungubwe region is important because it was here that widespread social upheaval took place, during which local society established southern Africa’s earliest state. At one LSA site important changes appear to be preserved in the cultural sequence, and that is Little Muck Shelter.

To date, a range of sites have been excavated and the region has been well-surveyed in certain areas. However, this all began with excavations at Little Muck in the late 1990s by Hall and Smith (2000), who wanted to examine the relationship between foragers living in the shelter and the farmer community at a nearby settlement called Leokwe Hill, 1.5km southeast. The inside of the shelter and the open area in front was excavated and preliminary results were published from one of the internal squares. The site’s sequence can largely be split into four phases: the initial occupation appears to be a small campsite, followed by increasing craft production during the first millennium AD that then peaks in the third phase between AD 900 and 1000, and finally after AD 1000 it was abandoned by foragers and occupied by farmers. Of particular interest was the evidence of trade that they identified in terms of large densities of stone scrapers and the appearance of farmer items in the sequence. These findings are unlike other sites in the valley and prompted further investigations at the shelter to better understand the role of crafts, trade and exchange, and forager-farmer relations in the region.

LSA research following Hall and Smith's (2000) work was initially carried out by van Doornum (2000) who excavated several nearby shelters. For her masters, van Doornum (2000: 13) conducted a comparative study between Balerno Shelter 3 and Little Muck. This provided an interesting contrast because Little Muck was surrounded by several contemporaneous farmer settlements whereas Balerno 3 was not. Van Doornum (2005) excavated three new sites for her doctoral study, Balerno Main Shelter, Balerno Shelter 2 and Tshisiku Shelter, and the latter was described as similar to Little Muck due to its proximity to Pont Drift, a large farmer settlement (Figure 2). Forssman's (2010) masters presented survey results from northern South Africa and examined open-air surface assemblages whereas his doctorate was carried out in eastern Botswana and involved a survey and the excavation of seven sites (Forssman 2014b). Since then, he has continued working in the area, as have his students (Seiler 2016; van Zyl 2019), and is currently excavating several sites, including Little Muck.

From these excavations, certain trends have emerged. Notably, most sites include farmer items that appear in the first millennium AD. In some instances, these are limited in frequency, but at Little Muck, for example, they are fairly common. This typically includes ceramics, glass beads, and metal, but might also have included food products. It is not always clear what foragers did in order to obtain these items. They may have been acquired through labour agreements, as the result of trade or exchange, or collected opportunistically in some cases. Little Muck has the best evidence that supports a mercantile economy between foragers and farmers, and this is due to the large number of scrapers from the site. Their frequencies follow closely the appearance and increase of farmer goods at the site, and it has been suggested that this tracks trade and exchange habits. As a result, it is hypothesised that the impact farmer relations, and associated changes to forager activities, had on forager toolkits might best be seen at Little Muck.

Figure 1: The Mapungubwe landscape (MLV) and the region's broader social landscape showing key sites (from Forssman 2020: 11).

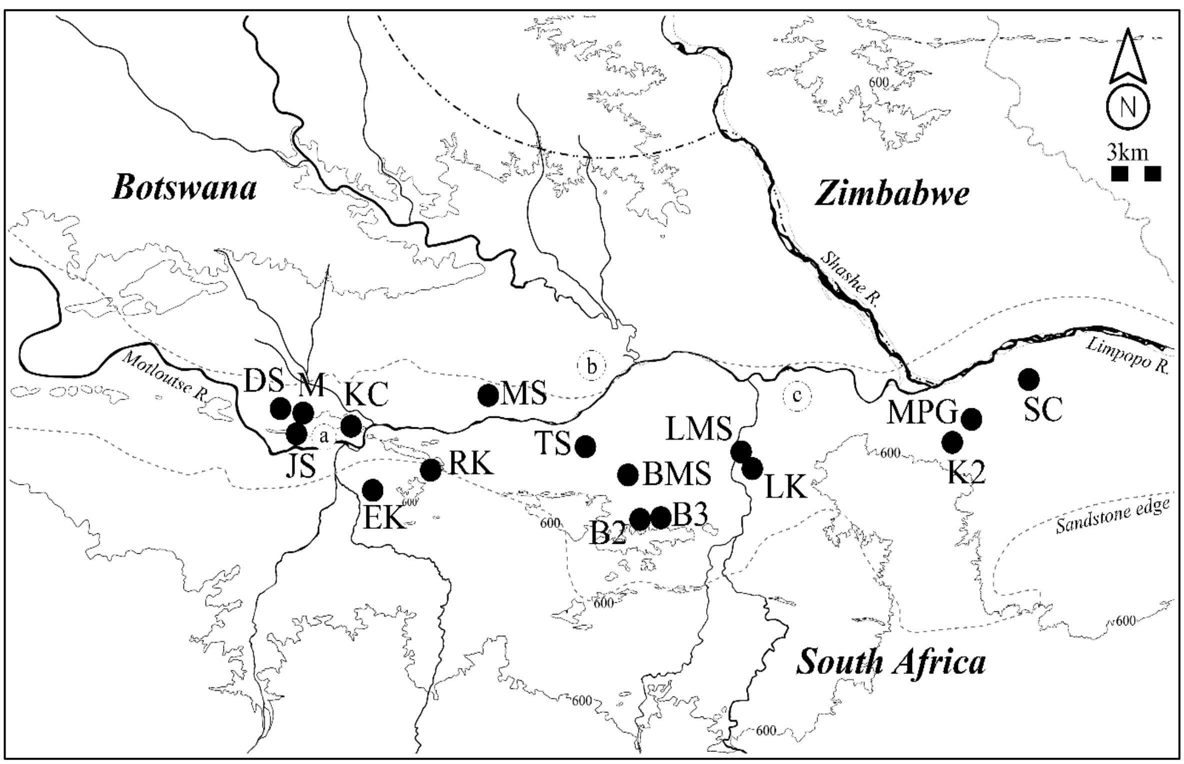


Figure 2: The Mapungubwe landscape and sites. This local map illustrates the position of Little Muck Shelter and its relative position to nearby sites (from Forssman 2020: 12).

This study presents the stone tool sequence from Little Muck. Its first aim is to describe and analyse the lithic sequence to assess the similarity, or difference, between Little Muck's assemblage and that of other sites in the extended region. The second aim is to compare the pre- and post-contact phases and assess change in the forager toolkit that might relate to a shift in behaviour and activities. A recent study has shown that from the onset of contact, foragers began using their scraper tools for different tasks (Sherwood & Forssman 2023), but it has not been shown whether their tools changed to accommodate new activity sets. Examining these changes will help us understand forager technological responses to contact with farmers and the role that their toolkit played in mediating contact with regard to production and behavioural strategies.

Using the recovered archaeological materials from Little Muck this brings forward the research question. How did the material culture change over time, if there is a change in the material culture by density, number, or percentage, it begs the question whether the changes were the result of external factors such as raw material availability, seasonal changes, site occupation and so forth. My hypothesis is that through the analysis of the material culture there will be some similarities with neighbouring sites in the extended region (aim one) and that changes resulting from activities at the site (aim two) will be presented in a change in tool type preference.

This thesis comprises six chapters. The following chapter, Chapter Two, presents relevant literature that outlines previous research conducted at LSA sites to better understand the lithic assemblage of Little Muck. Chapter Two also includes information regarding some Early and Late Iron Age (LIA) sites from southern Africa, as well as a discussion regarding the Wilton Industry of the Cape (Lombard *et al*. 2012) and the Amadzimba and Bambata Industries in Zimbabwe (Walker 1995). Chapter Three presents the methods used in this study, an explanation of terminologies, analysis methodologies, stratigraphy, and chronology. Chapter Four presents the results of the study with detailed tables, graphs and explanations of the changes that occur throughout the lithic assemblage. Chapter Five discusses the results and summarises the data from the previous chapter. Lastly, Chapter Six concludes the study by presenting final comments, observations, and recommendations for further study.

Chapter Two: Archaeological Background

The LSA and the Wilton Industry

The LSA of southern Africa began between 40 and 18 kya and continued until the arrival of Europeans. Throughout this period, several changes took place and industries are used to mark different technological phases (see Lombard *et al*. 2012). For the middle Limpopo Valley, the most relevant industry is the Wilton, which begins around 8000 years ago, a period that also includes the Amadzimba and Bambata Industries from Zimbabwe (Walker 1995). Although assemblages from the valley predating this phase are known, such as the lowermost levels at Balerno Main (van Doornum 2008), they have not been studied. As such, this chapter begins its review from the onset of the Wilton.

Stone tools, also referred to as lithics have been assigned a collective grouping based on the morphological (physical characteristics) and technological attributes and are then grouped by the relevant industries from which they are attributed. The Wilton Industry is commonly used to refer to assemblages that were defined predominantly at Cape sites within South Africa and are also used to describe interior assemblages that share similar cultural and technological features (e.g., Deacon 1984; Wadley 1986, 2000; Mitchell 1997; Lombard *et al*. 2012).

However, the during the mid- to late Holocene this becomes confusing as industries overlap both chronologically as well as spatially. Lombard *et al*. (2012) attempts to explain the changes through a list of sites based on the South African and Lesotho Stone Age sequence (SALSA), this is done to create a chronological and techno-typological foundation for the region (Lombard et al. 2012: 125-126). Lombard *et al*. (2012: 124) explains that the sequence is based on the concept of technocomplexes, which is also known as industrial complexes. From these technocomplexes or industrial complexes, the hierarchy of terms is divided into industries, phases and finally into assemblages (see Figure 1 in Lombard *et al*. 2012: 124). In Lombard *et al*. (2012), they propose a revised and new nomenclature to designate sites based on their lithic material, listing sites based on the dated assemblages and variations between sites. The list of sites that is subsequently generated in Lombard *et al.* (2012), sorts the archaeological sites into periods: the Later Stone

Age, final Later Stone Age (Wilton), early Later Stone Age, final Middle Stone Age, early Middle Stone Age and the ESA-MSA transition, ESA (Acheulean and Oldowan).

Orton (2014) responded to Lombard *et al*. (2012) by explaining that Deacon's (1972: 38) definition of the Wilton assemblages suggested that they should have "varying proportions of small scrapers and microlithic scrapers and microlithic backed tools, essentially including segments". Orton (2014) explains that through these efforts by Lombard *et al*. (2012), they have created exclusive technocomplexes that hide variation. Orton (2014: 112) advocates for the use of a broader and more inclusive terminology that are based on subjective size descriptors and broad temporal markers. Orton (2014: 112) argues that using more inclusive terminology would promote the expression of assemblage variation and it would not hinder the classification of any assemblages that are found to be 'atypical'.

Lombard *et al.* (2022) following the critique given by Orton (2014) released a revised paper in which they address the problems that Orton (2014) had indicated. The revised paper from Lombard *et al.* (2022: 172) now includes data from 450 assemblages and resulting in more than 1200 age estimates. In Lombard *et al.* (2012: 124, Figure 1) the hierarchy of terms that are used within a sequence based on technocomplexes are explained, whereas in the revised paper, Lombard *et al.* (2022: 177, Figure 3) provides a detailed example to illustrate the change from one technocomplex to the next. The revised LSA sequence in Lombard *et al.* (2022: 173) sorts the archaeological sites into technocomplexes: the ceramic final Later Stone Age, final Later Stone Age (regional variant: Smithfield), Wilton, Oakhurst (regional variants: Albany, Lockshoek, Kuruman), Robberg, early Later Stone Age, final Middle Stone Age, post-Howiesons Poort, Howiesons Poort, Still Bay, Mossel Bay, early Middle Stone Age, Fauresmith, Acheulean and Oldowan. While I agree with Orton's (2014) comments as they are valid, I nonetheless use Lombard *et al*. (2012, 2022) because it is useful for organising the LSA and will provide support for either argument depending on the study's findings.

The Wilton Industry includes industries like the final LSA and final ceramic LSA (Lombard *et al.* 2012). Such lithic industries may aid in the identification of occupation phases within sites, in the Cape and the interior such as the North West Province. However, the problem arises when sites do not conform to the standardised assemblage industries like the Wilton Industry. This would not be appropriate given the differences in stone tool densities that differ greatly from the expected outcomes of a standardised assemblage. For example, if an assemblage were to conform to the Wilton Industry, was dated to within the correct period, but lacked sufficient backed tools such as segments, the assemblage may not accurately reflect the expected outcomes and may force the analyst to consider questions such as: where would the backed tools be located, is it necessary to expand the analysis to additional squares within the site to test the outcomes, it is for these questions that there is a need for further research on LSA sites within the middle Limpopo Valley (see for example Guillemard 2020), to better understand how the lithic assemblages changed during varying periods. In doing so, this will inform the nature of trade and contact between forager and farmer communities, through the analysis of changes in frequency and density of stone tools.

For example, at Rose Cottage in the Free State a Wilton Industry dated between 7630 and 5970 BP and a pre-ceramic post-classic Wilton dated to 2240 BP was recovered (Wadley 2000: 90). The Wilton Industry occurs in a single layer, PT, and the pre-ceramic post-classic Wilton occurs in a different layer, A2 (Wadley 2000: 91). In PT, scrapers dominate (55%) the formal tools with varying sizes of scrapers, the dominant being small scrapers and the subtype end scrapers. In A2, scrapers comprise 62.7% of the formal tools, like PT, the dominant type being small scrapers and the subtype end scrapers (Wadley 2000: 93). Backed tools were recovered from PT and comprise 17.4% of formal tools whereas, in A2, backed tools are not as common but make up 12.3% of the formal tool inventory (Wadley 2000: 93-94). The presence of raw materials such as sandstone, tuffaceous rocks, opaline, and quartz, as well as other materials, indicates a difference in the local raw materials available. Chert and chalcedony are absent, which is unlike other LSA sites in southern Africa, where chert and CCS are usually the dominant material type.

The Wilton Industry while more commonly used for sites in the Cape and the interior is widely accepted, it is important to account for the Amadzimba Industry that is described by Walker (1995). In the Matopo Hills in Zimbabwe there are well known sites such as Pomongwe Cave and Bambata Cave, excavated by Walker (1995). Walker (1995: 204) informs that using terms that were previously used such as the Rhodesian Wilton, Matopan and Khami are inappropriate for Nswatugi Cave as they are too general and not assemblage-specific. This is addressed in Guillemard (2020).

Guillemard (2020) uses the Amadzimba Industry to explain that it is contemporaneous with the Wilton Industry as it is dated between 4800 and 2100 BP, it is thought to correspond to a phase of more intense aggregation (Guillemard 2020: 133-134). She explains that the Amadzimba Industry is "replaced after around 2100 BP by what is referred to as the Ceramic Matopan or Bambata which corresponds to the appearance of pottery in the area". Guillemard (2020: 134) informs that there are shared typological similarities with the Wilton illustrated by small scrapers and backed artefacts but with the addition of a "broad spectrum of microliths, such as triangles and trapezes (geometrics)". She also notes that the scrapers from the dated layers are typologically similar to the scrapers found in late Holocene sites in the SLCA (the Shashe-Limpopo Confluence Area). This is another useful typological tool for comparison between the Wilton scrapers of the Cape and scrapers recovered from the Matopo Hills in Zimbabwe, to better understand the similarities and differences between Little Muck's scrapers in comparison to sites that extend beyond the borders of the middle Limpopo Valley. Following from the framework provided by Lombard *et al.* (2012, 2022) the Amadzimba Industry now becomes an additional technocomplex from which to reference with the Wilton Industry within this paper. This will give insight as to whether a site corresponds to either a Wilton or Amadzimba technocomplex.

There are LSA sites from within southern Africa that contain examples of the Wilton Industry within their assemblages. These sites from the Cape or from within the interior can predate the Wilton assemblages recovered from the middle Limpopo Valley landscape. This is why it is important to identify these sites to record what kind of activities took place at the site, and how the resulting activities and changes affected the lithic material, as the lithic material may have changed during periods of contact. Forssman (2016: 145) explains that contact appears to have been limited and the changes in the LSA are usually difficult to identify, however the preference for specific stone tools changing is seen as an indication of the beginning of trade. I will elucidate how Wilton assemblages underwent changes during the late Holocene across various sites in southern Africa, illustrating the industry's variations in different periods and contexts through the analysis of relevant studies.

Forager interactions with farmer groups led to changes in stone tool industries (see Denbow & Wilmsen 1986; Thorp 1997; Forssman 2013, 2014, 2016; Sadr 2015). Jubilee Shelter, located within the North West Province has been radiocarbon dated and illustrates that the site was occupied during the mid-Holocene (Wadley 1986: 55). Wadley (1986) mentions dates for two other sites, Cave James (3870 ± 50BP) and Hope Hill (4400 ± 100 BP), which she argues provides further evidence for mid-Holocene occupation. Jubilee Shelter is dominated by small convex scrapers, identical to the ones in the pre-pottery layers and is made up of chert, jaspilite, chalcedony, and fault breccia (Wadley 1986: 56). Scrapers occur in the post-Wilton with Bambata pottery and post-Wilton without pottery units. In the post-Wilton without pottery unit there is an abundance of artefacts namely ostrich eggshell beads and worked bone artefacts such as points, linkshafts awls, spatulas, and ornaments. Wadley (1986: 56) notes that while the pre-pottery levels are undated, they are between a Wilton level dated 3100 BP and a post-Wilton level containing Bambata pottery dated to 1840 BP. Regarding the Wilton period, the stone tools bear a resemblance to both the 'classic' Wilton assemblages from the Cape. This is where Wadley (1986: 57) advocates that Jubilee Shelter assemblage should be subsumed within the Wilton Complex as it includes all regional variations.

Melkhoutboom is a site located within the eastern Cape with Holocene layers dating back to 6000 years (Deacon 1993). It is noted that there is a collection of well-preserved plant materials from the site. From the table provided in Mitchell (1997: 379) the span of the site's occupation from Melkhoutboom is at the earliest (7660 ± 80 BP) until (5900 ± 90 BP). Mitchell (1997: 371) explains that the most common tools are often small, thumbnailed-shaped scrapers and a variety of backed microliths (segments, backed bladelets, backed points, borers, and adzes) along with organic items. In the example of Melkhoutboom, Deacon (1993: 91) explains that within southern Africa bulbs and corms provided subsistence for the last 100 000 years. The idea being that the main focus of the site was the result of plant gathering for food production.

The changes that occurred during the final LSA period vary from one site to another. Sites like Jubilee Shelter, a forager-occupied site, and Broederstroom, an Iron Age farmer settlement, have changes that occur within the final LSA. Wadley (1996) notes that the Broederstroom stone tools are morphologically identical to those in Jubilee Shelter (Wadley 1996: 211). The stone tool assemblage of Broederstroom contains tiny end-struck scrapers that were made on chert or chalcedony. Wadley (1996) suggests that due to the lack of cores from these rock types, the scrapers were brought to the village as finished tools. There is a likelihood that farmers may have produced their own craft goods such as ostrich eggshell beads. Wadley (1996: 214) discusses the stone tools that seem to be the result of hunter-gatherer manufacture, which brought readymade scrapers to the village for processing hides, another part of the craft production. Wadley (1996) argues that this could be evidence of cooperative interaction between the farmers and hunter-gatherer groups and the possibility of a client relationship operating. With this, one can begin to understand how, the change in stone tools and the increase in trade goods, can inform about the ongoing changes during the early Iron Age (EIA) contact period.

The LSA before contact

The middle Limpopo Valley landscape is home to several sites that were utilised by forager and farmer communities. Several excavations have been conducted at sites on the landscape: Little Muck (Hall and Smith 2000), Balerno Main, Tshisiku, Balerno 2 (van Doornum 2005), Balerno 3 (van Doornum 2000), Dzombo Shelter, João Shelter, Mafunyane Shelter, Kambaku Camp (Forssman 2014), and Euphorbia Kop (Forssman *et al*. 2022). The nature of how each site was used, and their phases of occupation and activities, vary. With the aid of artefacts recovered through excavations, we have broadened our understanding of the sites themselves and the communities that utilised them. Although some sites overlap in terms of the activities performed by the people who occupied them, it is important to gauge an understanding of the nature of how these sites may differ from one another to better understand the complexities of trade between foragers and farmers. The change in the lithic material, resulting from contact between foragers and farmers during the contact period, shows how the stone tools vary from the earlier Wilton assemblages in the first millennium AD to the later contact assemblages such as Zhizo or Happy Rest affiliated assemblages. The stone tools present in the second millennium AD is utilised for different purposes like craft production and to enable trade.

With the importance of scale in mind, Forssman (2014b) expanded his research into Botswana whereby he conducted an excavation of the Dzombo Shelter. Dzombo was excavated by Forssman (2014b) and shares similarities with its neighbouring sites within South Africa. What makes Dzombo unusual is the changing preference for backed tools during its occupation, with the hypothesised notion that because of the arrival of farmers in the area, *c*. AD 350, hunting activities intensified or possibly, foragers were used as specialist hunters (Forssman 2015: 265-266).

Forssman (2014a: 186) notes that Dzombo has similarities with Little Muck, where scrapers increase with depth, from top to bottom but the density of the scrapers and backed tools remain relatively high throughout the deposit. The unique utilisation of Dzombo relative to other excavated sites within the region, allows it to stand apart from other LSA sites. Dzombo was used for hunting, whereas Little Muck was used for craft and hide production as shown by the high volume of scrapers (see Hall & Smith 2000). Dzombo have an increase in backed tools during the first millennium AD. A macro-fracture analysis study was conducted at Dzombo to provide evidence for shifting stone tool impact-related activities, Forssman (2015: 270) attributes this to an increase in hunting activities that are linked to changing opportunities or social dynamics.

Post-contact LSA across southern Africa

Broederstroom is an EIA site discovered by A. van Genderen in 1973, at an altitude of approximately 1210m on the gentle slopes of the Magaliesberg Valley, west of Pretoria (Mason 1981: 401). Excavated over the course of three years (from 1973 until 1978) brought about the recovery of archaeological debris, such as human remains and food waste from approximately 250 years of occupation of the site between *c.* A.D. 350 and A.D. 600 (Mason 1981: 401). From the recovered LSA materials Mason (1981) notes that the microlithic tools are produced mainly of white quartz and are typically single or double *outils écaillés* that were found scattered on the EIA surfaces throughout the excavation site. Lying among the EIA debris were 200 bone points and linkshafts (Mason 1981: 411). Huffman (1990) continued research at Broederstroom with a focus on domestic stock and the origins of cattle keeping. His focus was regarding the matter of economy and as to how a society procures, allocates, and consumes material resources. With this Huffman (1990) argues that the patterns of decisions and other aspects of social organisation are more important than specific resources. Huffman (1990) uses this economic discussion to explain the importance of a resource and how it is possible to maintain a viable bride wealth system with relatively few cattle (Huffman 1990: 5-6). Although the mention of foragers and LSA materials occurs briefly within Mason (1981), they are omitted completely in Huffman (1990, 1993), and nothing is said of them further. The appearance of LSA materials indicates that there was a forager presence at the site however, there was a decision made to neglect the archaeological material in the pursuit of expanding upon the existing Iron Age archaeology. The large assemblage of LSA tools would later be discussed by Wadley (1996) with a comparative paper written in relation to another LSA site Jubilee Shelter comparing the lithic materials.

Hall (2000) found a cache of LSA tools at a farmstead in Madikwe, North West Province. The presence of lithics in LS1, contained a 'scatter' of lithics with a random orientation of tool axes in all directions (Hall 2000: 39). Hall (2000) suggests that it represents a secondary context, and the impression of a scatter is false because the tools were eroded from the mouth of the pit (Hall 2000: 39). "The tight packing of lithics, indicative of burial within a pit, could be questioned when it is considered that all lithics are the result of bipolar reduction" (Hall 2000: 40). Hall (2000) draws the conclusion that both LS1 and LS2 do not mark primary knapping contexts but that they are the result of cleaning up the site. Hall (2000: 40) explains that once the knapping process was complete, the debitage material was collected and buried in small pits and suggests that the area in which the material was flaked is very close to, if not exactly where the lithic material was then subsequently buried.

The raw material from both scatters is a white to off-white chert with no formal tools in LS1, while LS2 had produced two scrapers and nine miscellaneous retouch pieces (Hall 2000: 40). The depositing of lithics after the completion of the knapping process is unique, as it strongly suggests that the work was completed at the site. Whereas with the inferred intention from the lithic materials recovered from Broederstroom is that scrapers were brought to the village, and that the reduction and formal tool retouch were done elsewhere (Hall 2000: 45). While Hall (2000) mentions that the "Madikwe scatters must be subject to careful scrutiny and a fortuitous association on the one hand, or direct association on the other, cannot be proved either way" (Hall 2000: 37). I have noted the material types used at Madikwe and Broederstroom and, the specific tool types mentioned and that the lithics are the result of bipolar reduction. These patterns become important in identifying patterns within southern African LSA assemblages.

There has also been research conducted by Mazel (1989) in the Thukela Basin in the Drakensburg region regarding social relations from 7000–2000 BP. From his research, Mazel (1989: 33) identified with evidence provided from 20 rock shelter excavations and the study of 10 open air sites, that the Thukela Basin was occupied during the LSA from around 10 000 BP, with intensive occupation beginning around 7000 BP. Mazel (1989: 34) also provides a discussion around the economic intensification between 7000–2000 BP as a result of increased emphasis on small ground game, the beginning of fish exploitation and increase in plant food exploitation. According to Mazel (1997: 3) the use of rock shelters is attributed to have been used exclusively by hunter-gatherers during the first millennium AD and by agriculturists during the second millennium AD. Concluding, he argues that contrary to prior commentators advocating for antagonistic relations between hunter-gatherers and agriculturists, relations were instead close and harmonious.

Walker (1980) conducted research in the Matopos employing excavation and analysis of the recovered material culture. Work conducted at Nswatugi Cave recovered microlithic artefacts from the Khami Industry, he notes that while backed tools are rare, it appears to show a shift from a predominant scraper emphasis among the small formal tools in the lower sub-units towards the increased numerical importance of backed tools in the sequence (Walker 1980: 21). Through the other sites analysed by Walker (1980), he concluded that the Khami Industry seems to be like the Wilton in the Cape – a single Holocene entity but with shifting modes through time (Walker 1980: 23). Other work excavations undertaken in Zimbabwe include the work done at Induna Cave, located in the southeastern lowveld of Zimbabwe. Thorp's (2010) work focused on the occupation of the cave by hunter-gatherers that made use of items of material culture acquired by farmers (Thorp 2010: 113). From a total of 8100 stone artefacts, 126 are formal tools that was recovered from the cave (Thorp 2010: 117). The assemblage is predominantly debitage-dominated (98.5%) with small scrapers as the most frequent formal tool recovered from the contact levels (Thorp 2010: 135).

The understanding is that the formal tools were used for hide preparation, and that the presence of formal tools are often interpreted as evidence for barter exchange of hides with farmers in contact scenarios (Thorp 2010: 135). Other formal tool categories were recorded, including segments, backed bladelets, borers and points, as well as adzes (Thorp 2010: 119). In terms of the most frequent raw material that was used for formal tools is opal, this raw material is used and followed by quartz. Regarding the dominant raw material for debris, it is quartz dominated followed by basalt (Thorp 2010: 123). There is evidence of shell beads that occur at Induna Cave, a total of 405 shell beads were recovered. Thorp (2010: 125) explains that due to the significant numbers of unfinished beads, this is an indication that bead manufacture was taking place on the site. A high density of stone tools, namely debitage and formal tools were collected in Level 4 with shell beads. Thorp (2010) indicated that borers in this context would have been assumed to be used to drill holes in shell beads. Thorp (2010: 127) does note however that, the peak density of unfinished shell beads in Level 4 (ED4) does not correspond with the occurrence of borers which were found in Level 3CC and Level 4 (ED1).

Induna Cave has four broad chronological periods. The first level is the most recent assemblage from the surface and dung levels probably reflects modern use of the site since the 1950s (Thorp 2010: 133). The second assemblage is likely the accumulation of the final hunter-gatherer occupation of the site (Thorp 2010: 133-134). This includes ceramics and indicates that the deposit had been disturbed. The third assemblage comprises stone artefacts with some ceramics in the top four spits (Thorp 2010: 134). The assemblage is dated between AD 1160 and 1270. The fourth assemblage in the bottom four spits of Level 4, indicates the pre-ceramic occupation of Induna Cave by stone tool-using hunter-gatherers and is undated (Thorp 2010: 134). The formal tools recovered comprise of two small end scrapers and a backed bladelet (Thorp 2010: 134). Thorp (2010: 134) concludes that due to the decreasing stone artefact density along with the presence of ceramic sherds are indicators of a decline in the intensity of use at the site by hunter-gatherers. Thorp's (2010: 134) alternative explanation is that the occupation of the site was by smaller numbers of hunter-gatherers who were increasingly interacting with and using the material culture of contemporary farmer communities nearby.

Thorp (1997) presents evidence for contact between hunter-gatherers and agropastoralists in the eastern Free State. Utilising archaeological evidence from two rock shelters, Rooikrans and Westbury rock shelters. At Rooikrans rock shelter the most recent occupation dated to the nineteenth or twentieth century and the underlying occupation dates between the fifteenth and the seventeenth centuries (Thorp 1997: 239). From the 3616 stone artefacts recovered Thorp (1997: 239) notes that the assemblage is dominated by small end scrapers that comprise between 33 and 56% of the formal tools from the contact levels and are produced mainly on opaline (which forms part of CCS). A small number of small segments were also reported that occur in Levels 1 and 2. Westbury rock shelter was subsequently also dated to the nineteenth or twentieth century (Thorp

1997: 246). The dominance of small end scrapers in the formal tool assemblages also occurred at Westbury with between 40 and 56% of the assemblages, that was also produced on the opaline raw material. There is a presence of medium scrapers that occur in small numbers in levels 1 and 2 with one large scraper from level 1 (Thorp 1997: 246).

From contact levels of excavation at Rooikrans and Westbury Shelter, Thorp (1997: 239) recovered a large percentage of scrapers that dominated the assemblage along with backed tools. The preference for scrapers is seen at later assemblages such as Balerno Main (see Guillemard 2020 for example). There are exceptions to this trend as shown in Sadr (2015: 9) at several sites at the Zambezi River Basin, the Kalahari Drainage Basin, and the northern part of the Namibian Coastal Basin that date to the first millennium AD, which was dominated by backed tools. There are key characteristics that define the Wilton Industry that are also present in the middle Limpopo Valley. The sites within the middle Limpopo Valley landscape tend to share the features of the Wilton Industry as well (see van Doornum 2000, 2005, 2007, 2000, 2014; Forssman 2014a, 2015, 2017, 2020; Forssman *et al*. 2018; Forssman & van Zyl 2022).

Forager-farmer interactions: some archaeological evidence

Archaeological research in the middle Limpopo Valley has mostly focussed on the Iron Age. From the earliest work published on sites such as Mapungubwe and K2 there has been a long history of excavation and study of Iron Age sites on the middle Limpopo Valley landscape. Other sites that have been studied include Schroda, Eurphobia Kop and Leokwe Hill (see van Riet Lowe 1936; Gardner 1955; Huffman 1989, 1990, 2000, 2001, 2007, 2009, 2015; Calabrese 2000, 2007; Forssman *et al*. 2018, 2022). There are examples of forager materials that occur within Iron Age sites, whether this is the result of trade, use and disuse of the site, or perhaps a change in the social dynamics of foragers and farmer communities is not necessarily easily discernible.

Denbow (2017) discusses whether the appearance of certain artefacts in forager contexts constitutes an example of trade between foragers and farmers or whether it is the result of meaning ascribed to the remains (Denbow 2017: 4). "Does the appearance of 'farmer' artefacts like potsherds and metal goods in 'forager' contexts necessarily mean trade between two archetypical categories–or can it point in some instances toward the development of more compound or

hybridized societies and economies" (Denbow 2017: 4). Using the example of Little Muck, Denbow (2017) shows how the meaning was ascribed to the site by Hall and Smith (2000).
Due to the increase in stone scrapers around AD 900, this led Hall and Smith (2000) to postulate that animal hide processing had become a craft, as such they were produced for exchange with neighbouring farmer communities (Denbow 2017: 4). With a decrease in lithics and with the appearance of Leopard Kopje ceramics, the conclusion drawn by Denbow (2017: 4-5) was that the site had been appropriated by farmer peoples who replaced or assimilated earlier foragers. Denbow (2017) argues whether the shifts were not perhaps "evidence for changing adaptations by the same population through the adoption of new technologies and subsistence strategies" (Denbow 2017: 4). He also argues that whether this change was the result of outward migration of foragers or their assimilation into farmer communities and explains that it is difficult to determine this from the material cultures alone (Denbow 2017: 4).

What is clear is that the difference between forager and farmer-occupied periods is attributable to the material culture that is recovered and, how archaeologists have gone about the analysis of the material culture. While there is a wealth of information regarding the EIA and LIA within the middle Limpopo Valley, the forager participants have been left to the wayside even with evidence of their participation in the valley. Forssman (2022: 12) phrases this well when he says, "the boundaries between foragers, herders, and farmers are contained in neat narratives, but in reality, those categories suffer an existential crisis". The reasoning is that while archaeologists place arbitrary boundaries on the archaeological material, the nature of human beings is a lot more complicated and dynamic. This often proves difficult to accurately represent the social dynamics of different groups of people within the physical space by simply analysing the material culture that has been deposited and remained behind. The use of structural models based on ethnographies can aid in the betterment of our understanding of past people as seen with the work done by Huffman (1989, 1990, 2000).

The Central Cattle Pattern (CCP) is the one model of Huffman's work that builds upon the work done by Kuper (1982). Huffman (1989) makes use of an internal arrangement of settlements to determine cultural identity. Huffman (1989: 157) argues that this is possible because the settlement organisation reflects society's attitudes and that this can be shaped. The attitudes are a result from a worldview influenced by things such as: politics, economy, rank, status, and religion, these all contribute to the worldview. Forssman (2022: 13), regarding the ascribed structure of settlements, explains that there are connections between the tangible and intangible features that were drawn out through ethnographies. Whereby there is both an informed understanding of the spatial distribution in farmer settlements and the archaeological methods that are used when investigating the sites themselves. Spatial sectors are examined based on expected results predicted using the Central Cattle Pattern (Forssman 2022: 13).

This would then suggest that while Iron Age farmers were dividing and organising the physical environment, there is the likelihood that LSA foragers would have had to be included within this spatial organisation. This is somewhat reflected in the archaeology with lithic scatters of foragers that are present at Madikwe, an Iron Age site (see Hall 2000) or the large scraper collection from Broederstroom (see Mason 1981). However, when looking at sites identified as being a part of the CCP, there is no mention of the inclusion of other groups outside of the Iron Age farmers. This occurs even though foragers are known to be present during periods of contact at sites like Little Muck during the Zhizo period. The discussion of Iron Age research and Stone Age research is treated as separate entities and studied as two separate periods. This has been done even with evidence of material culture that overlaps during the same chronological periods. Huffman (2000) argues that there is a significance in understanding these complexities and the relationships between artefacts and features, with the focus often being on the things rather than that of the social complexities themselves. This is how Huffman (2000) developed his spatial models, as he based it on two well-attested premises of human behaviour. The first is to create order, by dividing the physical environment into discrete locations, where only limited ranges of activities are permitted (Huffman 2000: 15). Second, the spatial locations have both significance and consequences where they can provide physical backdrops for social behaviour and could, in some cases, shape it. (Huffman 2000: 15).

With this thinking at the forefront, it ensures that there are designated areas that are specific to a given task. There are areas for metal smelting, the men’s court, storage facilities, high-status burials, low-status burials, and privately owned grain bins. These areas are all situated because of the divided physical environment. Huffman (2000: 15) has named two normative spatial patterns relevant to the origins of Zimbabwe culture: the Zimbabwe Pattern and the CCP. The latter is explained in depth (see Huffman 2001) with "the relationship between the physical components of a settlement in terms of concepts such as status, life forces and kinship" (Huffman 2001: 20). Huffman identifies five components of the Zimbabwe Pattern needed to function: (1) a palace, (2) court, (3) royal wives' area, (4) place for followers and (5) places for guards (Huffman 2000: 15). While these five components form the basis of the CCP and work within the EIA and LIA. Huffman (2001: 20) informs that the CCP is closely allied to a specific social organisation and worldview. The worldview to which Huffman (2009) refers to is derived from the Nguni and Sotho-Tswana (Kuper 1982 in Huffman 2009), two large groups of Eastern Bantu speakers in southern Africa (Huffman 2001: 21). Huffman (2009: 39) explains that the CCP model is the product of Eastern Bantu-speaking, ranked based societies who share similar ideologies. Ideologies such as a patrilineal belief about procreation, a preference for bride wealth by means of cattle, male hereditary leadership, and the positive belief about the role of ancestors in their daily lives (Huffman 2009: 39).

While it may be reasonable to assume that this is the result of the CCP being aligned with the worldview of Nguni and Sotho-Tswana, this notion has been challenged before. Lane's (1994: 53) critique explains that the examples tend to be 'founded on a largely unexamined premise that ethnographic and historical sources which are used to support their interpretations can be taken at face value because source and subject are closely related in time as well as space". Forssman (2022) refers to some examples and explains that while the notion of cattle wealth is essential to the residential model, its roots may be in a society transfigured by historical processes that occurred long after the initial farmer migration into the region (Forssman 2022: 13). It quickly becomes clear that there is no allocation for space within the CCP or Zimbabwe Pattern for forager materials to be identified, this argument was also brought forward by Lane (1994) and Forssman (2022). Badenhorst (2009: 149) notes that when looking at the CCP model it is applied to settlements of the Early and Middle Iron Age which lack stone constructions. There are also many other sites that fail to fit within the ideal norm, with little significance being given to these sites that vary from the modelled CCP (Forssman 2022: 13).

This has resulted in many criticisms regarding the use of the CCP (see Forssman 2022: 12-13). Lane (2005: 24) begs the question whether the "countless ethnoarchaeological studies in Africa" have been useful. Lane's (2005: 31-33) critique is that the main sources come from 16th-century Portuguese documents which provide descriptions of the elite settlements. He informs that from the source side (ethnographic/historical), there are criticisms that have focused on a failure to consider the historical context of the ethnography from which the models are derived (Lane 2005: 33). Forssman's (2022: 13) critique argues that by extending into the EIA, this means that the worldview recorded in the 20th century existed more than 1,500 years ago. Building upon the critique made by Lane (2005), Forssman (2022) problematises the use of a modern worldview due to the appearance of state–level society, new settlement patterns, and the impacts of colonization that are more recent than that of the archaeological material in which the worldview is being imposed upon. While there are the five components that were identified to allow for an EIA or LIA site to function, there are no components shown to identify if forager material or influence is present, apart from the lithic material that may appear during excavations. Foragers are omitted from these contexts, leaving only the presence of the material culture as evidence of having been a part of Iron Age farmer communities.

From Walkers (1994) excavations in Botswana, he found both IA and LSA stone tool materials. Tsodilo Shelter, a site with rock paintings in the Tsodilo Hills contained evidence of pottery and some stone tools such as casually made scrapers, miscellaneous backed tools, or broken pieces (Walker 1994: 6). Mantenge Shelter is described to be very rich in cultural material despite only one square meter having been excavated (Walker 1994: 7). Pottery was found throughout, and mostly attributed to the early Iron Age (Walker 1994: 8). There are scrapers and backed tools present at the site which changes from being backed tool dominated to scraper dominated. Walker (1994: 8) confirms that this is comparable with sequences in adjacent Zimbabwe from around 2000 years ago. Mantenge Shelter was used as a living site for LSA foragers and provides evidence of contact with farmers (Walker 1994: 8-9). Magagarape is a site that was excavated to try and assess its relationship to the nearby EIA village excavated by Campbell *et al.* (1991) where LSA tools were associated (Walker 1994: 10). Walker (1994) describes the assemblage as scraper-dominated and geometrics are rare among the backed tools. With the relatively high number of cores and flakes, Walker (1994: 11) suggests that there are a lot of flakes that were produced on-site, probably for cutting and may indicate a scarcity of iron. What sets Magagarape apart is that Walker (1994) suggests that the stone tool assemblage is an integral part of the village and is not the product of an earlier or older forager settlement (Walker 1994: 11).

Happy Rest located in the Soutpansberg is probably the earliest Iron Age faunal assemblage so far studied (Voigt & Plug 1984). A large quantity of bones was found associated with the sherds of typical Early Iron Age pottery in an ash heap (Voigt & Plug 1984: 221). They found a living floor and from the excavation recovered potsherds, bones, bone points, clay and *Achatina* beads as well as grooved stones, charcoal, hut rubble and several pieces of slag (Voigt & Plug 1984: 221). Happy Rest's faunal assemblage comprises of herding animals that account for 57.5% of the economic activities of the site (Voigt & Plug 1984: 221). Hunting accounted for 8.5% and hunting activities included both small and large animal sizes, i.e., duiker and zebra (Voigt & Plug 1984: 221-222). There is evidence of burials at the site with associated materials that were recovered such as "three 'ornaments' made of faunal material", ivory armbands and the presence of a cowrie shell (Voigt & Plug 1984: 224). They make mention of the occurrence of ivory armbands that had been recovered at Broederstroom (as well as cowrie shells) near Pretoria and Ndondondwane in Natal (Voigt & Plug 1984: 224). Where the ivory could have been obtained from is suggested to be either the result of scavenging tusks from dead animals or through trade. They explain that Happy Rest was not an isolated community because it had external contacts that could have provided a route for ivory ornaments (Voigt & Plug 1984: 224). With trade occurring between sites, items such as ivory and cowrie shells likely exchanged hands between sites such as Happy Rest and Broederstroom. The same may have occurred at other sites within the broader landscape in the middle Limpopo Valley with evidence of trade goods occurring at different periods during a site's occupation. High-intensity periods such as Happy Rest/Bambata or Zhizo will most likely contain higher densities of both trade goods and associated stone tools as seen at sites like Little Muck.

Euphorbia Kop is an Iron Age site 2km south of the Limpopo-Motloutse confluence area. The site contains stone tools, ceramics, and beads (shell and glass beads). "Of further interest is a small rock shelter with LSA remains on the outskirts of the lower-most occupied zone and the low-density stone tool scatter within the site" (Forssman *et al.* 2022: 421). From the excavations conducted by Seiler (2016) a small stone tool assemblage was recovered with most of the stone artefacts comprising of quartz 57.45% followed by chalcedony 23.94% (Forssman *et al.* 2022: 426). Forssman *et al.* (2022: 426) noted that the numeric dominance of small scrapers is a characteristic of scrapers from sites such as Balerno Main and Little Muck. This site has a clearer distinction regarding the stone tool assemblage of the LSA foragers and the Iron Age archaeology of the farmers and the association between the two groups. This contrasts with what has been covered previously with Broederstroom where the Iron Age archaeology discussion dominated the conversation and stone age archaeology fell by the wayside. Forssman *et al*. (2022) draw an interesting conclusion with the presence of foragers at Euphorbia Kop in a spatially distinct area of the site, namely that of which is in a lower portion of the tiered settlement, indicates the lower status within the sites social structure. While the status of foragers may have been in the low tier, Forssman *et al*. (2022: 431) argue that this inclusion within the hierarchy is still significant.

From these contact examples, it becomes clear that the stone tools from contact scenarios resemble the stone tools from Little Muck, during the periods of intense contact scenarios at the site. While models such as the CCP omit the inclusion of foragers within the model, with the examples this does shows that foragers were part of the Iron Age context. What this means is that there are still questions that need to be answered and this in turn promotes the need for further research, to better understand the nature of the relationship between LSA foragers and IA farmer communities within contexts that overlap with both LSA and IA archaeology.

Utilising the information available from research that had previously been conducted within the middle Limpopo Valley, including the work done by Hall and Smith (2000) and van Doornum (2000) at Little Muck there is a foundation from which to reference with the current ongoing research at Little Muck today. In Phase 1, Little Muck functioned as a camp (Hall & Smith 2000). With the arrival of farmers in the region in the early to mid-first millennium AD, craft activities increased. This is demonstrated by a high frequency of scrapers, and the site then became a workshop (Phase 2). During Phase 3, further intensification of craft activities took place in the Zhizo period (AD 900–1000). Phase 4 succeeded Phase 3 with Leopard Kopje ceramics (AD 1000-1300) whereby Hall and Smith (2000) argued the shelter was abandoned by foragers and appropriated by farmers (Forssman 2021: 25-26).

Little Muck's chronology for the interim has been established with relative chronology and it shares a pre-contact phase, an early contact phase, Zhizo, K2 and MPG phases with Balerno Main, Balerno 2 and 3. From stratigraphic units GS2/ARB2 through until a peak in density in PGA3 (Zhizo period) occurs, this includes in formal tools, worked bone, and faunal remains (see Figures 7-9 in Hall & Smith 2000: 35). "PGA2 above is associated with K2 ceramics whereas the other 3 layers above PGA3 are associated with K2 and Mapungubwe period pottery…this would place these deposits between AD 1100 and AD 1270" (Hall & Smith 2000: 35). This brings about the question of how was the site changed resulting from farmer contact or, was the changes due to the appearance of farmers?

From the analysis conducted by van Doornum (2000) she identified 437 formal tools from the internal Square L42 at Little Muck. This included 402 scrapers (see Table 16 in van Doornum 2000). Small scrapers dominate L42 (N=267), followed by broken small scrapers (N=131), medium scrapers (N=4) and segments (N=12) (see Table 16 in van Doornum 2000). At Balerno 3, Squares G7, G8 and H7 found that small end scrapers dominate (N=114) with a low number of segments (N=4) (see Table 11c in van Doornum 2000). She notes that "retouched tools are high in density during the Happy Rest/GB5-10 period at Balerno Shelter, but at Little Muck, the high density of retouch occurs later, during the Zhizo period, as does all other material" (van Doornum 2000: 94). Van Doornum (2000: 94) notes the frequencies of backed pieces are higher in the pre-ceramic deposit at Little Muck. When compared to Balerno 3 the numbers correlate with an increase in scrapers and utilised flakes in the last of the pre-ceramic levels (van Doornum 2000: 94). It is also noted that there is a strong preference for the bipolar flaking technique, with low reported frequencies of irregular cores at both Balerno 3 and Little Muck (van Doornum 2000: 90). Whether the preference for bipolar flaked pieces persists within the newly excavated assemblage will be tested and brought into question during the analysis of the assemblage. The frequency of irregular cores will also be noted and commented on.

Hall and Smith (2000: 36) argued that "the high number of scrapers suggest production over and above the immediate forager needs, and consequently, an obvious intensification of hide production for local trade and barter". An indicator of stone tools used for crafting purposes are markers such as usewear along the worked edge of a stone tool such as scrapers. Stone scrapers with evidence of usewear associated with working rigid materials, such as bone, wood and hide, increase significantly from pre- to post-contact periods and peak in the Zhizo phase (Forssman *et al*. 2018). It is argued that the change of the site's occupation is linked to social interactions between forager occupants and incoming or nearby farmers (Forssman *et al*. 2018: 289). The shifts towards craft production at Little Muck (Hall & Smith 2000; Forssman *et al*. 2018) are indicated by the high volume of stone scrapers found at the shelter and the appearance of use-wear along their working edges.

However, the usewear analysis of the scrapers undertaken by Forssman *et al*. (2018) indicated the predominant working was for rigid materials and showed almost no clear evidence of hide working. This study by Forssman *et al.* (2018) was a preliminary study, but further usewear analysis run alongside experimentation has provided supporting evidence. Sherwood and Forssman's (2023) study revealed a shift occurring at the contact divide: prior to contact, foragers primarily worked hide, wood and shell but afterwards it becomes predominantly bone with all other categories declining to low frequencies. This may indicate a focussing of activities reflecting preference patterns and trade systems (Sherwood & Forssman 2023).

The intensification of forager presence and the utilisation of the site may have resulted in the production of crafts. Crafts as described by Costin (2015: 1) form a wide range of non-food, tangible, utilitarian, and prestige goods. Some of the tangible crafts that could be used for trade or exchange purposes (but not strictly limited to trade) may be recovered through excavation efforts but perishable goods such as food products and cloth may not be recovered. Mitchell (1997: 388) explains how exchange could have served as insurance against ecological disasters and distributing information about people and resources across distances of 200km or more.

Clark (1995) problematises the definition of crafts and raises the importance of scale. Forssman *et al*. (2018: 288) make the argument that there is a need to view single-site findings from a broader regional perspective. This is so that it is possible to determine which sites contain different assemblages that may relate to craft specialisation (Forssman *et al*. 2018: 288). The analysed materials themselves should be able to give a sense of scale as to what we can expect from Little Muck and can be compared to the site and contribute to a broader regional scale. The change in lithic materials during contact periods and an uptick in trade goods can give insight into the organisation of Little Muck. We can expect high densities of stone tool materials in pre-contact levels, with low levels of backed tools and a high number of scraping tools during the contact periods.

Mitchell (1997: 388) explains that by analysing spatial patterning in the material culture depends heavily on ethnographic material studies of exchange networks among Kalahari San, particularly the *hxaro* system of the Ju/'ho-ansi. This is different from where Huffman (2000) had been critiqued about using ethnographic studies to inform a settlement pattern without taking external factors into account. This may provide insight into the exchange of intangible knowledge that might have been utilised as a commodity in the exchange process. Along with the use of tangible items such as the archaeological artefacts recovered from excavations, this helps to inform as to the working of trade and exchange between forager and farmer communities. Some examples of items produced by foragers for trade include shell and bone beads, arrow components (bone points and stone segments) (Wadley 1987, 1989) and hides (Sadr 1997). Forssman (2017: 52) mentions that a problem may occur when attempting to infer whether an item is the result of trade when the provenience is unknown. He argues that by using known trade goods and materials produced by foragers that were used in craft production linked to trade (i.e., scrapers used to produce hides) would circumvent this issue to some extent. Similarly, when talking about prestige goods (see Denbow 1990; Calabrese 2007; Denbow & Miller 2007; Swan 2008) found in the LSA context (glass beads and metals) that were obtained through trade by farmer communities. Forssman (2017: 52) explains that it is unlikely that when prestige goods are traded with foragers that the items themselves would be stripped of their social value. The presence of prestige goods at the site, the likely result of trade between forager and farmer communities, is evident through the presence of the materials across the site and appearing within other sites within the greater region.

Using data generated from her work at Balerno 3 and Little Muck, van Doornum (2000) analysed and compared the material culture from both sites. From this she identified a late pre-contact period and an early contact period at Little Muck that corresponds with Balerno 3. Balerno 3 which has been radiocarbon dated and is not based solely on relative chronology alone. At Balerno 2 a relative chronology was established based on diagnostic pottery that was compared with the ceramic typology, artefact assemblage and stratigraphy that was used for Balerno 3 (van Doornum 2005: 81). This was done as the charcoal and ostrich eggshell samples that were collected were too small to allow for radiocarbon dating (van Doornum 2005: 81). Balerno 2 contains the possible chronology of Phase 1 (Pre-ceramic) and Phase 2 (Ceramic).

With continued research efforts van Doornum (2005) utilised sites such as Balerno Main, Tshisiku and Balerno 2, she used the data generated to investigate hunter-gatherer conceptualisation of ‘space’ and ‘place’ and how these changed through time (van Doornum 2005: 61). There are significant pre-and post-contact hunter-gatherer assemblages, which indicate that the shelter was a gathering space, or aggregation camp (Figure 2; van Doornum 2005: 61). Balerno Main has four phases: Phase 1- early pre-contact 11 120–10 890 BC and 6230–6060 BC (van Doornum 2008). Phase 1 is identified from one of the earliest LSA assemblages in the valley (Table 2.2 in Forssman 2020:18). Phase 2, Late pre-contact 340–320 BC; 210–100 BC after a hiatus. Phase 3, contact AD 910–920; AD 950–1020 (Zhizo); AD 670–770. Phase 4, AD 1640–1650 seventeenth-century farmers (Table 10, van Doornum 2008, Table 2.2 Forssman 2020: 18). It is important to note van Doornum’s (2008: 249) statement that not all sites lying close to farmer settlements exhibit the same patterns of use. This means that sites may have been used for different purposes like with trade at Little Muck, it would be inaccurate to assume a blanket generalisation across many different sites that may exhibit similar patterns of use.

There are patterns that form resulting from the analysis of sites from the middle Limpopo Valley landscape. The dominance of crypto-crystalline silicates (CCS) as the dominant raw material of stone tool assemblages is one such example. Quartz is seldom present and other material types occur in low numbers, low frequency, and densities throughout the valley’s occupation. This has been recorded at Balerno Main, Tshisiku, Balerno 2 (van Doornum 2005), João and Dzombo (Forssman 2014a, 2014b, 2016). The primary formal tool type that occurs most frequently is scrapers (small end scrapers most commonly) which dominates throughout most assemblages, apart from Dzombo where backed tools dominate during the same period (see Forssman 2015).

The intensification of scraper production could be used to better understand the flow of the trade networks within the middle Limpopo Valley landscape and can provide critical evidence in terms of the frequency and density of both stone tools and traded goods recovered at the site. In the example of Boomplaas Cave in the Western Cape in Deacon and Deacon (1980: 35) they argue the implications for scraper function is primarily used for skin or as leather working tools, with the working edges and side mounting resembling larger stone skin scrapers. In an example by Deacon and Deacon (1980: 35), they explain that the difference in size between Ethiopian (cows) and Kalahari specimens (small and medium bovids) can affect the production of specific stone tools. The skins of the Kalahari specimens are thinner and favoured for clothing. This would affect the size of the lithic material produced for the purpose of clothing production. Examples of clothing items that are produced utilizing small scrapers are also mentioned with regards to the type of bovid that was hunted (see Deacon & Deacon 1980). When this is put into the perspective of Little Muck it becomes evident that there is a need to further investigate how the site was utilised.

Little Muck may well have played an important role in the valley due to the focus of the site being organised around the production of trade goods and prestige items. Stone technologies would have played a role in forager participation in the larger economies of the valley. The production of trade goods was done using stone tools (and probably bone tools; see Bradfield *et al*. 2019). The focus is on the stone tool materials from Little Muck in this study. The surplus production of these stone tools for craft production and trade occurs during the Zhizo period. This will offer insights into forager social patterns and the relationship of Little Muck to neighbouring LSA sites within the middle Limpopo Valley. As stone tool kits changed over time, the changes occurred in terms of densities between differing periods, varying dominant tool types in stone tool kits, a change in the dominant material type and the use and disuse of tools. There are changes in small flaking debris densities that occur in the assemblage, projections for small flaking debris densities can be calculated and inform the trends present in the assemblage. This is tracked stratigraphically and can identify upticks in densities, and tool frequencies and allow for the identification of changes across time. These changes and specific details regarding the lithic material can be found discussed at length in Chapter Four, the results chapter.

Chapter Three: Materials and Methods

Site description

Little Muck Shelter is surrounded by several other archaeological sites. This proximity is partly what led to Hall and Smith (2000) excavating the site in the first place. However, nearby there are also rock art sites, such as Kaoxa and Boulder Shelter, as well as the Mbere Complex, a shelter with an outside K2 homestead and a rain-control site on top of the hill (Schoeman 2006). Little Muck is a shelter with an opening of 12m and a depth of between 2 and 4m. The ceiling rises steeply across the site but in a recess at the back, it remains shallow. The rock overhang contains rock art images of giraffes, antelope, and people. The site also has an open area in front that may have been utilised for either activities or residential uses. Beyond this zone, low-lying bedrock protrudes through the substrate and upon it are a series of engravings, such as grooves, hollows, cupules and mankala (gaming) boards. The shelter faces northwards towards the Limpopo River and on the southern side of the sandstone ridge, in which the site occurs, is the Kolope River, and beyond this Leokwe Hill (Forssman 2020: 23). Little Muck was excavated in 1998 by a team of archaeologists from the University of the Witwatersrand headed by Simon Hall (Hall & Smith 2000). Excavations of Little Muck were conducted in two 1x1m squares inside the shelter and four outside. The results of their internal Square L42 were published in their seminal paper (Hall & Smith 2000), wherein they elaborate that the shift in material culture demonstrates shifts within the forager activities at the site.

Excavation methods

Little Muck Shelter was re-excavated for several reasons. First, the artefact assemblage from the first set of excavations was incomplete. Second, radiocarbon dates were needed to obtain absolute chronometric results for the assemblage[1]. Third, the excavations that had been carried out were in a limited area and whether the results were representative of the entire site was unclear. Finally, as the site was deemed significant further work was opted for in order to increase the sample size and better understand its occupation. Excavations began in 2020 under the Hunter-Gatherer Archaeological Research Project (HARP) and concluded in 2022. HARP's excavations followed

[1] At the time of writing the radiocarbon dates were not yet available, therefore the assemblage was dated using relative dating techniques from the work done by Barnard 2021.

the same procedures used by Hall and Smith (2000) and expanded upon their trenches. The internal excavations were conducted in two areas: the western recess of the shelter and near Hall and Smith's (2000) dripline excavations (Figure 3).

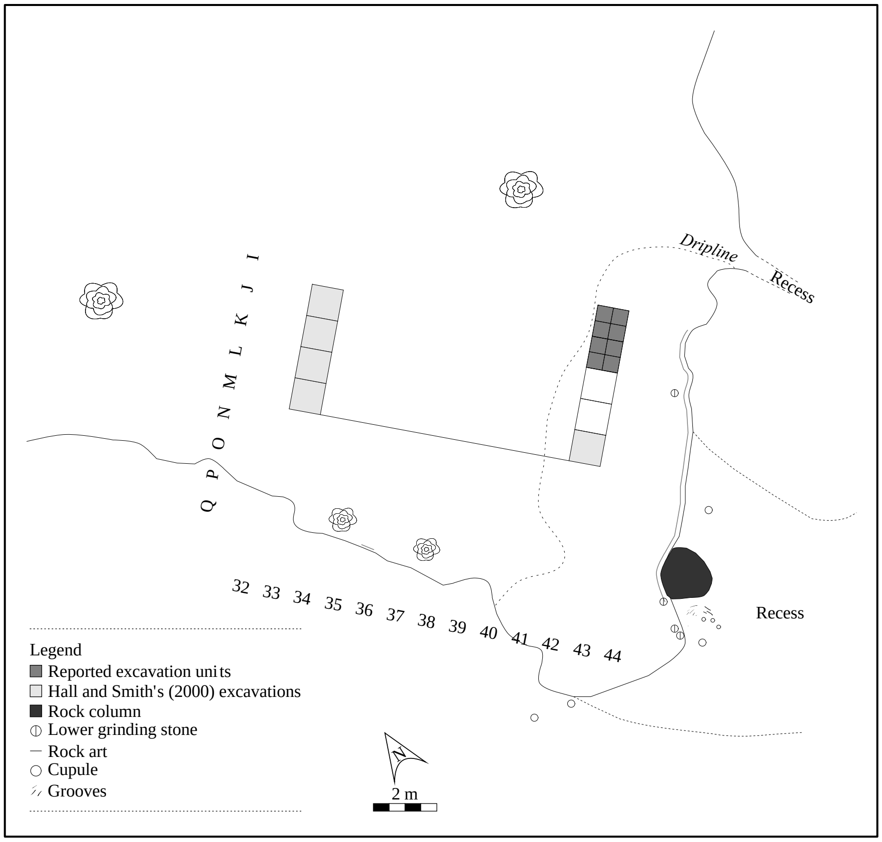


Figure 3: Little Muck Shelter site map showing Hall and Smith's (2000) excavations in light grey and HARP's western dripline excavation (not all of the excavated squares are shown in this map as they are not relevant to the work here and were not completed by the time the analysis was complete) (courtesy Tim Forssman).

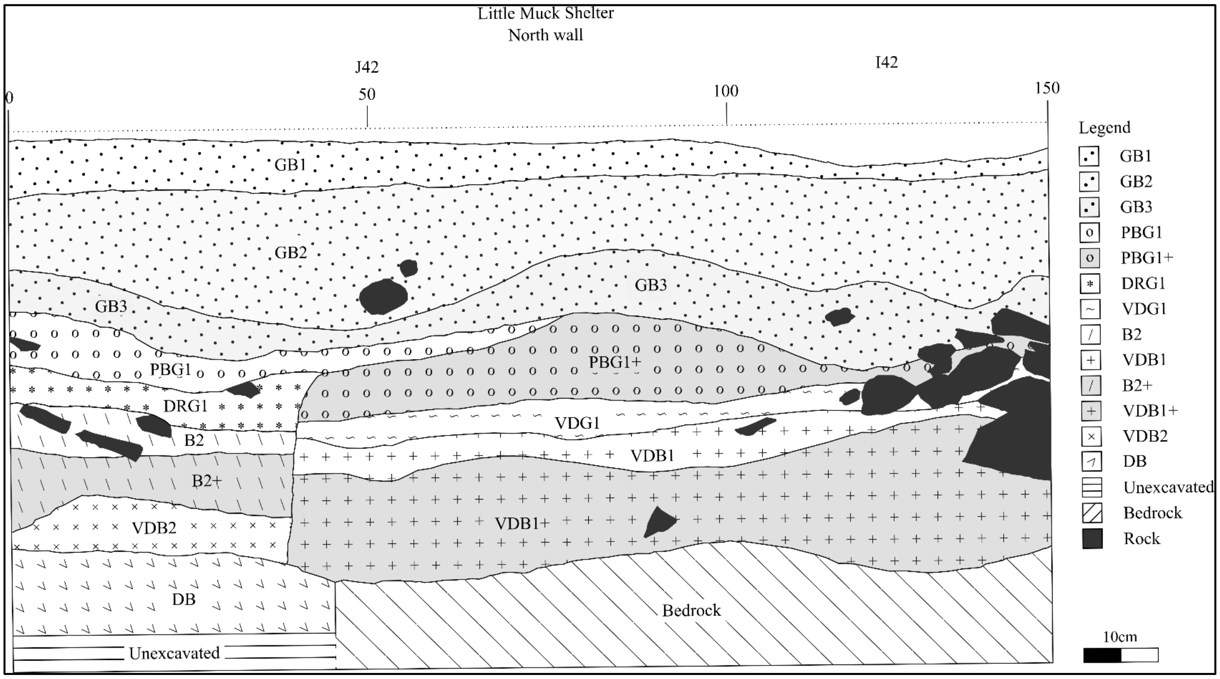


Figure 4: Little Muck Shelter, J42A-B I42A North Wall (courtesy Tim Forssman).

For this study, only the results of Square J42 were examined since at the time of analysing this was the only square that had been completely excavated. The square's assemblage was particularly large and as a result, a sampling strategy was designed and only Quadrants A and B were analysed (Figure 4). Selecting these quadrants was intentional due to the stratigraphic discontinuity reflected between the adjacent quadrants. Although the physical size of this analysed space is limited, the high density of recovered artefacts such as faunal remains, lithics, glass and ostrich eggshell beads and related artefacts from the squares is worth noting.

Excavations followed cultural strata recorded using context sheets adapted from the Museum of London Archaeological Services, and were described based on colour, compaction, and composition. Stratigraphic names were ascribed using Munsell Soil Colour Chart colour values and names, followed by the order in which the layer was identified. In addition to using a stratigraphic excavation method, spits of 3 cm were maintained throughout the excavations with bucket volumes recorded to record changes in density. This was to ensure that the vertical distribution of artefacts was recorded through a secondary control. Spits were measured from a datum point until bedrock and not changed when a new stratigraphic layer was encountered. As such, a single spit may contain more than one stratigraphic unit if a transition was noted within a spit's range (e.g., if a stratigraphic unit (A) changed from one to another (B) at 5cm it is within Spit 2 (3-6cm) and so there would be a Spit 2 A and Spit 2 B unit). Mapping, context sheets, charcoal and photographic records were utilised to record the provenience of finds *in situ*.

The four chronological phases of the middle Limpopo Valley

Forssman (2021: 16) describes a series of shifts that occurred during the course of the forager occupation of the valley. The shifts are divided into four phases which can be compared with the stratigraphic units and relative chronology (Table 1). Following Forssman (2021) Phase 1 (1220 BC–AD 100) is the transitional phase located in VDB2, the Wilton/pre-ceramic. Phase 2, the first millennium AD contact (AD 100–900) from VDB1+ until DRG1 contains the Wilton, Bambata and Happy Rest/Bambata affiliation. Barnard's (2021) (Table 2) findings of a decorated ceramic shard in DRG1 were associated with Phase 2. Phase 3, the Zhizo period (AD 900–1000) found within stratigraphic units PBG1+ and PBG1. High frequencies of decorated sherds were found to be associated with the Zhizo period (Table 2). Phase 4, the Leopard's Kopje period (AD 1000–1300) which is within GB3-GB2 contains the Leokwe/K2, Transitional K2 and Mapungubwe affiliation. Ceramic sherds and glass beads confirmed a likely K2/Mapungubwe period (Table 2).

Stratigraphy

In Square J42A-B, the deposit reached a maximum depth of 90 cm (Figures 3, 4) with a total of fifteen stratigraphic layers. The upper portion of the deposit is consistent between the quadrants but from about midway, they appear disconnected. In Quadrant B the stratigraphic layers PBG1+, VDB1 and VDB1+ are included in addition to the pre-existing stratigraphic units. PBG1+ and VDB1+ are stratigraphic units that have an increase in artefact density (indicated with a '+' symbol) and unit VDB1 is limited to Quadrant B. The lithic assemblage may show a difference between the two quadrants because of the change in stratigraphy.

Table 1: Stratigraphic units found in Square J42 A and B (courtesy of Tim Forssman).

Unit	Description of deposit	Relative chronology	Cultural affiliation
GB1 (31 L)	A fine greyish-brown sand with rock and root inclusions. Evidence of bioturbation and root penetration. This is an unconsolidated surface.	Post c. AD 1800	Historic/Venda
		AD 1220 – 1300	Mapungubwe
GB2 (72 L)	A fine but compact greyish-brown sand with root inclusions which could be a more compact version of GB1. Evidence for bioturbation and root penetration.	AD 1220 – 1300	Mapungubwe
		c. AD 1220 – 1250	Transitional K2
GB3 (29 L)	A pale greyish-brown ash that is more textured and includes a greater number of rock inclusions than GB2. Root penetration was evident within the unit.	AD 1000 – 1220	Leokwe/K2
PBG1 (27 L)	A fine textured, ashy sand with rock and pebble inclusions. Evidence of root penetration and bioturbation. A very slight change from the previous unit.	AD 900 – 1000	Zhizo
PBG1+ (8 L)	The only distinct change from PBG1 is an increase in artefact density.		
DRG1 (17.5 L)	Fine textured, darkish brown silt/clay; the unit was not coarse enough to be identified as sand. Rock and root inclusions.	First millennium, pre-AD 900	Happy Rest/Bambata
VDG1 (33 L)	Fine textured, dark grey ash with sandstone inclusions. Bioturbation was evident within the unit. Evidence for root penetration and bioturbation (J42 B). Unit occurs throughout J42 B and I42 A and is parallel to unit B2 in J42 A.	First millennium AD, pre-contact?	Bambata/Wilton?
B2 (8.5 L)	Richer, more distinct brown sand than in DRG1 (unit above B2 in J42 A) with a fine texture. Evidence for root penetration and bioturbation, along with rock and root inclusions. Unit occurs throughout J42 A only.		

Unit	Description of deposit	Relative chronology	Cultural affiliation
VDB1 (4 L)	Medium textured sand with rock inclusions. The dark brown colour of the deposit appears wet. Evidence for root penetration and bioturbation (J42 B). Unit occurs throughout J42 B and I42 A and is parallel to unit B2 in J42 A.	First millennium AD, pre-contact?	Bambata/Wilton?
B2+ (8 L)	The only distinct change from the previous unit is artefact density. Unit occurs throughout J42 A only (unit after B2).	Late BC to early first millennium AD periods	Wilton
VDB1+ (31 L)	The only distinct change from the previous unit is artefact density (J42 B). Unit occurs throughout J42 B and I42 A and is parallel to unit B2+ in J42 A.	Late BC to early first millennium AD periods	Wilton
VDB2 (103 L)	A thin, fine-textured, brown layer of sand above bedrock. Evidence of bioturbation and root penetration.	Pre-AD 100	Wilton/pre-ceramic
DB	Decayed bedrock	n/a	n/a

Chronology

Relative dating methods were used in this study due to a lack of radiometric results at the time of writing. Relying on cross-typological references, by looking at the occurrence of specific chronological markers such as scrapers, backed tools, decorated ceramics and glass beads, to establish broad chronological phases is possible because of the well-dated LSA and Iron Age sequence for the region (e.g., Wood 2000; Huffman 2007; van Doornum 2014).

Changes in preference for specific formal tool types (backed tools to scrapers) across southern Africa that changed between different phases (see Wadley 2000; Sadr 2015) can provide insight into the approximate chronology. However, this is not sufficient to establish the chronology below the contact phase as none of the valley's LSA tools are strong enough chronological markers for this period and is too general. Therefore, the use of beads and ceramics was relied upon (from Barnard 2021) and their stratigraphic relationship with the stone tools sequence (Table 1, Table 2).

Table 2: Summary of the relative chronology as per stratigraphic units from Barnard (2021: 20-26).

GB1:	The conclusions, based on the analysed materials, suggest that this unit is also representative of a Mapungubwe period (Phase 4).
GB2:	This unit is most likely indicative of a K2/Mapungubwe period (Phase 4).
GB3:	Ceramic sherds and glass beads confirm a K2 period (Phase 4).
PBG1 and PBG1+:	Decorated ceramics occur in higher frequencies from PBG1 and PBG1+ throughout the upper units. This seems to be representative of the Zhizo period (Phase 3).
DRG1 and DRG1+:	Presented the first decorated ceramic shard this indicates mid- to late first millennium AD period (Phase 2).
VDG1, B2 and VDB1:	The low density of other farmer-associated items and the presence of bead is a result of filtration from the upper strata. VDG1, B2 and VDB1 are thought to be representative of the first millennium AD (Phase 2).
B2+ and VDB1+:	Farmer-associated items are lacking, except for a single dark blue glass bead present in stratigraphic unit B2+. Most probably, the bead infiltrated this unit from PBG1/PBG1+. This is within the Late BC to early first millennium AD periods (Phases 1 and 2).
VDB2	A noticeable appearance of farmer-associated items, including glass beads. VDB2 represents a period of pre-contact.

Stone tool analysis

Preliminary sorting of the assemblage took place in the field where the assemblage was separated into fauna, shell, beads, ceramics, metal, and stone tools as well as an 'other' category for additional material. The material was subsequently re-sorted in the laboratory at the University of Pretoria Archaeology Laboratory and any misidentified artefacts were removed and placed into their relevant bags. The artefacts were weighed in grams to calculate artefact density throughout the deposit when compared to the bucket volume of recovered material.

Stone tools were analysed following van Doornum's (2005) typology, which was developed using Deacon (1984) and Walker (1994), as well as Guillemard's (2020) more recent study at Balerno Main. The recording techniques and approaches followed those outlined by Lotter *et al.'s* (2018) stone tool analysis workbook. The analysis aimed to typologically analyse all of the stone tools to compare them to previous studies in the area and record morphological and technological attributes of the stone assemblage. Guillemard and Porraz's (2019) and Guillemard's (2020) papers aid in providing new insights into a technological approach and a morpho-functional approach, which will not be conducted in this study but do provide guidelines from which to follow. Techno-functional analyses could be applied to cores, blanks, and retouched flakes (Guillemard 2020: 200) might prove to be useful for further study sometime in the future of this assemblage. Using these studies, I have created my own typological and morphological analytical approach to analyse the lithic assemblage.

Small flaking debris projection

The Little Muck assemblage was divided into two categories: small flaking debris (SFD) and non-SFD (Figure 5) (see Appendix A for additional information). SFD are stone tools less than 10mm in maximum length. SFD were weighed and were not sorted further. Ten percent of the total SFD mass was separated into separate measures of 20 SFD specimens per weight to calculate an individual SFD weight projection. This, multiplied by the total mass, generates a total numeric SFD projection for comparative purposes.

Non-small flaking debris

Stone tools that fell within the non-SFD (>10mm) category received additional analysis. This included identifying their raw material, measuring maximum length, width, and thickness, and recording condition (fresh, abraded, weathered), blank type (flake, blade, bladelet, shattered/indeterminate, or size class if undetermined, pebble, cobble, boulder, or block), primary type (debitage, core, formal tool, grinding or polishing stone, hammerstone, manuport or other) and completeness (complete, incomplete, fragment/chunk) (following Lotter *et al* 2018). These categories were all recorded within a master Excel Spreadsheet that included columns for each category and various macros that responded to specific input commands to ensure consistency in recording and analysing the specimens. The non-SFD was further sorted into four main categories:

complete flakes, incomplete flakes, formal tools, and cores. Cortex percentage was recorded for some stone tools from Little Muck this includes complete flakes, cores, and formal tools when they were being analysed.

Complete and incomplete flakes

Incomplete flakes' raw material was identified, and the specimens were counted. No other analysis took place. For complete flakes, however, the raw material was identified, their maximum length and width were taken, and the presence of cortex was recorded as a percentage of the dorsal surface.

Formal tools

The analysis included raw material identification, total artefact count, maximum length, width, and tool thickness. Cortex measurements were taken as (%) of the dorsal surface on formal tools for all tool blanks. Formal tools are sorted further into formal tool types, retouched pieces, backed pieces and, backed and retouched pieces. Formal tool condition is recorded as either complete, incomplete, broken or freshly broken. Retouched pieces were sorted into subtypes such as scrapers and miscellaneous retouched pieces (Misc. RP). Backed pieces are sorted into examples such as backed bladelets and, broken backed pieces. Backed and retouched pieces are stone tools with both traits of the retouched and backed pieces. Additional tools within these subtypes are explained in full in Appendix A.

Cores

The analysis included raw material identification, total core count, maximum length, width, and thickness of the tool along with the cortex percentage (total %) of the tool. Cores are subdivided into various subtypes based on typological or morphological features that allude to the nature of utilisation of the core for the preparation of formal tools.

This is sorted into different core types, bipolar, bladelet, casual, double platform, irregular, and single platform. Cores unlike formal tools, are not analysed with the identification of condition in mind in terms of their completeness. Cores and formal tools were subject to further analysis whereby they were classified on specific observable features, such as platforms and flaking techniques among cores and backing and retouch location and morphologies in formal tools.

Raw materials

Stone tool raw material type (quartzite, quartz, chalcedony, chert, agate, dolerite, indeterminate, not applicable [indicated by NA] and other) was recorded for all non-SFD artefacts. The numbers of chalcedony and chert were combined to produce a single material type CCS. This correlates with other LSA sites within the region to make the comparison of material types more easily recognisable. Primary types such as manuport and debitage included blank types such as pebble, cobble, boulder, block and other were counted and tallied into totals with their material type indicated as NA (not applicable, for the purposes of this study). This is the result of the material type not being relevant for the purposes of this study and was used to identify the total number of materials allocated for each type (see Appendix A).

The findings made by Hall and Smith (2000), and written up in van Doornum (2000), will be compared to the findings within this project. The raw material type, stone tool categories, the frequencies of tool types, their densities and dominance across time with the relative chronologies, will be compared to the findings within this project. This project will identify and note similarities and differences as they appear, to better illustrate the changes that happened at Little Muck during the different occupational phases by foragers and farmer communities.

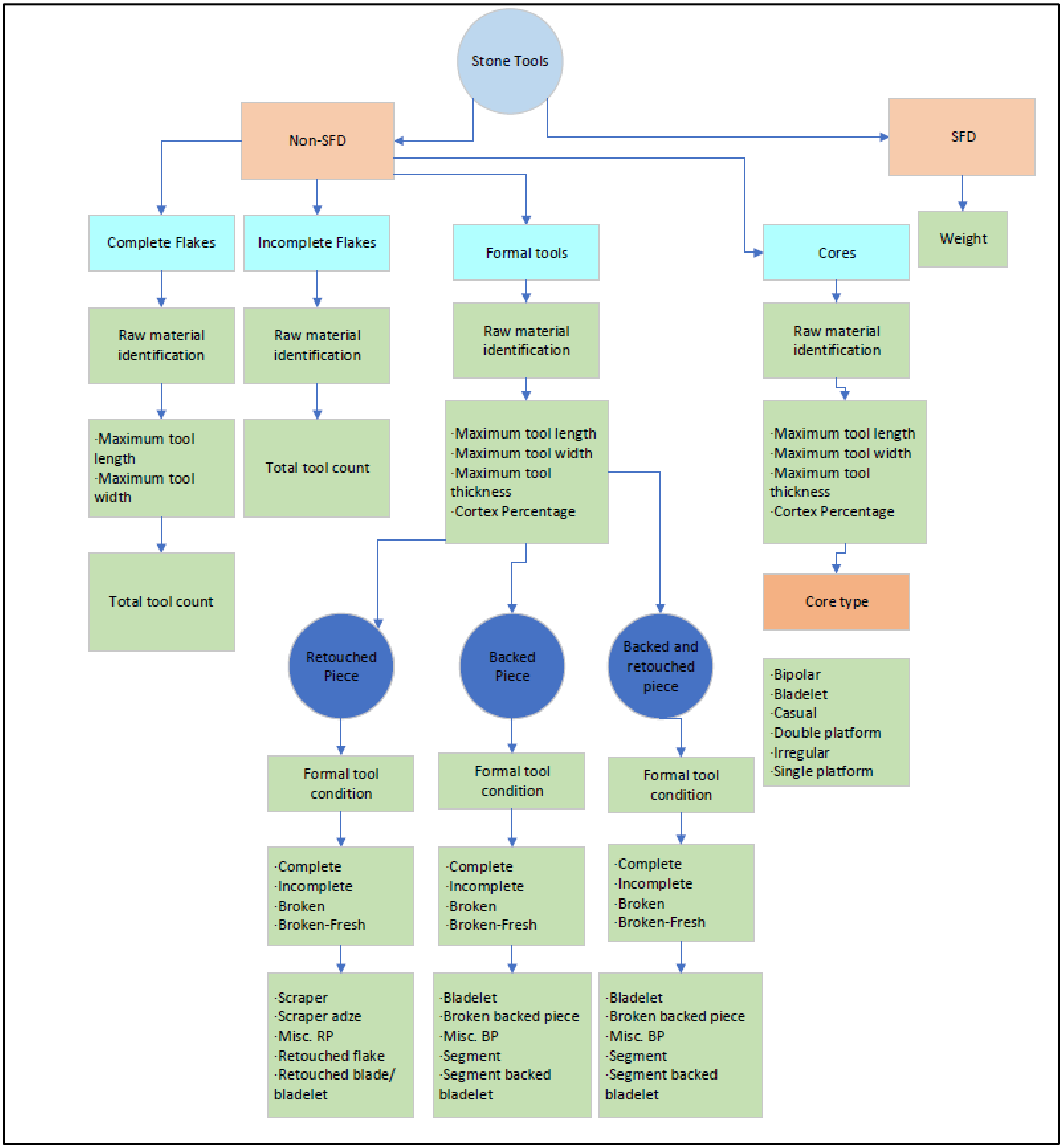


Figure 5: Figure representing the division of stone tools into varying categories.

Chapter Four: Results

The results from this study are presented in two sections. First, the distribution of the stone tools is examined across the stratigraphic units. Second, the analysis of the studied material is presented with a discussion about changes in density and artefact frequency.

Stone tool distribution

Little Muck's stone tools are variably distributed throughout the stratigraphic units. A total volume of 371 L was excavated from Square J42, Quadrants A and B. From the upper units, the unconsolidated surface GB1 is followed by the more compact stratigraphic units GB2 and GB3 that are beneath it. Table 3 presents values for stone tools from Little Muck in different categories: debitage, formal tools, cores, complete flakes, scrapers, backed pieces and manuports. These categories include the number of artefacts, density, and percentage values. The stone tools column represents the total number of artefacts recovered from Little Muck followed by the debitage column which represents the number of artefacts that make up that contribution within the total number of stone tools. The comparison in Figure 6 is to illustrate that from the density of stone tools, debitage comprises the highest density to stone tools when compared to other categories such as formal tools and the subsequent categories mentioned in Table 3.

With this data two graphs are plotted the first, Figure 6 outlines and compares the densities of the total stone tool material to that of debitage materials. This shows how closely related the densities remain across the stratigraphic units with the R^2 value (R^2=0.47) indicating that the trend is a decrease in artefacts from the bottom of the stratigraphic units until the top. When looking at the number of stone tools and their distribution across the stratigraphic units may indicate where most of the material culture was extracted from, the highest number of tools come from VDB2 (N=5651) (see Figure 7) however the highest density of material was in (VDB1+). The R^2 value (R^2=0.43) of Figure 7 indicates the same trend in that the number of artefacts decrease from bottom to the top but the statistical usefulness of this value is not as indicative as the former density the R^2 value, as such it is important to note the usefulness of the former rather than that of the latter value.
There are four peaks in stone tool density of Little Muck these are in: VDB1+ (N=130.58), VDB1 (N=113.50), VDG1 (N=71.18) and, PBG1+ (N=69.13) (Table 3). VDB1 and VDB1+ are related

as explained earlier in Chapter 3 due to the increased volume from one unit to the next. However, it is important to note that there are therefore 3 periods in which stone tool volumes had increased throughout the stratigraphic units of the site. There are three peaks: before the BC/AD transition the first peak occurs in VDB1+ and VDB1 followed by a gradual decline. The second peak in density occurs in VDG1 in the first millennium AD, pre-contact period and the last peak in density occurs in PBG1 the Zhizo period.

Table 3: Little Muck Shelter stone tool distribution table.

Order	Strat	Vol. (L)	Stone tools		Debitage			Formal tool			Core		
			Num.	Den.	Num.	%	Den.	Num.	%	Den.	Num.	%	Den.
1	GB1	31	89	2.87	85	0.55	2.74	3	1.81	0.10	1	2.38	0.03
2	GB2	71	406	5.72	389	2.53	5.48	6	3.61	0.08	4	9.52	0.06
3	GB3	29	421	14.52	416	2.70	14.34	4	2.41	0.14	1	2.38	0.03
4	PBG1	27	749	27.74	737	4.79	27.30	10	6.02	0.37	1	2.38	0.04
5	**PBG1+**	8	553	**69.13**	543	3.53	67.88	9	5.42	1.13	1	2.38	0.13
6	DRG1	18	340	19.43	328	2.13	18.74	5	3.01	0.29	4	9.52	0.23
7	**VDG1**	33	2349	**71.18**	2298	14.93	69.64	39	23.49	1.18	9	21.43	0.27
8	B2	9	163	19.18	157	1.02	18.47	6	3.61	0.71	0	0.00	0.00
9	**VDB1**	4	454	**113.50**	448	2.91	112.00	6	3.61	1.50	0	0.00	0.00
10	B2+	8	407	50.88	400	2.60	50.00	6	3.61	0.75	1	2.38	0.13
11	**VDB1**+	31	4048	**130.58**	3998	25.97	128.97	31	18.67	1.00	13	30.95	0.42
12	VDB2	103	5651	54.86	5597	36.35	54.34	41	24.70	0.40	7	16.67	0.07
	Total	**371**	**15630**		**15396**	100.00		**166**	100.00		**42**	100.00	

Order	Strat	Vol. (L)	Complete flakes			Scrapers			Backed pieces			Manuports		
			Num.	%	Den.	Num.	%	Den.	Num.	%	Den.	Num.	%	Den.
1	GB1	31	1	0.20	0.03	0	0.00	0.00	3	15.79	0.10	0	0.00	0.00
2	GB2	71	22	4.43	0.31	0	0.00	0.00	4	21.05	0.06	7	26.92	**0.10**
3	GB3	29	25	5.03	0.86	2	2.11	0.07	0	0.00	0.00	0	0.00	0.00
4	PBG1	27	28	5.63	1.04	4	4.21	0.15	1	5.26	0.04	1	3.85	0.04
5	PBG1+	8	20	4.02	2.50	4	4.21	0.50	0	0.00	0.00	0	0.00	0.00
6	DRG1	18	9	1.81	0.51	5	5.26	0.29	0	0.00	0.00	3	11.54	0.17
7	VDG1	33	87	17.51	2.64	24	25.26	0.73	4	21.05	0.12	3	11.54	0.09
8	B2	9	5	1.01	0.59	3	3.16	0.35	0	0.00	0.00	0	0.00	0.00
9	VDB1	4	16	3.22	4.00	4	4.21	1.00	1	5.26	0.25	0	0.00	0.00
10	B2+	8	19	3.82	2.38	5	5.26	0.63	0	0.00	0.00	0	0.00	0.00
11	VDB1+	31	122	24.55	3.94	22	23.16	0.71	3	15.79	0.10	6	23.08	1.52
12	VDB2	103	143	28.77	1.39	22	23.16	0.21	3	15.79	0.03	6	23.08	4.32
	Total	**371**	**497**	100.00		**95**	100.00		**19**	100.00		**26**	100.00	

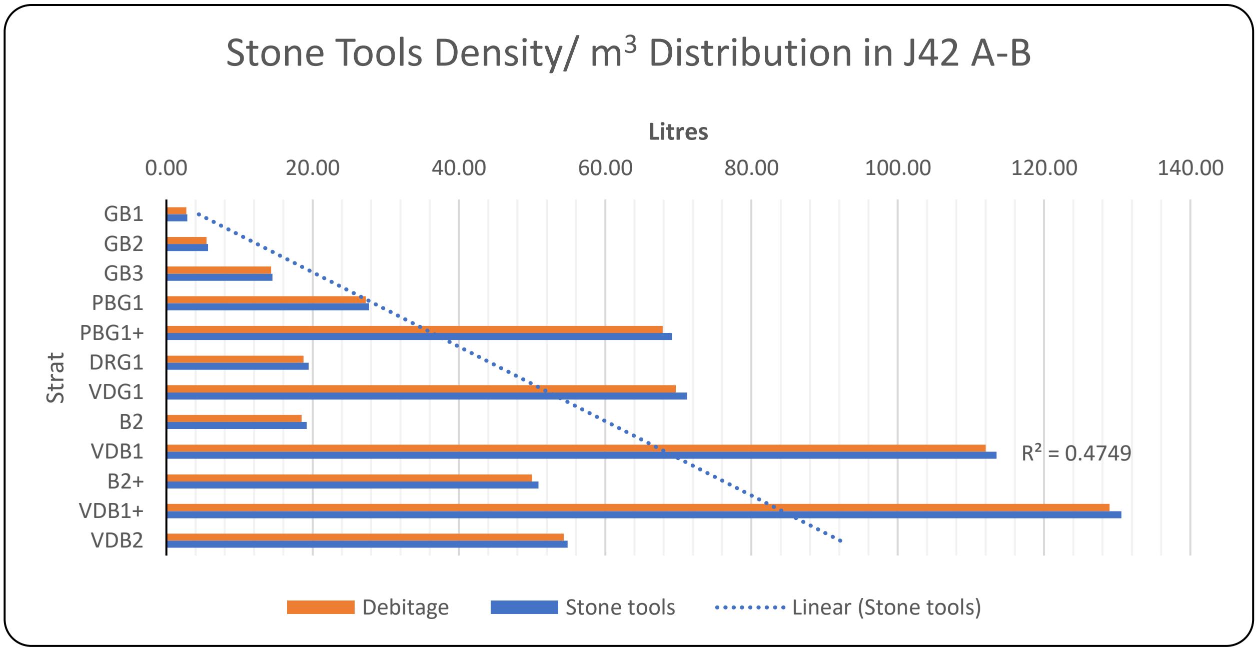


Figure 6: Density of stone tools in Little Muck Shelter J42 A and B.

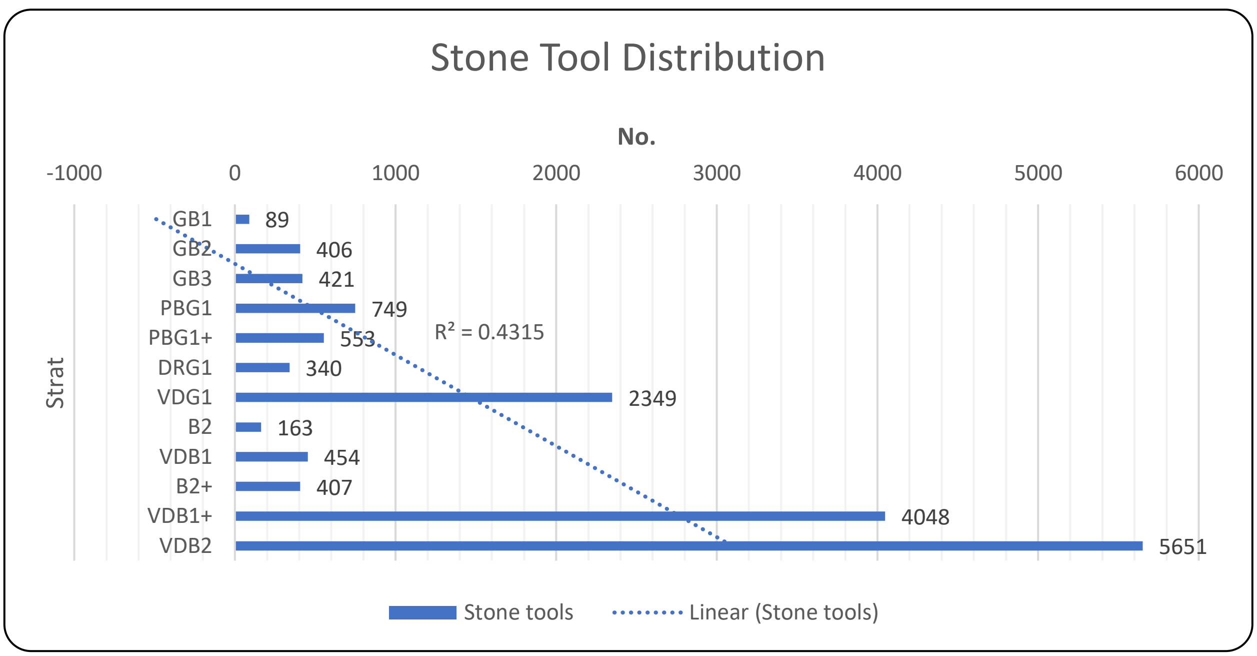


Figure 7: Stone tool distribution in Little Muck Shelter J42 A and B.

Small flaking debris projection

The combined weight of SFD for Quadrants A and B is 4301g, which makes up close to ten percent of the total SFD weight. The SFD mass was divided into sets of 20 pieces to make counting the sets of pieces easier. This produced a total mass of 427.9 g and 119 sets of 20 pieces respectively with this information I used it to calculate the average mass of a SFD piece to produce a numeric projection. This means that I can approximate a projected series of values of the potential weight and number of SFD pieces there would be on average throughout the different stratigraphic layers. By combining the mass of the SFD sets and dividing this by the number of SFD sets produced during the analysis, this gives an average weight of 3.84 grams per 20-piece set. This means that the average SFD piece from the sample had a mass of 0.18g. It is then projected that there are approximately 23 894 SFD pieces which amount to 60.1% of the assemblage. Whereas the total number of stone tools, both SFD and non-SFD is approximately 39 430 pieces.

Estimating the approximate number of SFD pieces across the stratigraphic units and the projected totals are presented in Table 4. The highest projected number of tools is in VDB2 (N=10 150.56), followed by a decline until B2+ (N=276.11) (Figure 8). There is a peak in density in VDB1 (N=930) that declines in B2 (N=160) whereby it becomes another peak in VDG1 (N=1456.67). The R^2 value (R^2=0.43) in the graph indicates that the trend is a decline from VDB2 until the surface layer. There is a pattern of increasing number of projected pieces of SFD that can be expected throughout the stratigraphic layers with periods of high numbers followed by periods of decreased numbers projected, and this cycles throughout. This serves to model a projection and not as a definitive case as this relies on frequency and not density however, it does inform the reader to how the SFD could change through the stratigraphic units over time.

Table 4: Small flaking debris piece projection.

Strat	Average Weight (Grams)	Estimated Piece Projection
GB1	3.40	18.89
GB2	99.80	554.44
GB3	78.90	438.33
PGB1	207.80	1154.44
PBG1+	145.90	810.56
DRG1	51.60	286.67
VDG1	262.20	1456.67
B2	28.80	160.00
VDB1	167.40	930.00
B2+	49.70	276.11
VDB1+	1378.40	7657.78
VDB2	1827.10	10150.56

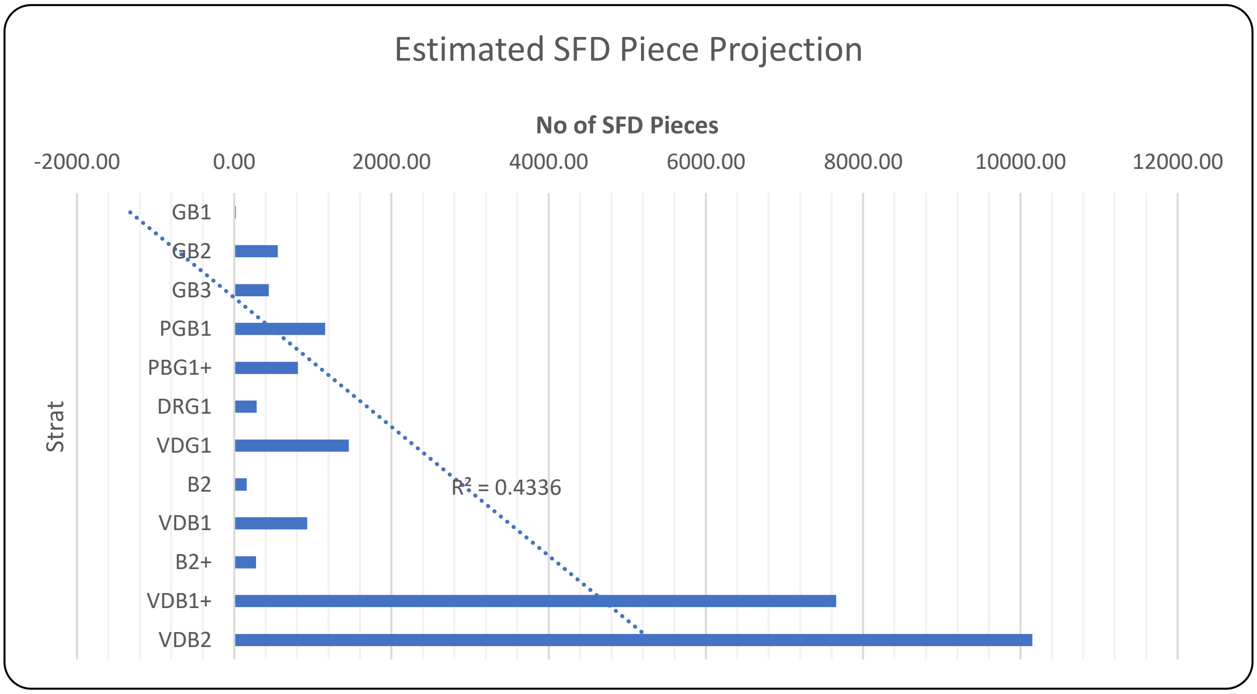


Figure 8: Estimated SFD piece projection in Little Muck Shelter J42 A and B.

Raw materials

The raw material that comprises a stone tool can inform the analyst of many different things. Perhaps the raw material was sourced from a nearby neighbouring area or site, whether one material type was preferred to another and occurs in higher volumes. It could indicate raw material preference for a tools function for example the use of quartz in scrapers or blades for the sharp working edge. These form part of the indicators of the site much like the specific formal tool types and as such can indicate patterns of increased use or disuse across different periods.

The most dominant raw material type is CCS (chalcedony, chert and agate) (N=10 037; 27.5/L; 64.2%), followed by quartz (N=4968; 13.39/L; 31.79%), quartzite (N=137; 0.37/L; 0.88%), indeterminate (N=8; 0.02/L; 0.05%) and dolerite (N=1; 0/L; 0.01%) (Table 5; Table 6; Figure 9). The CCS material type dominates throughout all the stratigraphic units followed by quartz in terms of both density and percentage value. There were 479 artefacts (3.06%; 1.29/L) that were not identified indicated by NA, this included: pebbles, shattered/indeterminate, and block pieces found and identified as manuports and debitage.

The stratigraphic units are challenging to follow when analysing a change in density or percentage from one period to the next. While it might be useful to use established relative chronologies as outlined in Chapter 3 this creates confusion, and the meaning becomes unclear. Therefore, I will be talking about the stratigraphic units as follows using the relative chronologies to sort the stratigraphy into three groups: the top layers (GB1; GB2 and GB3), the lower layers (PBG1; PBG1+; DRG1; VDG1) and the bottom layers (B2; VDB1; B2+; VDB1+; VDB2). This will be applied to the rest of the analysis when attempting to identify trends from the excavated materials.

In the top layers there is a decline in raw materials in which CCS and quartz are the only two material types present that appear with a percentage value greater than zero (Table 5, Figure 9). The lower layers have a peak in density in VDG1 where CCS (11%) and quartz (4%) are at the highest in this area that declines into DRG1 followed by an increase and second peak in density in PBG1. The percentages of PBG1 while giving a value greater than zero percent are like the percentage values of GB1-2. In the bottom layers the percentage values of CCS (23%) and quartz

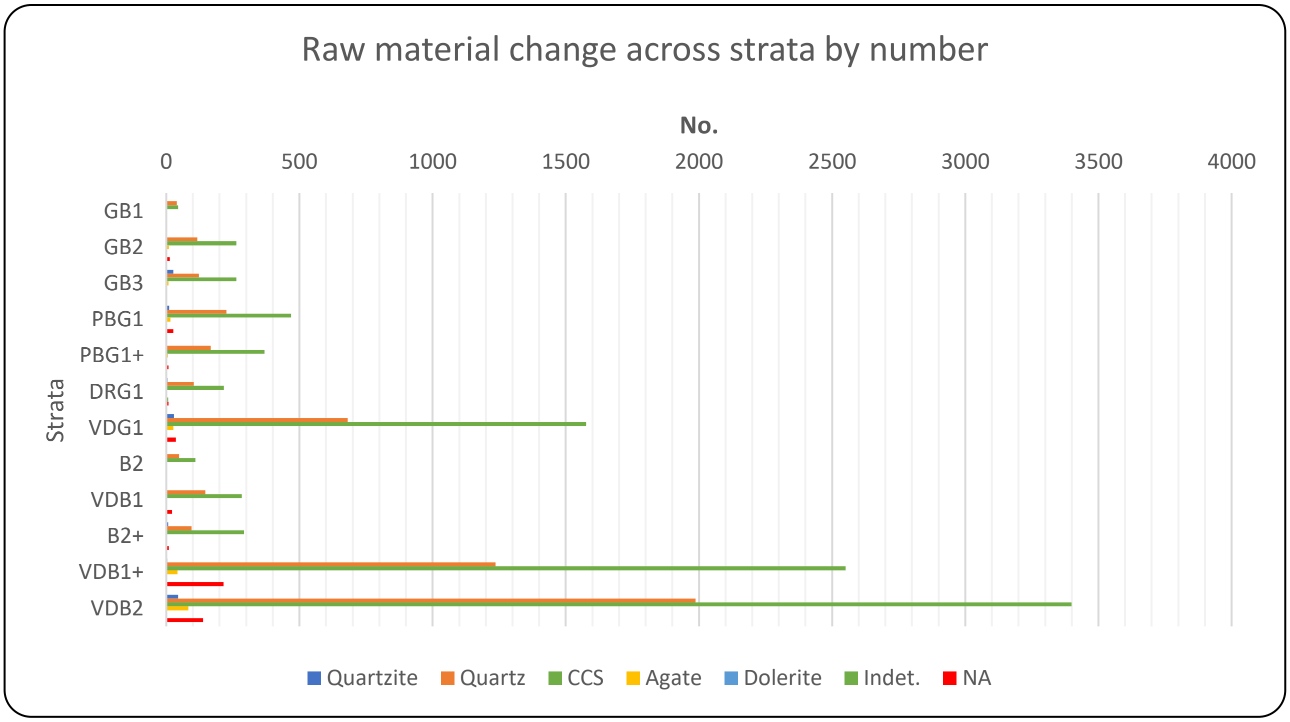
(13%) are at the highest values in VDB2 with a decline that continues until B2 (Table 5; Figure 9).

Table 5: Little Muck Shelter distribution of raw material numbers Square J42, Quadrants A and B (indet. = indeterminate).

Total Raw material No.	**15630**							
Strat	**Quartzite**	**Quartz**	**Chalcedony**	**Chert**	**Agate**	**Dolerite**	**Indet.**	**NA**
GB1	3	40	41	4	1	0	0	0
GB2	2	117	169	94	10	0	1	13
GB3	27	122	179	84	8	0	0	1
PBG1	11	226	294	175	16	0	0	27
PBG1+	2	167	195	174	6	0	0	9
DRG1	5	103	146	70	0	1	7	8
VDG1	29	681	935	641	27	0	0	36
B2	3	48	73	36	3	0	0	0
VDB1	0	146	183	100	3	0	0	22
B2+	7	95	157	135	3	0	0	10
VDB1+	4	1236	1557	994	42	0	0	215
VDB2	44	1987	2084	1315	83	0	0	138
Total	**137**	**4968**	**6013**	**3822**	**202**	**1**	**8**	**479**
%	**0.88**	**31.79**	**38.47**	**24.45**	**1.29**	**0.01**	**0.05**	**3.06**
Density	**0.37**	**13.39**	**16.21**	**10.30**	**0.54**	**0**	**0.02**	**1.29**

Table 6: Little Muck Shelter distribution of raw material numbers Square J42, Quadrants A and B by percentage values.

Strat	CCS No.	Quartzite %	Quartz %	CCS%	Dolerite %	Indet. %	NA %
GB1	46	0%	0%	0%	0%	0%	0%
GB2	273	0%	1%	2%	0%	0%	0%
GB3	271	0%	1%	2%	0%	0%	0%
PBG1	485	0%	1%	3%	0%	0%	0%
PBG1+	375	0%	1%	2%	0%	0%	0%
DRG1	216	0%	1%	1%	0%	0%	0%
VDG1	1603	0%	4%	11%	0%	0%	0%
B2	112	0%	0%	1%	0%	0%	0%
VDB1	286	0%	1%	2%	0%	0%	0%
B2+	295	0%	1%	2%	0%	0%	0%
VDB1+	2593	0%	8%	17%	0%	0%	1%
VDB2	3482	0%	13%	23%	0%	0%	1%
		1%	**33%**	**66%**	**0%**	**0%**	**3%**
Total	**10 037**						
%	**64.22**						
Density	**27.05**						



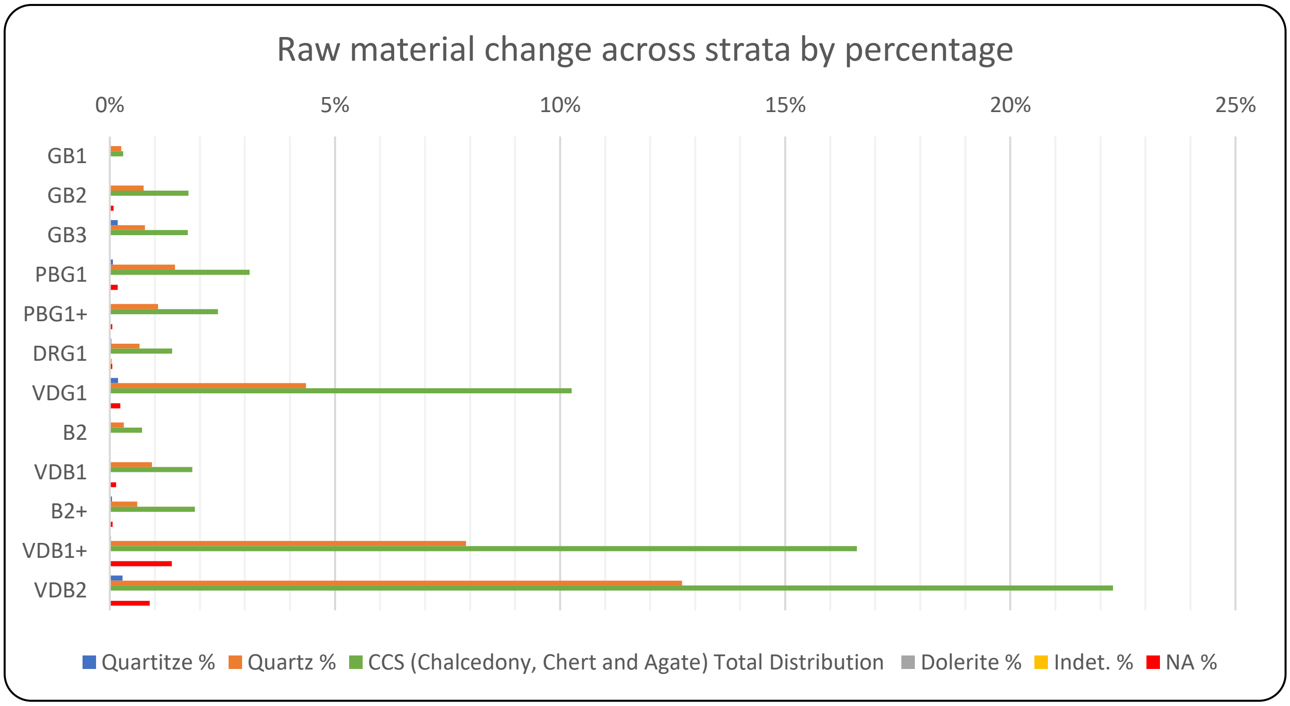


Figure 9: Graphs illustrating the change in raw material across strata by number and percentage.

Debitage

Previously in the stone tool distribution section it has been established that debitage forms a large part to the overall stone tool number due to the high density of materials. With this it is established that from the stone tool assemblage the bulk of the material is comprised of debitage materials. Of the total stone tool distribution number debitage dominates the assemblage making up 98.5% of all stone tools (N=15 396) (Figure 6), this in turn is followed by formal tools (N=166; 1.06%) and manuports (N=26; 0.17%) (Table 3) in low numbers and densities and percentages.

It has been established that the trend is a decrease in artefacts from the bottom of the stratigraphic units until the top (Figure 6) and this occurs throughout the stratigraphic units in all three-layer groups. In the top layers the peak in stone tool density is within GB3, in the lower layer there are two peaks in density respectively in VDG1 and PBG1+. In the bottom layer this occurs in VDB1 and VDB1+ which are related units.

Distribution of stone tools: debitage versus formal tools.

Primary tool types are a group of tools that were identified and labelled according to which category they fell within, namely debitage, cores, formal tools, manuport and other. Primary tool types are distributed throughout the assemblage (Figure 10). The density of formal tools throughout the stratigraphy is varied and not as predictable as the downward trend in density that was observed in debitage. In the top layers formal tools peak in GB3 (0.14/L; 2.41%) with two peaks occurring in the lower layers PBG1+ (1.13/L; 5.42%) and VDG1 (1.18/L; 23.49%) (Table 3). Like debitage there are two peaks in formal tools within the bottom layers in VDB1 (1.50/L; 3.61%) and VDB1+ (1.00/L; 18.67%) which are related units.

Identifying the peak in density is one useful identifier, the other is the percentage values of the tools relative to other artefacts in the same stratigraphic unit. Formal tools are at the highest percentage value in the bottom layers in stratigraphic unit VBD2 with a low density (24.70%; 0.40/L). However, formal tools are at a high percentage value and peak density in the lower layers

VDG1 (23.49%, 1.18/L) followed by PBG1+ (5.42%; 1.13/L) with a further decline into the top layers GB3 (2.41%; 0.14/L) (Table 3).

Manuports follow the same pattern as formal tools and cores reaching their first peak in VDB1+ (0.19/L), from VDB2 (0.06/L) into VDB1+ (0.19/L) This places the shift in density from Wilton/pre-ceramic into the late BC to early first millennium AD (Table 3). The second peak in manuport density occurs in DRG1 (0.17/L), first millennium AD, pre-AD 900 and the likely cultural affiliation is Happy Rest/Bambata. The changes in the density of cores and manuport fluctuate across the stratigraphic units and are illustrated in full below in Figure 10.

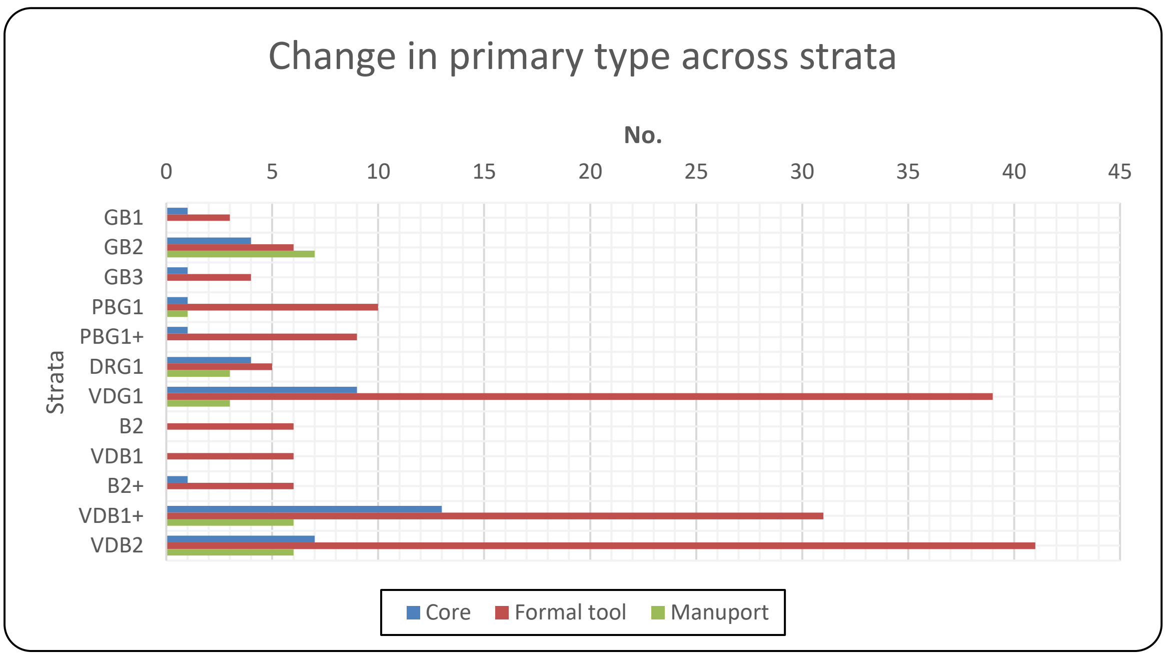


Figure 10: Graph illustrating the change in primary type across strata by number.

Cores

Cores are infrequent in the assemblage with only 42 specimens (0.27% of total assemblages) in the two quadrants (Figure D). This number will undoubtedly rise as additional squares are analysed. In the top layers cores are at the highest percentage value and density in GB2 (9.52%; 0.06/L). In the lower levels there is a peak in density and percentage in VDG1 (21.43%; 0.27/L). From the bottom layers there is a peak in VDB1+ (30.95%; 0.42/L) where cores contribute the highest percentage value. Overall, there is a pattern of declining density that occurs from the bottom to the top of the stratigraphic units, this is also indicated by the R^2 value (R^2=0.13) (Table 3; Table 7; Figure 10; Figure 11). The sparsity of cores is noticeable given the low number and density of cores in relation to the relative abundance of complete and incomplete flakes along with the large amount of SFD remains.

Table 7: Little Muck Shelter distribution of cores across strata in J42 A and B.

Strat	Vol. (L)	Core		
		Num.	%	Den.
GB1	31	1	2.38	0.03
GB2	71	4	9.52	0.06
GB3	29	1	2.38	0.03
PBG1	27	1	2.38	0.04
PBG1+	8	1	2.38	0.13
DRG1	17.5	4	9.52	0.23
VDG1	33	9	21.43	0.27
B2	8.5	0	0.00	0.00
VDB1	4	0	0.00	0.00
B2+	8	1	2.38	0.13
VDB1+	31	13	30.95	0.42
VDB2	103	7	16.67	0.07
Total	**371**	**42**	**100.00**	

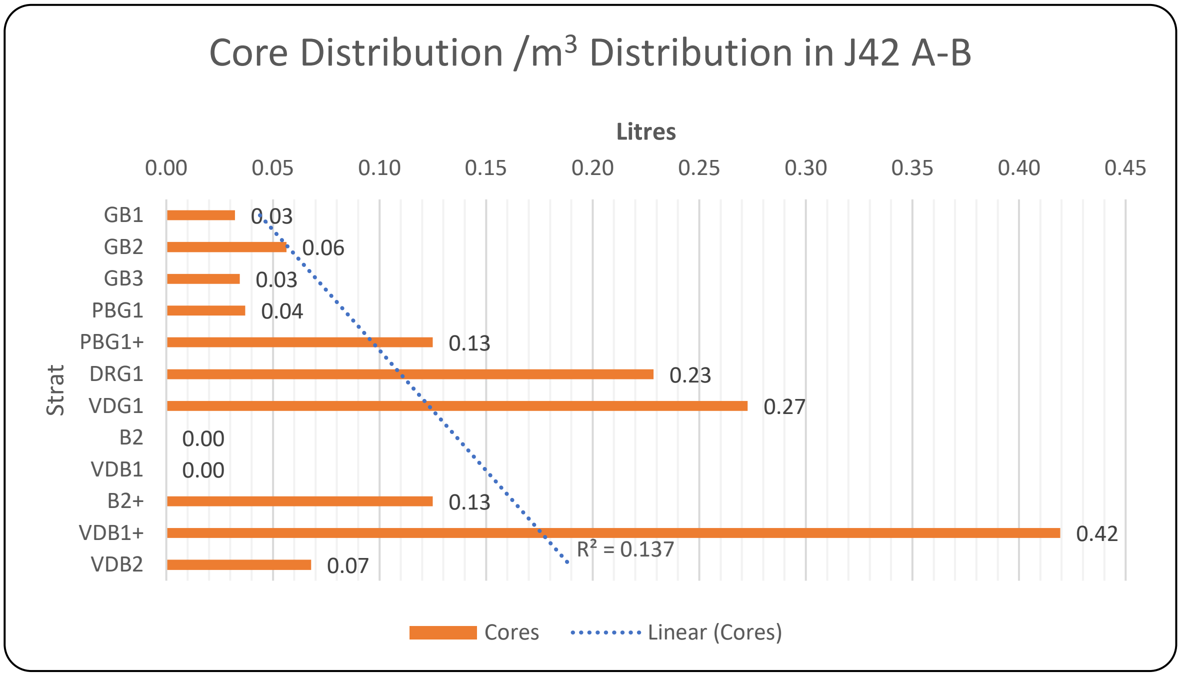


Figure 11: Density of core distribution across strata in Little Muck Shelter J42 A and B.

Core types

The dominant core type are single platform cores (N=24; 57.14%), followed by double platform cores (N=6; 14.29%), bipolar cores (N=4; 9.52%), bladelet cores (N=3; 7.14%), irregular (N=3; 7.14%) and casual cores (N=2; 4.76%) (Table 8; Figure 12). Single platform cores are present in eight of the twelve stratigraphic units. While double platform cores are a close second, they are present in three stratigraphic units and are limited to the lower and bottom layers.

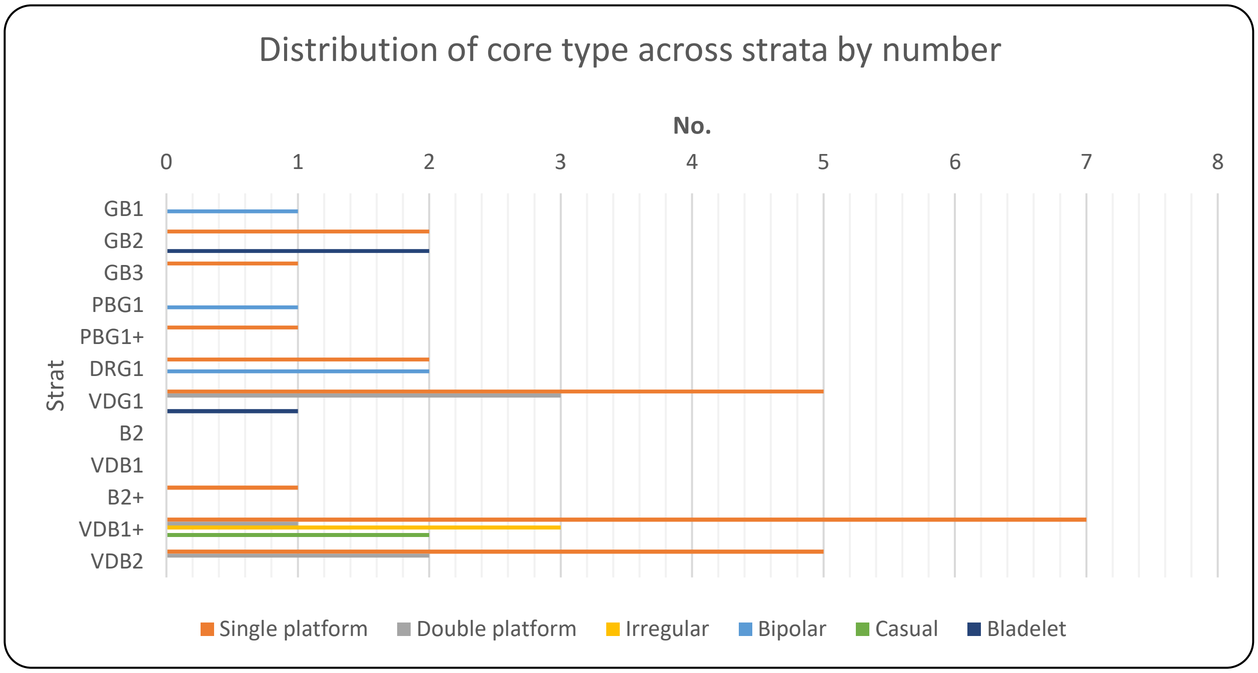
The top layers contain low numbers of cores, and the peak density of cores is within GB2 (Table 8, Figure 11). In GB3 there is one single platform core (N=1, 100%) and this contributes to the entire core distribution for this stratigraphic layer. In GB2 there single platform cores (N=2; 50%) and bladelet cores (N=2; 50%) and in GB1 there is again one single platform core (N=1; 100%). In the lower layers the peak in core density is in VDG1 with a decline in density to the top layers and the surface. Single platform cores dominate in three of the four lower levels, in VDG1 there are single platform cores (56%) followed by double platform cores (33%) and bladelet cores (11%). With a decline in density in DRG1 there is the presence of single platform cores (50%) and the introduction of bipolar cores (50%) with an even percentage distribution. In PBG1+ single platform cores dominate as the only core type and in PBG1this is dominated by bipolar cores (Table 8; Figure 12). The bottom layers have a peak in single platform cores by percentage value in B2+ (N=1; 100%) as it was the only core and core type recovered from this stratigraphic unit and there are no cores from the upper units VDB1 and B2 respectively (Figure 12). Cores have the greatest variety of core types found in VDB1+: single platform cores (54%), irregular cores (23%), casual cores (15%) and double platform cores (8%) (Table 8; Figure 12).

Little can be said for other site trends using these figures due to the low volume and density that is recovered but what is interesting is the emphasis on freehand percussion. In other LSA assemblages, bipolar cores are most common whereas at Little Muck freehand percussive techniques appear to have been preferred and there are fewer identifiable core types (see Table 8). This of course would require additional analysis to confirm due to the small assemblage size. Cores reach a peak density and percentage value in the bottom layers, specifically VDB1+ (0.42/L; 30.95%), this indicates a period of activity starting in the late BC to early first millennium AD periods. A second peak in core density occurs within the lower layers in VDG1 (0.27/L; 21.43%) which is within the first millennium AD, pre-contact period (Figure 11).

Bipolar cores, while not as predominant at Little Muck as seen with other neighbouring sites, occur within the lower layers (PBG1; DRG1) and GB1 (the top layers) (refer to Table 1 throughout the text for dates). However, due to the low number, the frequency in which they occur and density of these cores this provides little information about this core type at Little Muck at present. The same can be said for the presence of cores in this assemblage as the sample size for the cores themselves has yielded very few artefacts.

Table 8: Little Muck Shelter core type distribution by number and percentage.

Strat	Core	Single platform	%	Double platform	%	Irregular	%	Bipolar	%	Casual	%	Bladelet	%
GB1	1	0	0%	0	0%	0	0%	1	100%	0	0%	0	0%
GB2	4	2	50%	0	0%	0	0%	0	0%	0	0%	2	50%
GB3	1	1	100%	0	0%	0	0%	0	0%	0	0%	0	0%
PBG1	1	0	0%	0	0%	0	0%	1	100%	0	0%	0	0%
PBG1+	1	1	100%	0	0%	0	0%	0	0%	0	0%	0	0%
DRG1	4	2	50%	0	0%	0	0%	2	50%	0	0%	0	0%
VDG1	9	5	56%	3	33%	0	0%	0	0%	0	0%	1	11%
B2	0	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
VDB1	0	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
B2+	1	1	100%	0	0%	0	0%	0	0%	0	0%	0	0%
VDB1+	13	7	54%	1	8%	3	23%	0	0%	2	15%	0	0%
VDB2	7	5	71%	2	29%	0	0%	0	0%	0	0%	0	0%
Total %		**57.14**		**14.29**		**7.14**		**9.53**		**4.76**		**7.14**	
Total	**42**	**24**		**6**		**3**		**4**		**2**		**3**	



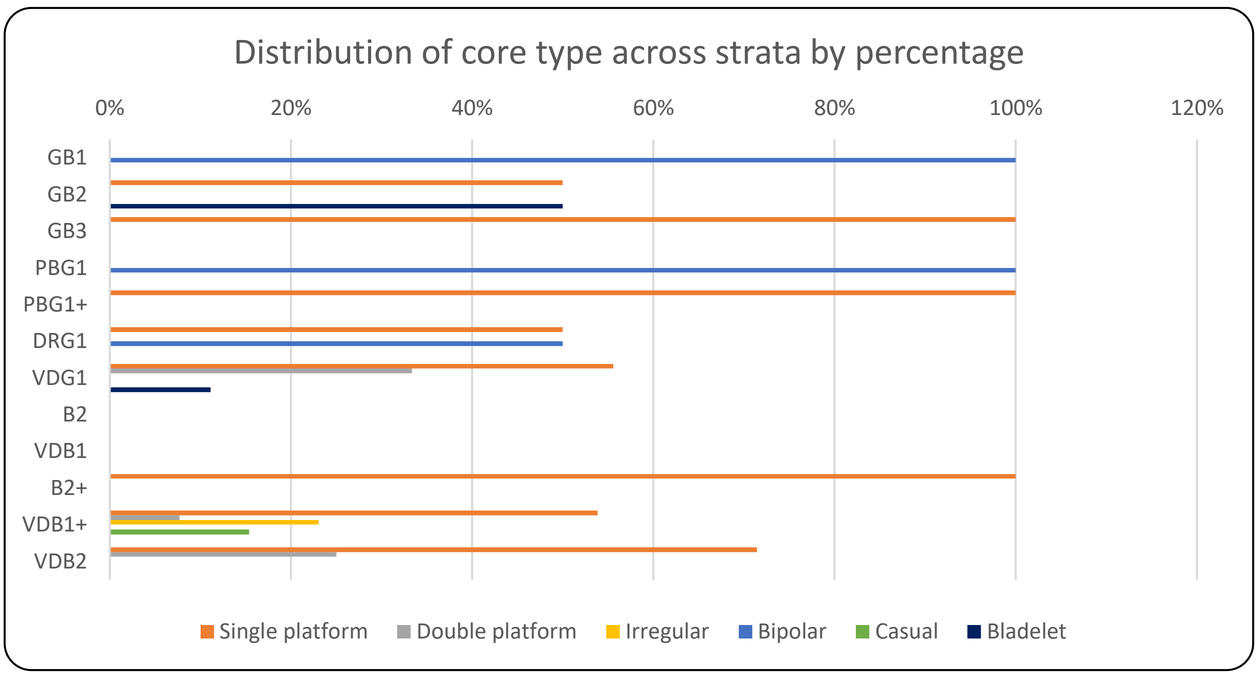


Figure 12: Bar graphs illustrating the change in core type across strata by number and percentage.

Complete flakes

There is a total of 497 complete flakes that were identified, with the length and width of the artefacts being recorded. Compared to the incomplete flakes (N=14 339), complete flakes represent 3.35% of the unmodified flake assemblage. This number while low does present some interesting patterns across the stratigraphic units of Little Muck.

The density of complete flake materials has a changing distribution of frequency throughout the stratigraphic units with periods of increased activity indicated by high densities. This changes according to the period of occupation at the site, the R^2 value (R^2=0.40*)* in the graph indicates a pattern of declining densities that occur from the bottom layers to the lower layers before concluding in the top layers. In the top layers the peak of complete flake density occurs within GB3 (0.86/L; 5.03%) that declines until the surface layer (Table 9; Figure 13). In the lower layers there are two distinct peaks in density, the first occurs in VDG1 (2.64/L; 17.51%) and the second occurs in PBG1+ (2.50/L; 4.02%). This indicates that VDG1 contains the most complete flakes by percentage value in the lower layers relative to other associated artefacts from the same stratigraphic unit. The bottom layers have two peaks in density in VDB1 (4.00/L; 3.22%) and VDB1+ (3.94/L; 24.55%) and as established previously in this paper, these two stratigraphic units are closely related (Table 9; Figure 13).

There are peaks in density that occur in each layer group and the consistent trend is that while there are these peaks in complete flake density at intervals, the downward trend in the densities of complete flakes occurs throughout the strata as evidenced by the R^2 value. Some patterns of decline are more obvious to see as demonstrated in the top layers while the bottom layers need the comparison of both density and percentage values to better understand what is happening in these units.

Table 9: Little Muck Shelter distribution of complete flakes in J42 A and B.

Order	Strat	Vol. (L)	Complete Flakes		
			Num.	%	Den.
1	GB1	31	1	0.20	0.03
2	GB2	71	22	4.43	0.31
3	GB3	29	25	5.03	0.86
4	PBG1	27	28	5.63	1.04
5	PBG1+	8	20	4.02	2.50
6	DRG1	18	9	1.81	0.51
7	VDG1	33	87	17.51	2.64
8	B2	9	5	1.01	0.59
9	VDB1	4	16	3.22	4.00
10	B2+	8	19	3.82	2.38
11	VDB1+	31	122	24.55	3.94
12	VDB2	103	143	28.77	1.39
	Total	**371**	**497**	**100**	

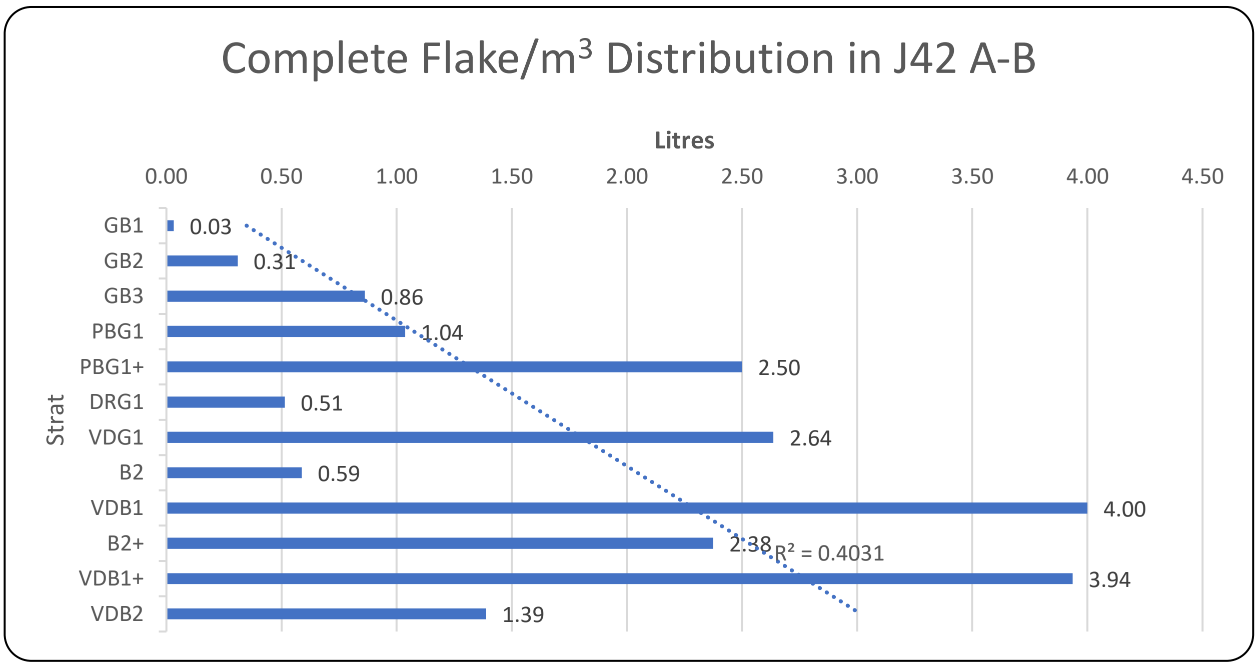


Figure 13: Complete flake distribution in Little Muck Shelter J42 A and B.

Average complete flake size

This section uses the information gathered by analysing the complete flakes using length, width and thickness, this information was added together and divided to produced averages from which potential patterns could be identified from. The aim of this is to have a record of what a complete flakes size would be on average so that when conducting further analysis in future this could be utilised for any potential questions that may occur or simply for comparison.

The average length of a complete flake is 18.47mm, the average width is 14.09mm and has an average thickness of 6.47mm. Working from the bottom layer up, complete flakes increased in their overall tool size over time from VDB2 until reaching the largest overall size in B2+ when the average length and width are considered (Table 10) (refer to Table 1 throughout the text for dates). In the lower layers the size of the complete flakes remains consistent between each stratigraphic unit, the largest averages that occur are within DGR1 which see the average size of tools increase in length, width, and thickness. These complete flake averages are like those from the bottom layers. The top layers averages are slightly less than what was previously recorded from the older stratigraphic units however they are consistent with the uniform pattern of similarity that is found throughout the stratigraphy.

Table 10: Distribution of complete flake averages across strata.

Order	Strat	Average Length (mm)	Average Width (mm)	Average Thickness (mm)
1	GB1	16.78	10.38	3.50
2	GB2	18.52	12.64	4.33
3	GB3	17.19	14.36	6.30
4	PBG1	19.07	15.09	5.21
5	PBG1+	17.86	14.42	7.67
6	DRG1	20.39	16.79	10.13
7	VDG1	19.38	14.60	6.58
8	B2	17.96	12.27	4.30
9	VDB1	18.93	14.76	6.03
10	B2+	21.78	16.80	5.49
11	VDB1+	18.73	14.06	6.80
12	VDB2	17.15	13.19	6.57

Cortex percentage

Cortex percentage refers to the amount of cortex that remains on a flake after undergoing processing like stone tool reduction techniques. Most complete flakes from Little Muck have no cortex (80.43%), 1-24% range (10.64%), 25-49% range (2.84%), 50-74% range (5.11%), 75-99% range (0.71%) and 100% range (0.28%) (Table 11). The dominance of low cortex percentages indicates high levels of core and flake reduction.

The highest proportion of complete flakes with 0% cortex occurs within the bottom layers, VDB2 (N=148) and this continues through until B2. In the lower layers the dominance of the 0% cortex group continues throughout the stratigraphic units with a peak in VDG1. This is a peak by number value and is not indicative of density so this must be kept in mind when looking at these values. The 0% cortex group is dominant in the top layer stratigraphic units continuing until the surface layer (Table 11; Figure 14).

This may indicate that the complete flakes were heavily reduced during the production of tools in each period at the site as this is indicated by the volume of tools that exhibit the same pattern of reduction. Similarly, the 1-24% range also exhibits a pattern that mimics the pattern of the 0% cortex range even though it is significantly less prominent (Figure 14).

Table 11: Little Muck Shelter cortex percentage of complete flakes across strata J42 A and B.

Order	Strat	0%	1-24%	25-49%	50-74%	75-99%	100%
1	GB1	5	0	0	0	0	0
2	GB2	26	5	0	0	0	1
3	GB3	22	5	0	2	1	0
4	PBG1	34	1	3	1	0	0
5	PBG1+	27	2	0	1	0	0
6	DRG1	15	3	0	0	0	0
7	VDG1	116	9	2	8	0	0
8	B2	8	2	0	1	0	0
9	VDB1	18	2	0	1	1	0
10	B2+	24	1	0	1	0	0
11	VDB1+	124	22	9	9	2	0
12	VDB2	148	23	6	12	1	1
	%	**80.43**	**10.64**	**2.84**	**5.11**	**0.71**	**0.28**
	Total	**567**	**75**	**20**	**36**	**5**	**2**

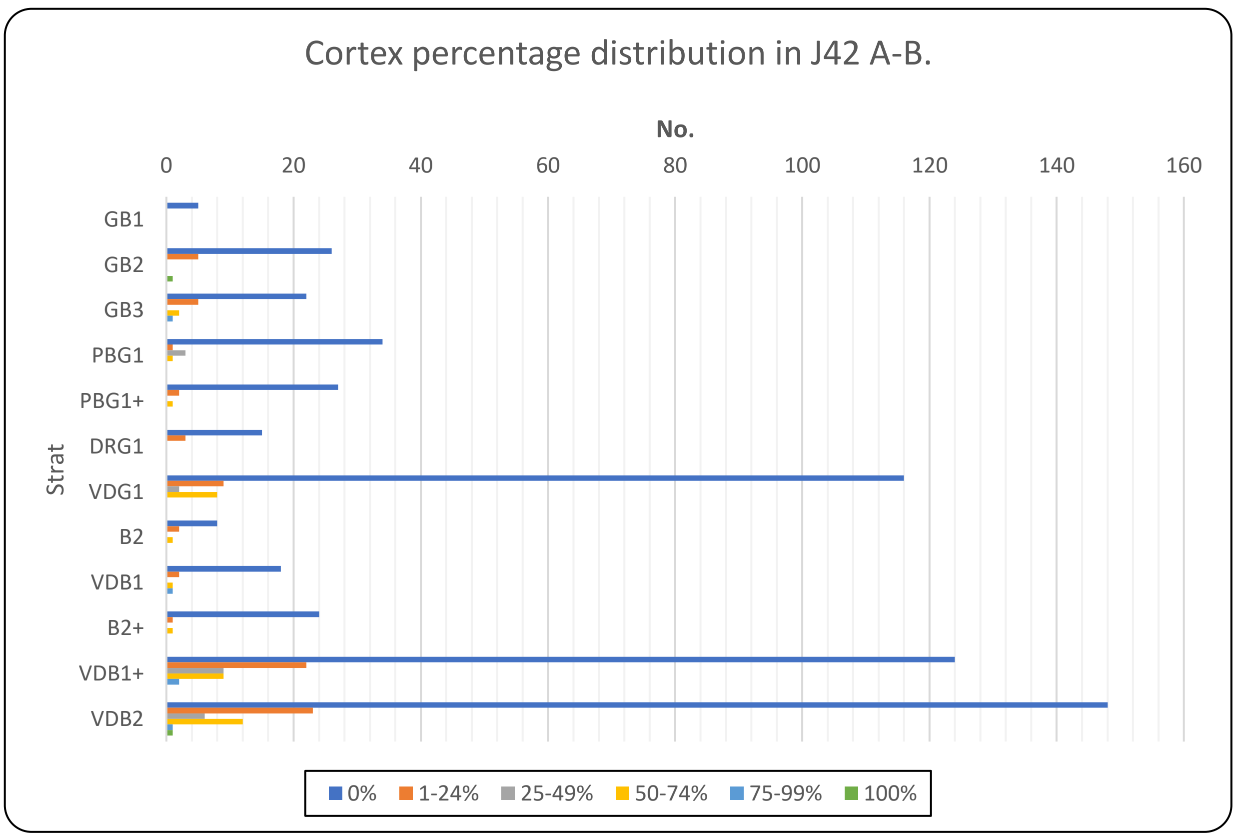


Figure 14: Cortex percentage distribution in Little Muck Shelter J42 A and B.

Incomplete flakes

Incomplete flakes contribute the highest number of artefact pieces as they occur with a greater number (N=14 339) and density than that of complete flakes, incomplete flakes comprise 96.65% of the unmodified assemblage. The R^2 value (R^2=0.48*)* indicates a downward trend in the density of incomplete flakes from the bottom layers to the top layers of the stratigraphy (Figure 15).

In the top layers the highest density of incomplete flakes occurs in GB3 (13.45/L; 2.72%) but this contributes a low overall percentage value relative to the other artefact types from the assemblage in the same stratigraphic unit (Table 12; Figure 15). In the lower levels there are two peaks in density that occur are in PBG1+ (64.25/L; 3.58%) and VDG1 (65.91/L, 15.17%). VDG1 has both the highest of the two densities and contributes to a higher percentage value for incomplete flakes in the stratigraphic unit. The bottom layers have two peaks in density in VDB1 (102.5/L; 2.86%) and VDB1+ (118.10/L; 25.53%) and as established previously in this paper, these two stratigraphic units are closely related however, VDB1+ has the highest percentage overall between the two units (Table 12; Figure 15). When the densities values are considered the stratigraphic group with the highest densities is found within the bottom layers and gradually decreases over time until the surface layers. This is expected due to the high number, density and percentage values of incomplete flakes recovered from the bottom layers (refer to Table 1 throughout the text for dates).

Table 12: Little Muck Shelter distribution of incomplete flakes in J42 A and B.

Order	Strat	Vol. (L)	Incomplete flakes		
			Num.	%	Den.
1	GB1	31	84	0.59	2.71
2	GB2	71	323	2.25	4.55
3	GB3	29	390	2.72	13.45
4	PBG1	27	679	4.74	25.15
5	PBG1+	8	514	3.58	64.25
6	DRG1	17.5	314	2.19	17.94
7	VDG1	33	2175	15.17	65.91
8	B2	8.5	152	1.06	17.88
9	VDB1	4	410	2.86	102.50
10	B2+	8	378	2.64	47.25
11	VDB1+	31	3661	25.53	118.10
12	VDB2	103	5259	36.68	51.06
	Total	**371**	**14339**	**100.00**	

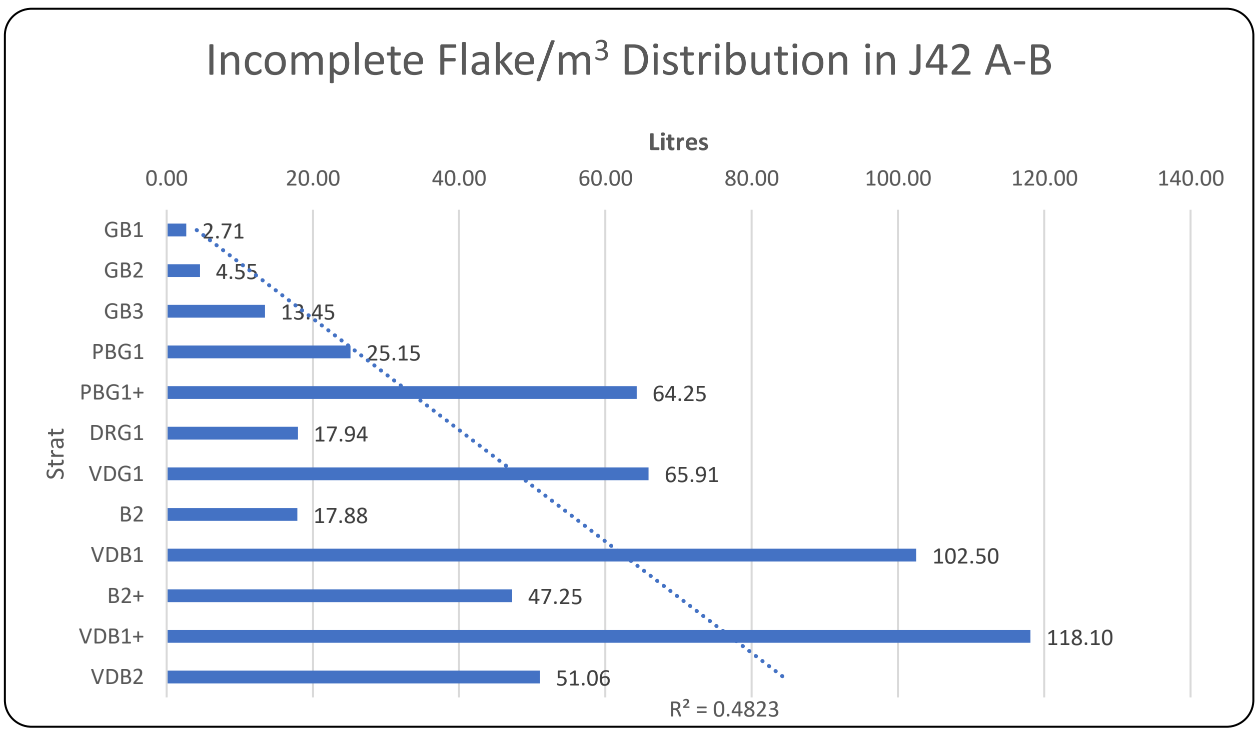


Figure 15: Incomplete flake distribution in Little Muck Shelter J42 A and B.

Formal tools

Formal tools are tools that are the subject of working beyond just the reduction process, these tools include backed pieces, retouched pieces, and the combination of backed and retouched pieces (Table 13, Figure 16). The densities of the formal tools to which I am referring is in Table 3 and for the purposes of this breakdown the data in Table 13 is to inform Figure 16.

A low number of formal tools were identified (N=166) which means that the density, percentage value and distribution of these tools are lower than that of complete flakes and incomplete flakes (Figure 17). Retouched pieces are the dominant formal tool subtype (N=143; 86.14%) followed by backed pieces (N=19; 11.45%) and backed and retouched pieces (N=143; 2.41%) (Table 13; Table 14; Figure 15). Table 14 represents the number and percentage value of the backed piece type (12.65%) and retouched stone tool pieces (87.35%) relative to the total formal tool number (N=166).

Table 13: Little Muck Shelter formal tool type distribution in J42 A and B.

Strat	Backed Piece	Backed + retouched piece	Retouched piece
GB1	3	0	0
GB2	4	1	1
GB3	0	0	4
PBG1	1	0	9
PBG1+	0	0	9
DRG1	0	0	5
VDG1	4	1	34
B2	0	0	6
VDB1	1	0	5
B2+	0	0	6
VDB1+	3	0	28
VDB2	3	2	36
%	**11,45**	**2,41**	**86,14**
Total	**19**	**4**	**143**

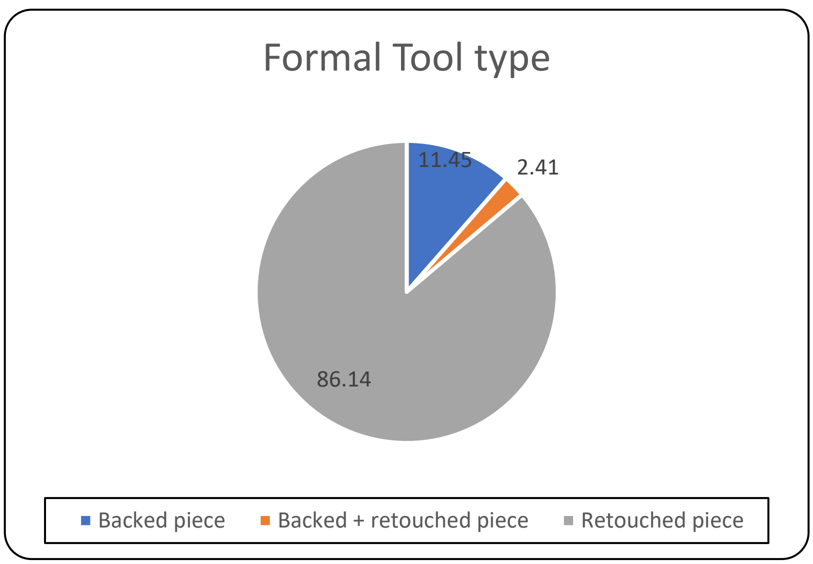


Figure 16: Little Muck Shelter formal tool types.

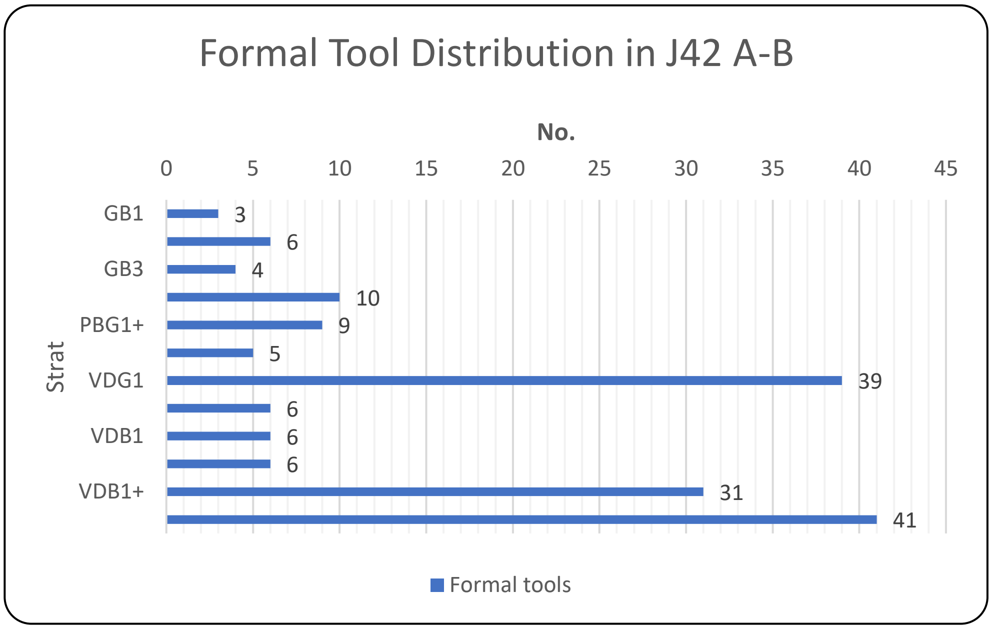


Figure 17: Little Muck Shelter distribution of formal tools across strata in J42 A and B.

Table 14: Little Muck Shelter backed tools and retouched piece breakdown in J42 A and B.

Backed piece type	**No.**	**%**
Segment	13	7.83
Triangle	0	0.00
Trapeze	0	0.00
Flake	0	0.00
Blade	0	0.00
Bladelet	3	1.81
Segmented backed bladelet	2	1.20
Misc. BP	2	1.20
Broken backed piece	1	0.60
Total	**21**	**12.65**

Retouched piece type	**No.**	**%**
Adze	2	1.20
Awl	0	0.00
Burin	0	0.00
Misc. RP	44	26.51
Borer	1	0.60
Retouched flake	1	0.60
Retouched blade/bladelet	1	0.60
Scraper	95	57.23
Scraper-adze	1	0.60
Total	**145**	**87.35**

Formal tool distribution

The total number of formal tools are organised by number across the stratigraphic profile as seen in Figure 17 includes backed pieces, backed and retouched pieces and, retouched piece tools. Figure 18 organises the tools by type and shows how they are distributed by number of tools present in the stratigraphic profile however the density of these tools is the more important graph, and this is presented in Figure 19.

The R^2 value (R^2=0.31*)* indicates a downward trend in the formal tool density from the bottom layers until the surface. In the top layers formal tools are at the highest density in GB3 (0.14/L; 2.42%) and contribute few tools overall to the stratigraphic unit. In the lower layers there are two peaks in density in PBG1+ (1.13/L; 5.42%) and VDG1 (1.18/L; 23.49%) where VDG1 contributes a notably higher percentage value to the overall stratigraphic unit. In the bottom layers there are also two peaks in formal tool density: the first is VDB1 (1.50/L; 3.61%) followed by VDB1+ (1.00/L; 18.67%), while these two stratigraphic units are closely related, the contribution by VDB1+ in terms of percentage value when compared to the stratigraphic unit is higher (Table 3, Figure 19). VDB1+ (N=31; 1.00/L; 18.67%) has a high number, density and percentage value of formal tools from the lower layer. VDG1 is similar as it also contains a high number of formal tools (N=39; 1.18/L; 23.49%) relative to the density as observed in VDB1+. Inversely however VDB1 (N=6) contains the lowest number of tools relative to its density of the entire assemblage.

The specifics of the how each formal tool subtype is distributed is discussed in detail in the coming sections below, identifying the number of artefacts, densities and percentages of each in relation to the stratigraphic units. Images of backed tools and scrapers are presented in Figure A and Figure B.

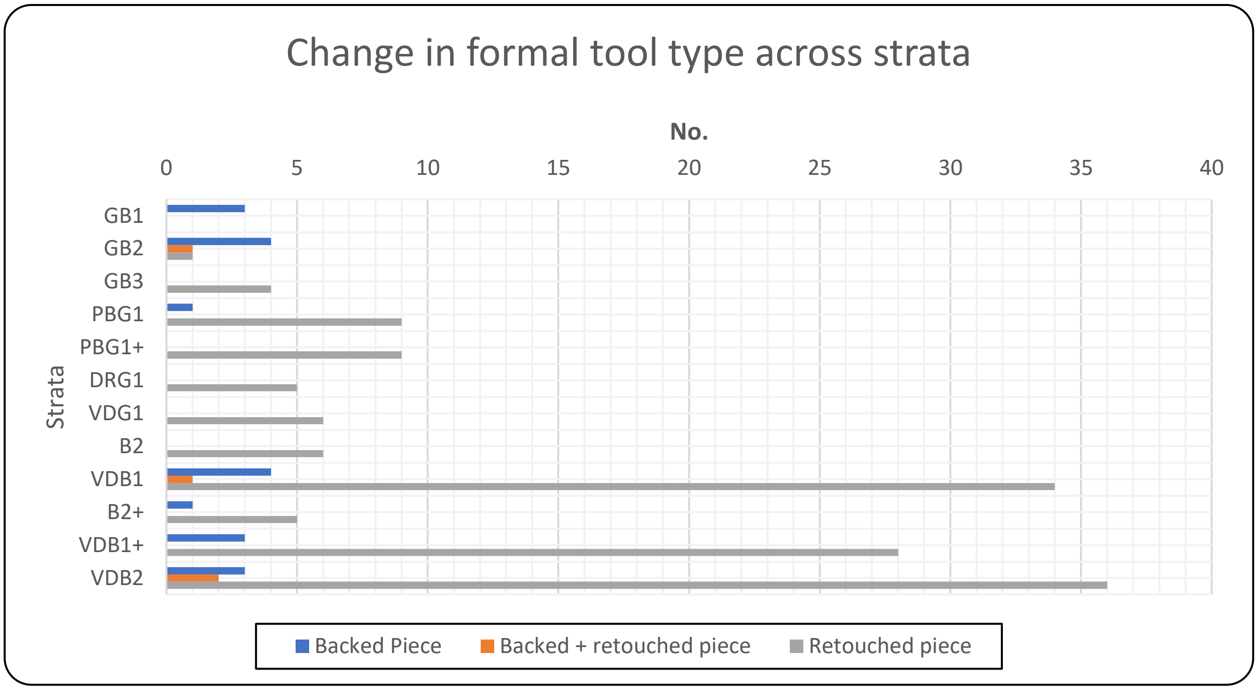


Figure 18: Line graph illustrating the change in formal tool type across strata.

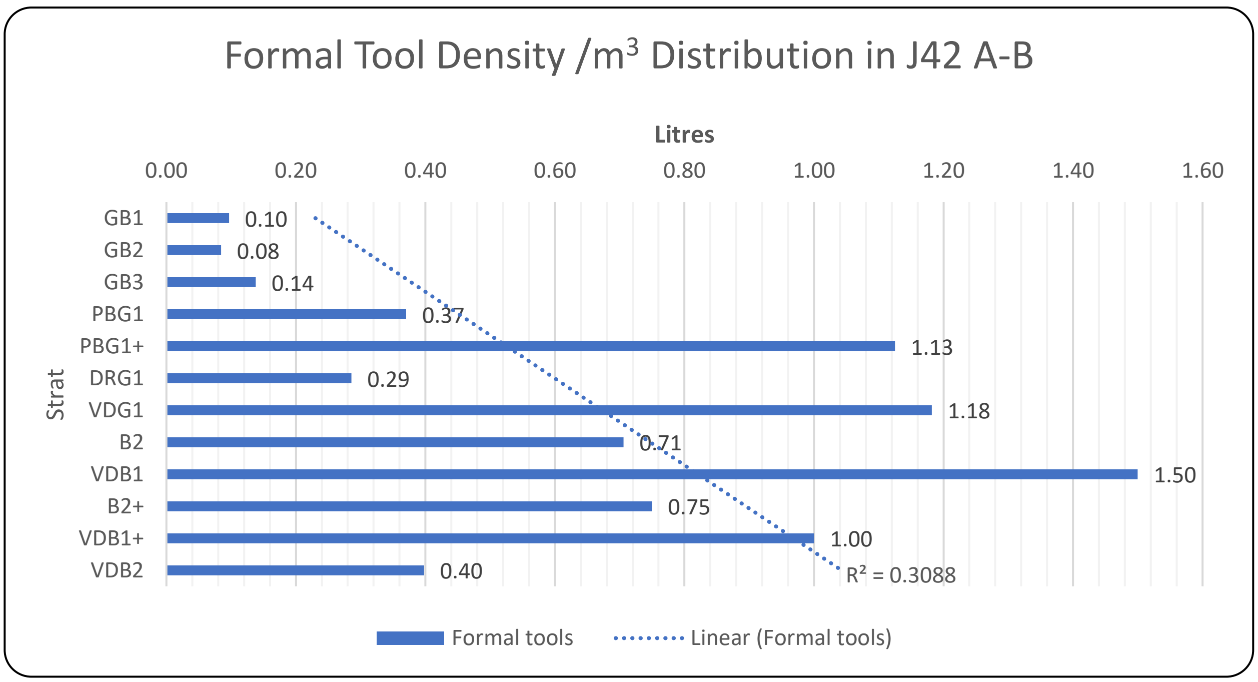


Figure 19: Density of formal tools in Little Muck Shelter J42 A and B.

Scrapers

The formal tool category is dominated by the scraper subtype (N=96; 0.61% of total assemblage) this includes one scraper-adze to the combined total. Followed by miscellaneous retouched pieces (Misc. RP) (N=44; 26.51%), the remainder of the retouched piece types are addressed in Table 14. The most common scraper type is end scrapers (N=60; 63.16%), followed by side scrapers (N=15; 15.79%), circular (N=14; 14.74%), end-side (N=5; 5.26%) and indeterminable (N=2; 2.11%) (Figure 20; Table 15; Figure C).

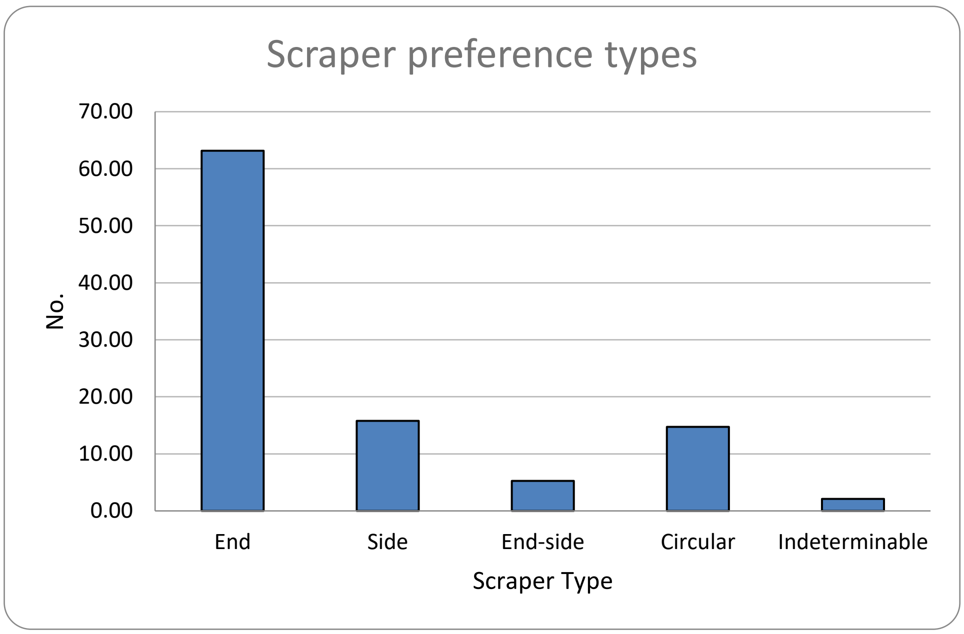


Figure 20: Little Muck Shelter scraper types.

Scraper distribution

Scrapers are low both number and density within the stratigraphic units throughout the assemblage this is shown by the R^2 value (R^2=0.43*)* that indicates a downward trend in scraper density from the bottom layers until the surface. In the top layers there are no scrapers present apart from those in GB3 (N=2; 0.07/L). Within the lower layers there are two peaks in scraper density PBG1+ (0.50/L; 4.21%) and VDG1 (0.73/L; 25.26%) with the percentage of scrapers in VDG1 being higher than that of the former unit. This indicates that VDG1 has the greatest peak in scraper density and the highest contribution by percentage value for the stratigraphic unit from which it was recovered (Table 3; Figure 21). In the bottom layers there are two peaks in density, VDB1

(1.00/L; 4.21%) and VDB1+ (0.71/L; 23.16%) and as established previously in this paper, these two stratigraphic units are closely related. The VDB1+ has the highest percentage overall between the two stratigraphic units while VDB1 is the densest stratigraphic unit (Table 3; Figure 21).

There is a decrease in the number and increase in the density of scrapers from VDB2 (N=22; 0.21/L) to VDB1 (N=4; 1.00/L). Scraper density peaks in VDB1 with the limited numbers of scrapers are recovered; end scrapers are the most common type (Table 3; Table 15; Figure 21). There is a decline in scraper density that continues until a second, smaller peak occurs in PBG1+ (N=4; 0.50/L), end scrapers are also the most common type within this stratigraphic unit.

In the top layers there are no scrapers recovered from GB1 however in GB2 there is an end-side scraper (N=1; 0.01/L). End scrapers dominate the assemblage across most stratigraphic units however, in GB3 the dominant scraper type is a side scraper (N=1; 0.03/L), and a circular scraper (N=1; 0.03/L) which is both low in number and density (Table 15; Figure 21; Figure 22). End scrapers peak in density in the lower layers in stratigraphic units PBG1+ (0.50/L) and VDG1 (0.42/L), in the bottom layers the peak occurs in VDB1 (1.00/L). Hall and Smith (2000) noted the highest density of scrapers in their PBG3 level, dating to the Zhizo period. However, in Square J42, two meters away, it was in the pre-contact phase that the highest density of scrapers was retrieved. This either suggests that space at the site was used differently over time, or that discard patterns changed.

There is a decline in formal tool density that occurs in VDG1 (0.73/L) until DRG1 (0.29/L). However, end scrapers dominate followed by side scrapers, end-side and circular. The dominance of end scrapers is seen from VDB2 (0.21/L) through until B2 (0.35/L) and returns as the dominant scraper type in PBG1+ (0.50/L) and PBG1 (0.15/L) (Table 15). With the decline in density from B2 into DRG1 is the introduction of an indeterminable scraper type, which occurs with side scrapers (Figure 22). The smaller and lower uptick peak in density in PBG1+ (0.50/L) is dominated by end scrapers before declining in density into PBG1 (0.15/L), end scrapers dominate this stratigraphic unit. A change in scraper preference occurs from GB3 until GB1, with a decline in the number and density of scrapers until the surface layer, side scrapers and circular scrapers dominate GB3. GB2 contains an end-side scraper, and no scrapers were recovered in GB1.

Table 15: Little Muck Shelter distribution of scraper type in number J42 A and B.

Strat	Vol. (L)	Total Scraper Den.	End	End Scraper Den.	Side	Side Scraper Den.	End-side	End-side Den.	Circular	Circular Den.	Indeterminable	Indeterminable Den.
GB1	31	**0.00**	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
GB2	71	**0.00**	0	0.00	0	0.00	1	0.01	0	0.00	0	0.00
GB3	29	**0.07**	0	0.00	1	0.03	0	0.00	1	0.03	0	0.00
PBG1	27	**0.15**	4	0.15	0	0.00	0	0.00	0	0.00	0	0.00
PBG1+	8	**0.50**	4	0.50	0	0.00	0	0.00	0	0.00	0	0.00
DRG1	18	**0.29**	0	0.00	3	0.17	0	0.00	0	0.00	2	0.11
VDG1	33	**0.73**	14	0.42	4	0.01	3	0.09	3	0.09	0	0.00
B2	9	**0.35**	3	0.35	0	0.00	0	0.00	0	0.00	0	0.00
VDB1	4	**1.00**	4	1.00	0	0.00	0	0.00	0	0.00	0	0.00
B2+	8	**0.63**	5	0.63	0	0.00	0	0.00	0	0.00	0	0.00
VDB1+	31	**0.71**	13	0.42	4	0.13	1	0.03	4	0.13	0	0.00
VDB2	103	**0.21**	13	0.13	3	0.03	0	0.00	6	0.06	0	0.00
%			**63.16**		**15.79**		**5.26**		**14.47**		**2.11**	
Total	**371**		**60**		**15**		**5**		**14**		**2**	

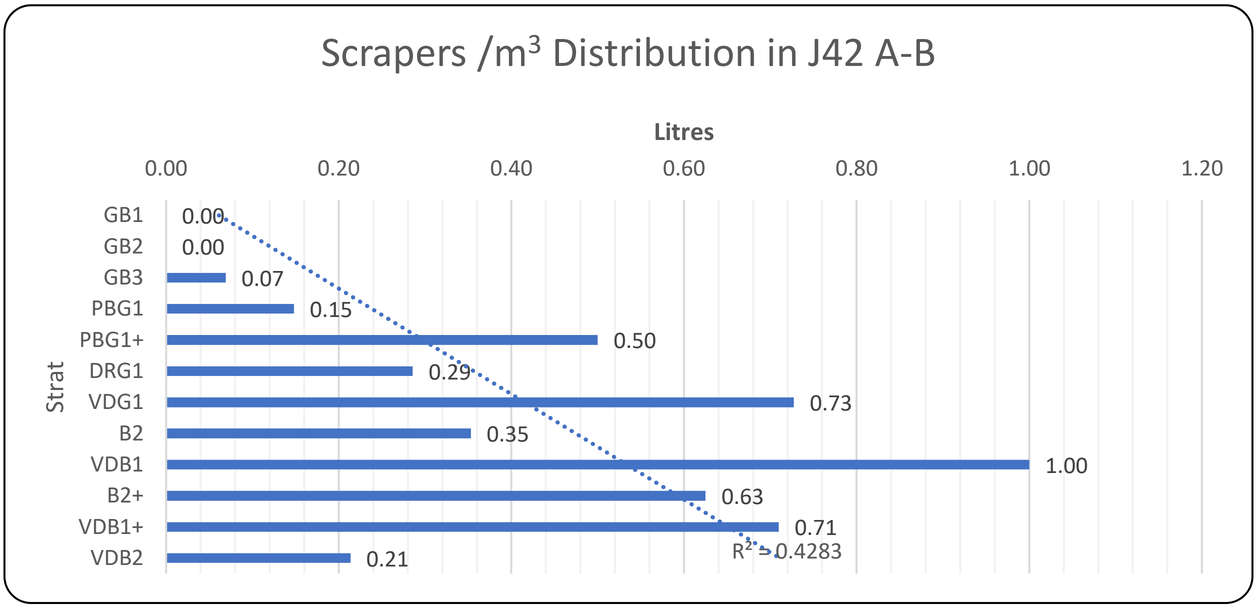


Figure 21: Density of scrapers in Little Muck Shelter J42 A and B.

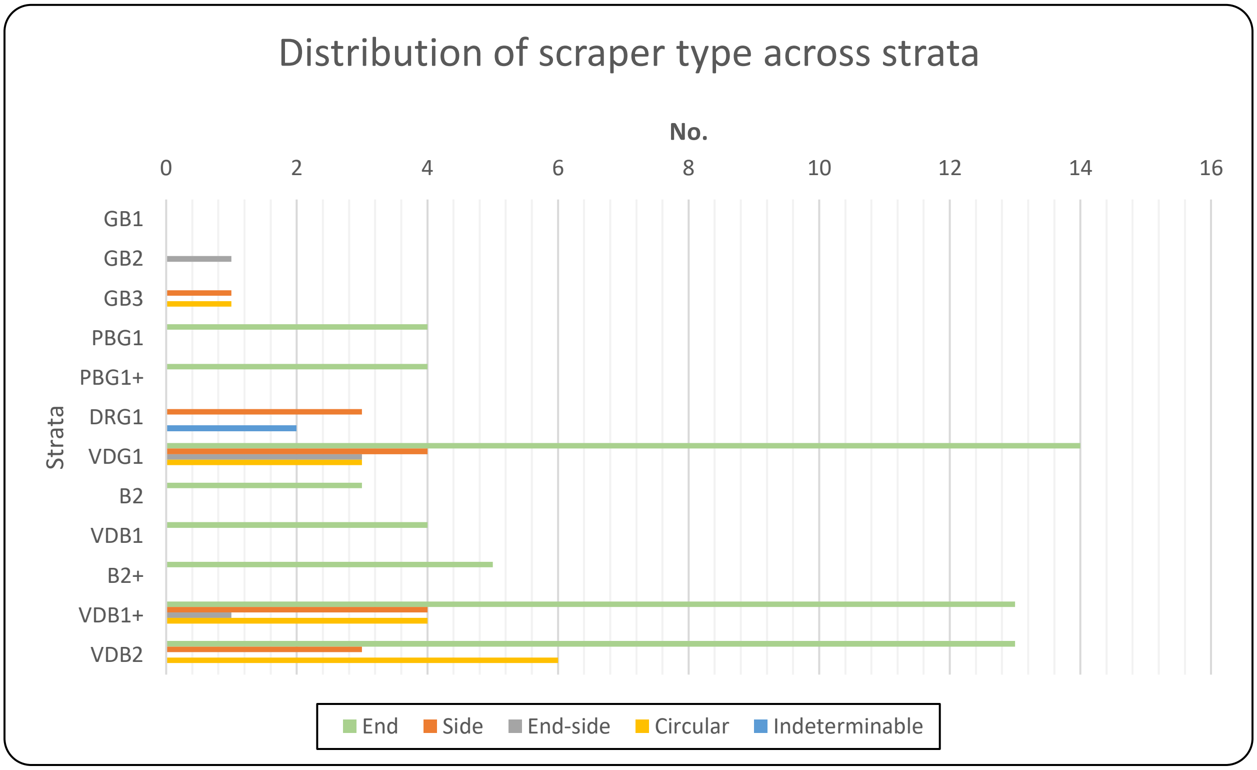


Figure 22: Bar graph illustrating the change in scraper type by number across strata.

Scraper size

Scrapers increased in their overall tool size from VDB2 until reaching the largest overall scraper size in VDB1. This occurs during the first millennium AD when the greatest average length of 21.43mm and width of 18.13mm is recorded (Table 16). VDB1 also has the highest density of scrapers for the assemblage. Scrapers overall size remains consistent in terms of average length and width with the greatest average thickness of 13.98mm from VDG1. From VDG1 until B2 this is within the first millennium AD, pre-contact phase.

Table 16: Distribution of scraper size averages across strata.

Order	Strat	Average Length (mm)	Average Width (mm)	Average Thickness (mm)
1	GB1	0.00	0.00	0.00
2	GB2	0.00	0.00	0.00
3	GB3	13.25	16.00	4.50
4	PBG1	14.25	12.38	4.50
5	PBG1+	16.75	13.00	6.00
6	DRG1	11.00	9.30	2.00
7	VDG1	16.05	13.98	13.98
8	B2	16.07	13.23	5.07
9	VDB1	21.43	18.13	6.30
10	B2+	15.90	12.70	5.10
11	VDB1+	16.39	12.91	4.94
12	VDB2	17.39	12.68	4.96

Backed tools

Backed tools are lower in both number and density when compared to scrapers (N=21; 0.12% of total assemblage) the specifics regarding their numbers and densities within the assemblage are outlined in Table 14. Utilising Table 17 below, the number of backed pieces are separated into subtypes to identify the percentage values of how much each subtype contributes to the total backed piece number. This is why the percentage values per each subtype are slightly different from Table 14 are these are not being divided from the total stone tool number.

Backed tools include segments (N=13; 61.90%), backed bladelets (N=3; 14.29%), segmented backed bladelets (N=2; 9.52%), MBP (N=2; 9.52%), and a broken backed piece (N=1; 4.76%)

(Table 17; Figure 23; Figure A, Figure B). The percentage values from Table 17 represent the percentage of backed tools in relation to formal tools.

The volume of backed pieces are low within the assemblage with the R^2 value (R^2=0.02*)* indicating a steep downward trend in backed pieces density from the bottom layers until the surface. In the top layers the peak in density is in GB1 (0.10/L), the lower layers have two stratigraphic units that contain backed pieces with the peak density in VDG1 (0.12/L). This is followed by two stratigraphic units without any backed piece density and a second peak in density in PBG1 (0.04/L). The bottom layers like what is observed in the lower levels above also contain two stratigraphic units with an absence of backed pieces. There are also two peaks in density that occur, the first is VDB1+ (0.10/L) and the second larger peak is VDB1 where backed pieces are at their densest (N=1; 0.25/L) (Table 18; Figure 23). As established prior these two stratigraphic units are related. There are low frequencies of backed tools occurring in levels post-dating the late first millennium AD, PBG1 (N=1; 0.04/L), GB2 (N=4; 0.06/L) and GB1 (N=3; 0.10/L), which reflects Hall and Smith's (2000) findings.

Utilising Table 18 the density of backed tools are compared to the overall volume density of the assemblage and are separated by stratigraphic unit, and subtype to better understand the distribution of these artefacts in relation to the site in its entirety. Segments are sparse in number but contribute the highest density of backed piece artefacts (N=13; 0.53/L) followed by backed bladelets (N=3; 0.06/L), segmented backed bladelets (N=2; 0.05/L), MBP (N=2; 0.05/L) and, broken backed piece (N=1; 0.03/L) (Table 18). Comparing the peaks in density in Figure 23 to the values in Table 18 a few things become clear. In the top layers namely the peak in density observed in GB1 there are three distinct backed piece types present: segment, segmented backed bladelet and broken backed piece. In the lower layers PBG1 only one backed piece type is present, a miscellaneous backed piece (MBP) and in VDG1 it is dominated by segments. In the bottom layers segments dominate VDB1 and VDB1+, however in VDB1+ segments are followed by the bladelet subtype (Table 18; Figure 23) (refer to Table 1 for dates).

Table 17: Backed piece types in J42 A and B.

Backed Piece	No.	%
Segment	13	61.90
Triangle	0	0.00
Trapeze	0	0.00
Flake	0	0.00
Blade	0	0.00
Bladelet	3	14.29
Segmented backed bladelet	2	9.52
Misc. BP	2	9.52
Broken backed piece	1	4.76
Total	**21**	**100**

Table 18: Little Muck Shelter distribution of backed tool types by number and density J42 A and B.

Strat	Vol. (L)	Segment	Segment Den.	Bladelet	Bladelet Den.	Segmented backed bladelet	Segmented backed bladelet Den.	Misc. BP	Misc. BP Den.	Broken backed piece	Broken backed piece Den.
GB1	**31**	1	0.03	0	0.00	1	0.03	0	0.00	1	0.03
GB2	**71**	2	0.03	1	0.01	1	0.01	1	0.01	0	0.00
GB3	**29**	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
PBG1	**27**	0	0.00	0	0.00	0	0.00	1	0.04	0	0.00
PBG1+	**8**	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
DRG1	**17.5**	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
VDG1	**33**	4	0.12	0	0.00	0	0.00	0	0.00	0	0.00
B2	**8.5**	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

VDB1	**4**	1	0.25	0	0.00	0	0.00	0	0.00	0	0.00
B2+	**8**	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
VDB1+	**31**	2	0.06	1	0.03	0	0.00	0	0.00	0	0.00
VDB2	**103**	3	0.03	1	0.01	0	0.00	0	0.00	0	0.00
Total Density			**0.53**		**0.06**		**0.05**		**0.05**		**0.03**
Total		**13**		**3**		**2**		**2**		**1**	

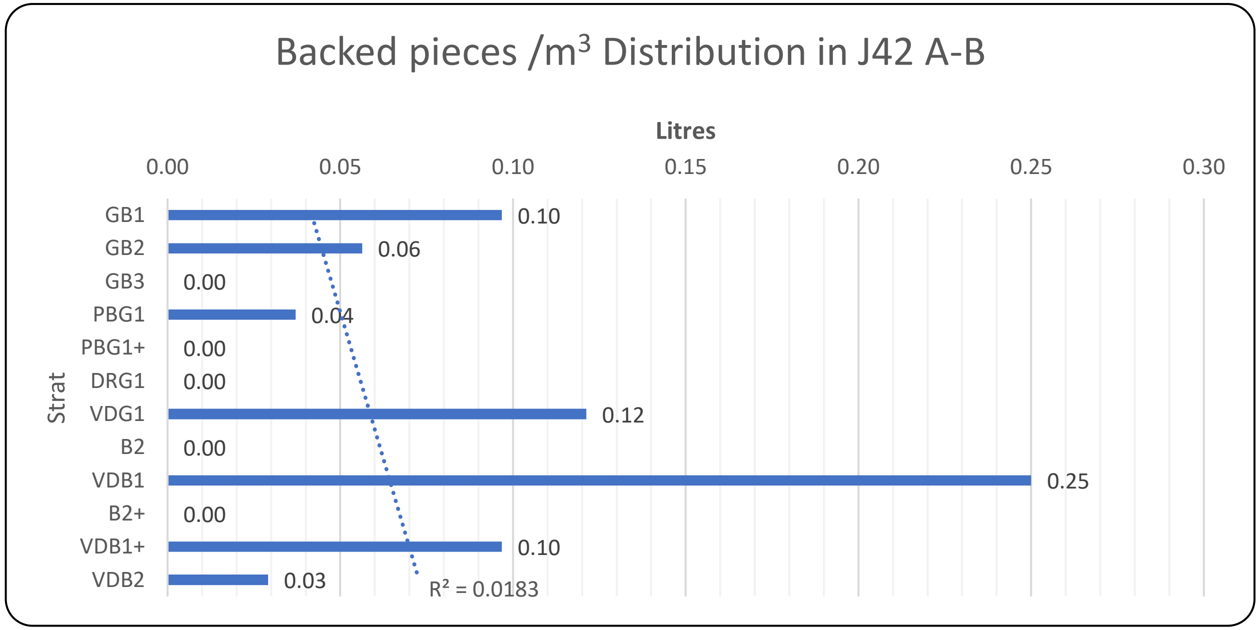


Figure 23: Density of backed pieces in LMS J42 A and B.

Synthesis

The stone tool assemblage has periods in which there are high numbers and densities of tools. There are generally two peaks that occur within the stratigraphy, one greater and earlier in the assemblage in the bottom layers, the second one occurring later and is smaller than the first peak. This makes the main pattern bimodal, and this is reflected in all categories.

The first peak of the stone tool distribution graph occurs in the bottom layers in VDB1+ and the second is in VDB1, this includes the densities of the subtypes such as cores, complete and incomplete flakes, and formal tools. It is important to note that stratigraphic units VDB1 and VDB1+ are related units as they are stratigraphic units that have an increase in artefact density indicated by +. This is true for other stratigraphic units that are denoted with the + value. Cores have a peak density in VDB1+ and are without a density value in VDB1. Complete flakes, incomplete flakes and formal tools have a peak in density that occurs in VBD1+ but has a larger peak in density occurring in VDB1, the same can be said of formal tools, and backed tools also have a higher density in VDB1. (Figure 24).

Incomplete flakes in the lower layers have peaks in density in VDG1 and PBG1+ and the densities are similar in each stratigraphic unit. The same occurs with complete flakes that have peaks in density in VDG1 and PBG1+ with similar densities between the stratigraphic units. Cores have one peak in density that occurs in VDG1 and formal tools peak in density in PBG1+. Formal tools peak density occurs within PBG1+ and backed tools peak in VDG1. When the top layers are considered the densities of all categories have been drastically reduced when one considers the large densities from the bottom layers are compared. The peak in core density in the top layers is in GB2 (Figure 11), complete and incomplete flakes peak density is in GB3 (Figure 13; Figure 15), formal tools peak in GB3 (Figure 19) and backed tools are in GB1 (Figure 23).

Complete and incomplete flakes, formal tools and cores have peak densities occurring in the bottom layers in VDB1+, this also occurs in VDB1 (apart from cores). There are peaks in density in the lower layers that correspond as well, complete flakes and incomplete flakes as well as formal tools have peaks that occur in VDG1 and PBG1+. This pattern extends to the top layers where complete flakes and incomplete flakes with formal tools have a peak density in GB3. Where there is an increase in complete flakes and incomplete flakes densities there is mirrored increase in density in formal tools. The decline of core densities occurs with the decline in debitage and formal tools densities until a peak in core density in DRG1. There is a further decline within the densities of complete flakes and incomplete flakes.

The overall pattern that is established from the bottom layers through until the top layers is that there are periods in which stone tool densities peak and there are some similarities between the densities of groups such as complete flakes and incomplete flakes and differences like what is seen in core densities. This will be discussed further in the coming chapter below.

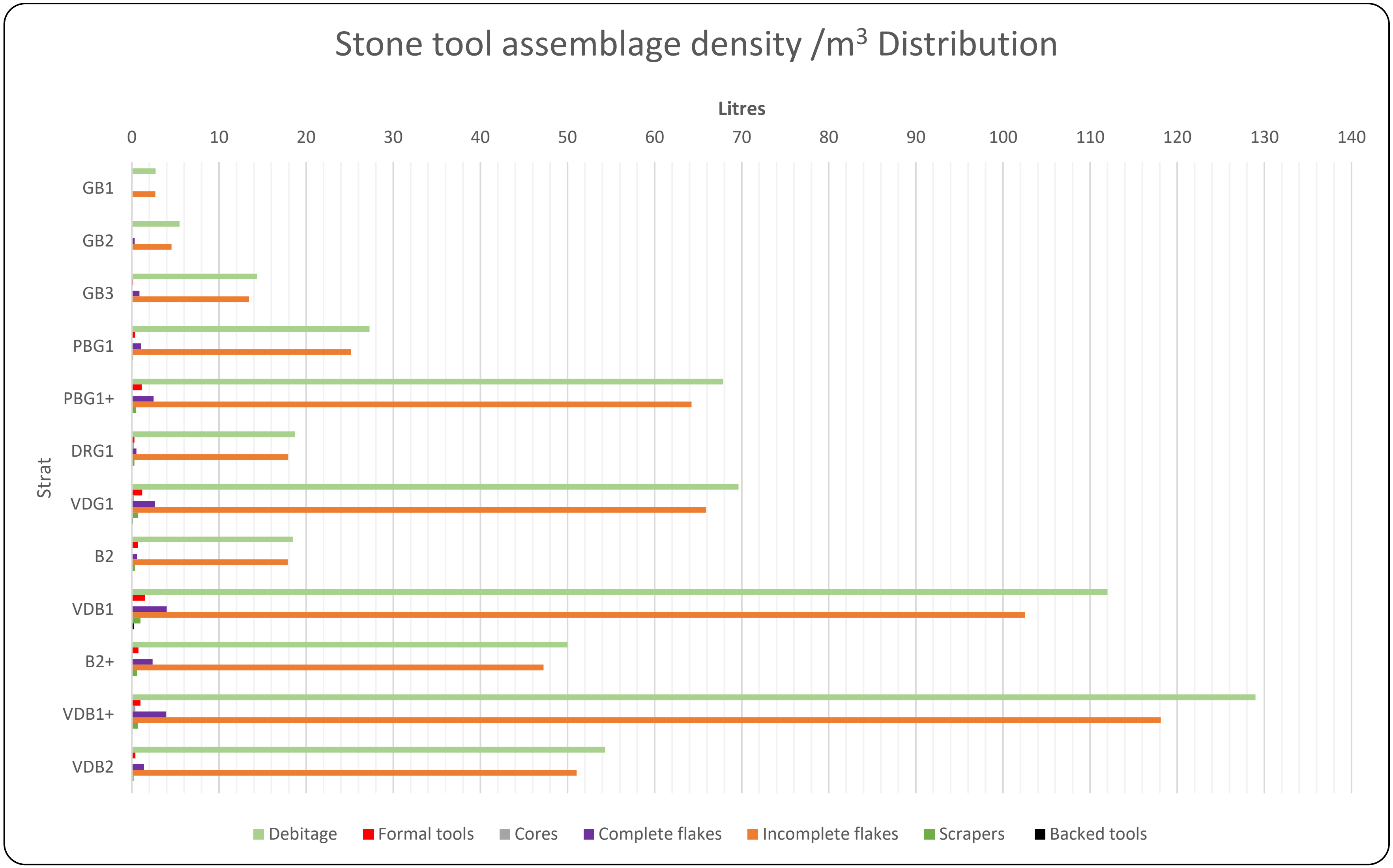


Figure 24: Little Muck Shelter Stone tool type distribution in J42 A and B.

Chapter Five: Discussion

The purpose of the study presented above was to examine Little Muck's stone tool assemblage and assess two key issues. First, and more broadly, does the assemblage match other Wilton-period assemblages from around southern Africa. Second, is there a change from pre- to post-contact levels in stone tool production and preferences. I address each aim individually before drawing any conclusions.

Chronology

Little Muck has two identified periods of use, namely from the late BC to the early first millennium period and the second millennium AD. This is shown through the continued use of stone tool technologies in various stages of production, and the increase in stone tool densities that are illustrated through means of a bimodal model. There are clear indicators that Little Muck was used during the first millennium AD, the increase in density during the Zhizo period is reflected in increased densities of complete flakes, incomplete flakes and formal tools. This corresponds with the findings of Hall and Smith (2000) and van Doornum (2000). While cores and backed tools may not be the most useful markers in this study, they do provide information regarding periods of increased density along with their typological information.

Is Little Muck's assemblage a Wilton assemblage?

The results from Little Muck demonstrate certain similarities with neighbouring sites; however, there are also some differences. There are noticeable changes in the density of stone tool materials between the BC/AD transition and the first millennium AD. While the stone tools show similarities with the Wilton Industry, I argue that they do not conform to what is usually expected from a Wilton-associated assemblage. I agree that while Little Muck has a Wilton period, and the stone tool assemblage resembles the Wilton Industry, the number of segments and backed tools are much lower than what is usually associated with a Wilton assemblage. One of the key components in identifying an assemblage comes from Deacon (1974), who states that the importance of segments is said to be regarded as a key feature in assigning an assemblage to the Wilton Industry and is described as 'zone fossils' of the Wilton. There may be any number of reasons for the small number of segments recovered from the site. Segments may have been used elsewhere within the site and may not have been deposited within the analysed portion of Square J42. These tools may have been used outside of the site and discarded, or they may be omitted from the site as the result of natural processes such as animal disturbances prior to excavation.

Excavations undertaken by Walker (1980) in the Matopos expanded upon the LSA materials at Iron Age sites. This is where he noted the similarity between the microlithic artefacts from the Khami Industry and the Wilton Industry of the Cape (Walker 1980: 23). There is a predominance of scrapers that occurs at Nswatugi Cave and Tshangula Cave (with hardly any backed tools). Small samples taken from Kalanyoni and Maleme Dam Shelters indicate a high backed tool/scraper ratio (Walker 1980: 21). Looking at Walker's (1980, 1995) work, we can compare the Little Muck assemblage to that of the Amadzimba Industry from the Matopo Hills in Zimbabwe. This is what Guillemard (2020) did, by utilising the work done by Walker (1995), she describes the Amadzimba Industry as being contemporaneous with the Wilton Industry. The understanding is that the Amadzimba Industry was replaced by what is referred to as the Ceramic Matopan or Bambata. While Guillemard (2020) acknowledges that there are typological similarities with the Wilton Industry when compared to the Amadzimba Industry, the difference lies within the inclusion of microlithic tools such as triangles and trapezes (geometrics) (Guillemard 2020: 134).

I argue that while Little Muck has a Wilton-like assemblage within the first millennium AD, the small number of segments and backed tools that typically classify a site as Wilton, is not as compelling. It would be better to acknowledge the assemblage as being Wilton-like, than that of it being Amadzimba-like as the assemblage lacks triangles, trapezes and other geometric tools that would suggest otherwise. Both the Wilton and Amadzimba are very similar and using either industry as a descriptive tool to describe the assemblage would be the result of comparing stone tools of similar typologies to one another. The Amadzimba Industry is a useful indicator as it occurs at sites within Zimbabwe, which is geographically closer to Little Muck, and resembles similarities to the Wilton, which is originally found within the Cape. With the addition of future studies and the results from expanded excavations this may change, and it will be important to note whether the assemblage during the first millennium AD remains similar to Wilton assemblages or becomes more like an Amadzimba assemblage with the potential addition of geometrics. The typological designation of the site will become clearer as more of the site is excavated and more artefacts are analysed.

CCS dominates the Little Muck assemblage throughout the entire stratigraphic profile, followed by quartz. The highest density of these CCS materials is recovered in the period between pre-AD 100 and the first millennium AD. In terms of raw material, there is a greater emphasis on CCS within the late BC to first millennium AD/pre-contact period, than from within the contact period into the second millennium AD. This seems to illustrate a pattern in the middle Limpopo Valley where CCS (namely chert) dominates stone tool assemblages and is followed closely by quartz. This was recorded at sites such as Balerno Main, (van Doornum 2005, 2008), Balerno 2 (van Doornum 2005) Balerno 3 (van Doornum 2000), Tshisiku Shelter (van Doornum 2005, 2007), and João (Forssman 2014b) and occurs in Botswana at Dzombo (Forssman 2014b).

Stone tool assemblages follow another pattern whereby the assemblage can be separated into a bimodal model. The first peak appears to occur within the late BC period and the second peak occurs within the contact period or within the first millennium AD. This indicates that there are two main periods of activity at the site. To work out whether Little Muck is Wilton-like, the results of the stone tool densities need to be considered. If the artefact densities and percentages are compelling to make the argument that this is a Wilton Industry assemblage in the bottom layers or whether it would be more appropriate to consider this assemblage as Amadzimba-like. To do this the stratigraphic sequence is often divided into phases of occupation at various sites. This will include cultural affiliations such as the Zhizo period (PBG1+, PBG1), Leokwe/K2 (GB3), Transitional K2 (GB2), Mapungubwe (GB2, GB1) and Historic/Venda (GB1). The peak in the density of stone tools may differ in relative chronology and cultural affiliation between different tool types (complete, incomplete, cores and formal tools) and other material culture recovered from the site.

Is there a notable change from pre- to post-contact levels in stone tool production and preferences?

From the stone tool assemblage, the largest variety and density of scrapers occur during the first millennium AD within VDB1+ and VDG1. Backed pieces are at their highest number and density within the first millennium AD period as well, with segments dominating the assemblage during the Wilton period. During the second peak in density in the second millennium AD (PBG1+), the density of scrapers increases and is end scraper dominated which correlates with other neighbouring sites within the region. Backed pieces were preferred in the first millennium AD based on density data when compared to the densities from the contact period until the end. Production of stone tools was at its highest during the pre-contact levels which preferred both scrapers and backed tools. When comparing this to post-contact levels, the focus shifted to a predominantly scraper based lithic toolkit. The raw material preference remained consistent throughout both pre-and post-contact levels of stone tool production. There is a slight uptick in backed piece density in PBG1 however, the frequency and density remain low. This may indicate a preference for scrapers during the second millennium AD over backed tools which supports the hypothesis posited by Hall and Smith (2000).

Small flaking debris projection

SFD contributes 60.36% of the entire assemblage, the highest density of SFD material is projected to be in the stratigraphic unit VDB2 in the bottom layers. This continues with a downward projection throughout the entire stratigraphic profile . This projection suggests that the stone tools of Little Muck would be at the highest number based on the average weight in the bottom layers with the peak projected number in VDB2 followed by a smaller peak in VDB1 (Table 4; Figure 8). Due to the high volume of SFD that is projected in these stratigraphic units, this suggests that this was the most likely period in which stone tools were produced on site. In the lower layers there are two peaks in VDG1 and an increase in number that occurs in PBG1+ with a second peak in PBG1+. As these two units are related by the denotation of the + to indicate an increase in density from the one stratigraphic unit to the next, the closeness of the numbers is understandable given that they are associated. This suggests that stone tools were produced at Little Muck during two periods, between the pre-AD 100 period (associated with the Wilton) in the oldest stratigraphic unit and, during the pre-contact period (AD 900 – 1000).

There may be several reasons why the density of SFD remains low, even with a peak in density occurring within the Zhizo period in PBG1 and PBG1+. The production of stone tools may have occurred outside of the excavated square. It may be likely that the low density of SFD could be due to the knapping process being conducted elsewhere within the site and not within the analysed area, with dedicated spaces for specific tasks such as knapping. Stone tools may have been knapped elsewhere and brought back to Little Muck during the contact-period for retouching of the working edge on the formal tool kits such as scrapers and backed tools. It is also likely that J42 was an area in which SFD material was discarded, like what occurred at Madikwe.

Cores

There is a sparse number of cores recovered from Little Muck (N=42) relative to the high number of complete flakes, incomplete flakes and SFD materials from the lithic assemblage. While core numbers are low and do not reliably indicate patterns across the site, for the purposes of the analysed square, the distribution of cores through the stratigraphic profile is outlined. Unlike other sites within the region, Little Muck is dominated by single platform cores (57.14%), followed by double platform cores (14.29%), bipolar cores are present but noticeably lower (9.52%), with irregular cores comprising (7.14%). Single platform cores dominate the bottom layers with the peak in VDB1+ however, the largest variety of core types also occur within this stratigraphic unit and contain irregular cores, casual cores and double platform cores.

Cores have three clearly identifiable peaks in density throughout the stratigraphy. Cores occur at their highest number, density, and percentage value in VDB1+ (0.42/L; 30.95%). This peak occurs within the Wilton Industry, this peak in density corresponds with what is observed with the peak in density of complete flakes and incomplete flakes. The second, smaller peak in density occurs in the lower units VDG1, this corresponds with complete flakes and incomplete flakes graphs that have a peak density in this stratigraphic unit. From this peak density in VDG1 there is a clear decrease in core density that continues throughout the lower layers before concluding in the top layers and reaching the surface. While there are core densities present from VDG1 through until GB1 the pattern of decline is clear, apart from the peak in core density in GB2 before the concluding density in GB1. This does however clearly illustrate that there is activity occurring from the first millennium AD into Zhizo, Leokwe/K2, Transitional K2 and Mapungubwe associated units. During the second millennium AD, there is a decline in core density that occurs from PBG1+ until the surface. The lack of core densities in stratigraphic units B2 and VDB1 in the lower units could be due to any number of reasons and due to the limited size of the excavated area in this paper that was analysed, it would be inaccurate to make any assumptions.

In van Doornum's (2000) unpublished master's thesis, she explains that both Balerno 3 and Little Muck exhibit a strong preference for bipolar flaking, "which is especially noticeable when one examines bipolar core and battered piece frequencies through time-emphasis on the bipolar technique is strong throughout both assemblages and irregular core frequencies are low at both sites" (van Doornum 2000: 90). She attributes this preference to be due to the nodular nature of the raw material and because bipolar flaking maximises the use of cores (van Doornum 2000: 90). At Balerno Main the most common type of cores are those produced by bipolar flaking (including 'traditional' bipolar cores, bipolar bladelet cores, bipolar 'rice seed' cores, and split cobble cores) (van Doornum 2008: 259). Bipolar cores form 96% of the total core category with frequencies low in the pre-contact period in DBG 70-75 (340–100BC) and DBG 65-70 but increase through time to DBG 60-65 (van Doornum 2008: 259).

Balerno 2 has lithic frequencies that increase from very low amounts in the pre-contact levels to peak in the contact levels (van Doornum 2005: 113). The inverse occurs at Little Muck with a high density of lithic materials occurring from the pre-contact period until the increase in density during the Zhizo period. This occurs in the overall stone tool density, SFD, and core densities. Bipolar cores dominate Balerno 2 assemblage forming about 86% of the total core types. Bipolar core percentage frequencies increase through time in general from lower levels to the surface (van Doornum 2005: 114). While irregular cores "decrease through time from GB 10-15 to GB 5-10 in the contact period, before increasing again to the Surface" (van Doornum 2005: 114).

From the data provided in Chapter Four, my observation has indicated that the assemblage is predominantly single platform cores (57.14%) with bipolar cores making up a smaller percentage (9.52%). While the core numbers and density may not be representative of the entire Little Muck assemblage, I compare the data that has been generated. Square J42 contrasts the data provided by van Doornum (2000) as bipolar cores are sparse, whereby they occur only in DRG1 (N=2) during the first millennium AD. Bipolar cores do increase in time during the second millennium AD with PBG1 (N=1) and GB1 (N=1). Irregular cores only appear in the pre-contact level VDB1+, in low numbers (N=3). While there is a pattern of bipolar cores dominating at multiple sites within close proximity to one another, Little Muck seems to be an outlier.

At Balerno 3 van Doornum (2014: 132-133) explains that there is a clear increase in artefact frequencies from the bottom of the DR layer to the top with a dip in stone artefact frequency. She attributes this to activity that occurred in AG1 (after the second century AD) with the peak in activity that occurred at the shelter occurring during the fifth century AD. This is interesting as the introduction/activity at the site is shown through a decrease in the frequency of stone tools, whereas the opposite occurs at Little Muck with an increase in stone tool materials. This pattern of decreasing density of artefacts is addressed in Forssman (2014b) where he identifies a pattern of decreasing density of artefacts dated between AD 1000 and 1300. Forssman (2014b) explains that this "gradual disappearance of the forager record at other sites, demonstrates additional shifts in the forager settlement pattern" (Forssman 2014b: 375). There is a preference for bipolar flaking by Balerno 3 hunter-gatherers, evidence of this is provided by the overall high frequencies of bipolar cores, battered pieces, split cobble cores, lozenge chunks and split cobbles (van Doornum 2014: 137). Little Muck in contrast is dominated by single platform cores and followed by double platform cores. Bipolar cores dominate the Tshisiku Shelter assemblage forming 91% of the total core category along with mention of a few irregular cores occurring (van Doornum 2005: 86). High frequencies of bipolar cores occur in Spit 6, in the early pre-ceramic period and the surface, peaking in Spit 4 (1220–1010BC) (van Doornum 2005: 86). van Doornum (2005) notes that "the peak in activity at Tshisiku Shelter occurs far earlier in the history of the occupation of the shelter than in comparison to other shelters studied in the Shashe-Limpopo so far" (van Doornum 2005: 86).

From João, a total of 88 cores were recovered with eight different core categories present at the site with irregular cores as the most frequent core type (Forssman 2014b: 258). Forssman (2014b) notes that a bipolar flaking technique was favoured and the primary production occurring at the site appears to be within the rock shelter. There are two phases of occupation identified at João, "the latest occupation has been radiocarbon dated and the dates, along with the European glass bead assemblage and other items such as the broken bottle, indicate that the site was used within the last 400 years" (Forssman 2014b: 335). "The earlier phase is indicated only by the ceramic –

Toutswe, K2 and TK2 – and glass bead – Zhizo, K2, K2 Indo-Pacific and Mapungubwe – the assemblages suggest that occupation is between AD 900 and 1300" (Forssman 2014b: 335).

Skirbeek Shelter is a site located in the Tshirundu Hills in the Maremani Nature Reserve, east of Musina. From the site, a total of 28 cores were recovered from Square 2I-J, little can be said about the core types as they were not recorded however, it is noted that there is a sparsity of cores when compared to the large number of SFD and complete and incomplete flakes (Pentz 2020: 19).

Madikwe is a site located in the North West has cores that are the result of bipolar reduction. Hall (2000: 40) suggests that the site may not have been the primary knapping context, but rather that the area was cleaned up after knapping was completed and the debitage was buried in small pits.

Rose Cottage is located in the Free State and contains irregular cores, with nine bladelet cores in PT and 22 in layer A2. Wadley (2000) suggests that the cores were worked extensively before they were discarded, or that flakes which were being produced, were being produced elsewhere and brought into the cave (Wadley 2000: 94). This is not uncommon to find forager tools brought into a site that was produced outside of the site itself. From the examples mentioned in Chapter Two, there are a few examples of stone tools that were brought to sites for retouch, or tools that were reused as cores to produce new flakes.

The stone tools recovered from these sites have similar characteristics to the stone tool assemblages from the valley. There is a reoccurring pattern of cores being produced through bipolar reduction, this occurs across the assemblages of Balerno Main, Balerno 2, Balerno 3, Tshisiku and Madikwe. Whether it is due to attempts to maximise the use of cores, as van Doornum (2000) suggests, is one working consideration. Little Muck was originally said to exhibit a strong preference for bipolar flaking through the work done by van Doornum (2000: 90). This has changed during the analysis of materials from this study, the change in dominant core type may be a few reasons however, the low number and frequency of cores makes it difficult to say with any certainty. There is a likelihood that the dominant core type at Little Muck may change with further study in future when additional material is analysed and the densities of cores increase.

Complete and Incomplete Flakes

Complete flakes make up a small percentage of the unmodified flake assemblage with the distribution pattern occurring as a bimodal model. The first peak in density is within the bottom layers in VDB1+ and VDB1 which is associated between the Late BC to early first millennium AD periods/ pre-contact period as well as the Wilton Industry. The densities of complete flakes decline until a second peak occurs within the lower layers VDG1 and PBG1+, the pre-contact and Zhizo associated periods. This indicates that there has been a pre-contact presence and utilisation of the site that corresponds with the pattern of SFD density. The increase in the density of complete flakes in PBG1+ indicates renewed activity taking place during the contact-period of the Zhizo. This uptick in density corresponds with the findings made by Hall and Smith (2000) and van Doornum (2000). From her work in her master's paper, van Doornum (2000: 97) notes that there is an increase in the frequency of formal tools, worked bone, ostrich egg shell, *Achatina* and ochre from pre-ceramic layers until reaching the layers that contained Bambata and Happy Rest ceramics. van Doornum (2000) attributes the increases in density at Little Muck to be different to that of Balerno 3 as the equivalent period is the densest occupation of Balerno 3 (van Doornum 2000: 97). The conclusion drawn is that, based on the evidence from Little Muck, foragers intensified the settlement of the Shashe-Limpopo area at about 2000 BP (van Doornum 2000: 97).

Regarding the average complete flake size, the flakes increased in overall tool size from VDB2 until B2+ which is between pre-AD 100 and the late BC to early first millennium AD periods. This corresponds with the peaks in density, illustrating that as time progressed so did an increase in the tool size. The size of complete flakes remained fairly consistent from B2 until GB1, which could illustrate a standardisation of size that continued until the surface. Most complete flakes from the assemblage have no cortex (80.43%), followed by the 1-24% range. This illustrates high levels of work done on the tools due to the low percentage of cortex remaining on the tools. There are high levels of core and flake reduction that occur within VDB2, this is followed by VDB1+, which is within pre-AD 100 and the late BC to early first millennium AD periods. This may suggest that there was stone tool production done on-site at Little Muck during the first millennium AD, prior to the contact period with tools brought in for retouch during the second millennium AD.

The incomplete flakes of the assemblage make up a larger number and density than that of complete flakes. Incomplete flakes are also separated into a bimodal model with two peaks. The first peak is within the bottom layers, VDB1+, whereas complete flakes reached a peak in density in VDB1 (with a pattern of declining density until the surface for both subtypes). The high density of complete and incomplete flakes from VDB2 until VDB1 may have been the result of any number of factors. If this site was used seasonally, it does explain the high number and density of these tools that have been collected from these stratigraphic levels. As these two stratigraphic units are related, the densities exhibiting similarities are not necessarily unexpected. The second peak in density occurs in VDG1 and PBG1+ which corresponds with the complete flakes second bimodal peak. Both complete and incomplete flakes appearance in these stratigraphic units places the relative chronology between the late BC to early first millennium AD periods This presence of both complete and incomplete flakes during the Zhizo period indicates a renewed use of the site with the appearance of farmers in the area.

Formal tools

The formal tools identified from the assemblage are low in number (N=166) and are dominated by scrapers, with a few backed pieces, and backed and retouched pieces. Formal tools are separated into a bimodal model with two peaks that occur, the first is in the bottom layers and the second is in the lower layers. In the bottom layers the peak in density occurs in VDB1+ and VDB1, which as established prior are related, this means that these stratigraphic units are relatively dated from the late BC to early first millennium AD and is affiliated with the Wilton Industry (due to the presence of segments in the formal tool assemblage within these stratigraphic units). In the lower layers formal tools have a peak in VDG1 and PBG1+ which corresponds with the complete flakes and incomplete flakes in the same stratigraphic units followed by a decline in density until the surface layers. The peaks in density confirms that foragers were increasing their formal tool production during the contact period with farmers.

Scrapers dominate the formal tool assemblage, which is similar to trends observed from neighbouring sites such as Balerno Main (van Doornum 2005, 2008), Balerno 2 (van Doornum 2005), Balerno 3 (van Doornum 2014), João (Forssman 2014b) and Skirbeek (Pentz 2020). Scraper-dominated assemblages extend to sites in the interior, Rose Cottage, Rooikrans rock shelter, Westbury rock shelter and to sites in Botswana and Zimbabwe as well, with similar periods of occupation. At Balerno 3 van Doornum (2014) notes that "there is increasing diversity in scraper types through time, from a period of little diversity and low frequency (DR spits) to greater diversity and higher frequencies (AG and GB spits)" (van Doornum 2014: 142). Little Muck demonstrates a similar trend: small end scrapers are most prevalent from the pre-contact levels with an increasing diversity in scraper type through time. Similarly, to Balerno 3, the diversity of scraper type occurs within the first millennium AD from VDB2 (Wilton/pre-ceramic) until VDG1 (Bambata/Wilton).

Scrapers reach a peak in density in the bottom layers in VBD1+ and VDB1 which corresponds to the densities of complete flakes and incomplete flakes and this identifies them to be within the Wilton Industry. Scrapers reach a peak in density in the lower levels in VDG1 and PBG1+ which correlates with both complete flakes and incomplete flakes making the relative chronology to be within the first millennium AD/ pre-contact and Zhizo period. The increase in scraper density that occurs alongside the increase in complete and incomplete flakes, may suggest that this could be the result of the contact between foragers and farmers. The production of craft goods by foragers and trade wealth from farmers indicate the relationship between the two groups during this contact period.

Backed pieces

Backed piece numbers are lower in number and density when compared to scrapers. Segments make up N=13, this number of backed pieces is much lower than that of the total number of scrapers. The number of segments is sparse and like cores, may not inform for a larger pattern across the site. I argue that Little Muck does not conform to the standard Wilton Industry assemblage as the numbers of backed pieces, specifically segments, are much lower than other examples from neighbouring sites. Most of the segments from Little Muck are concentrated within the bottom layers' stratigraphic units from within the first millennium AD. These correlates to neighbouring sites which is to be expected as this falls within the Wilton period (VDB2; VDB1+; B2+; VDB1; B2; VDG1).

However, it must be noted that there are some segments, while low in number (N=2) that have been recovered in stratigraphic units outside of the Wilton affiliated units. These segments have been recovered from GB1 and GB2 which fall within the second millennium AD. It is not certain as to why there would be two segments in these layers, apart from mixing occurring from earlier stratigraphic layers or, the addition of these tools during a later period of occupation at Little Muck. While there are formal tools and backed tools that are within the Wilton during the first millennium AD, the low frequency and density of these tools must be taken into consideration. The low number of backed tools I argue, is not sufficient to confidently identify the tool kit as that of a typical Wilton Industry. I argue that it may be more reasonable to attribute the tools as Wilton-like until further analysis of the site and stone tool assemblage is conducted. It would also be inaccurate to identify the backed tools as being part of the Amadzimba Industry as there is presently no samples of geometrics present in the assemblage. Another issue is that due to the low frequency and density of backed tools, they may not be reliable indicators as was shown with cores. With additional analysis of materials from Little Muck, these densities are likely to increase with core densities and could provide better insight.

At Tshisiku Shelter, the frequency of total scrapers vs the frequency of total formal backed tools (Figure 13) in van Doornum (2007: 32) illustrates a close relationship between the number of scrapers with backed tools. The formal tool assemblage comprises 3.0% of the total assemblage which is slightly lower than that found at Balerno Main however, it remains higher than that of Little Muck. Tshisiku's formal tool assemblage is dominated by small end scrapers, followed by segments and backed bladelets (van Doornum 2005: 92). The widest variety of formal tool types occurs in the early pre-contact period, with the "highest densities of formal tools occurring between Spit 8 (4330 – 4220 BC) and Spit 6" (van Doornum 2005: 92). From van Doornum's (2007: 37) work, she identified that the bulk of the occupation at Tshisiku occurred in the pre-contact period where many fluctuations in activity occurred. This correlates with Little Muck as the widest variety of formal tool types and the highest density occurs in the early pre-contact period (Figure 22).

Little Muck is dominated by CCS (62.9%), followed by quartz (31.79%) which shows a stronger preference for CCS and quartz at Little Muck than at Balerno Main. The formal tool assemblage of Balerno Main comprises 3.7%, retouched/backed (miscellaneous) pieces 0.5% (van Doornum

2008: 258). This formal tool percentage is higher than Little Muck which is understandable given the larger size of the recovered assemblage and the number of analysed materials. Both Balerno Main and Little Muck are dominated by cryptocrystalline silicates (CCS) and end scrapers with backed tools forming a small percentage of the formal tools in both assemblages. There is "a general increase in the density of material from the pre-contact basal level DBG 75+, to the contact period BRA levels where artefact densities are high" (van Doornum 2008: 258). Little Muck has a pattern of decreasing density from the late BC to early first millennium periods (VDB2 – VDB1) to the first millennium AD/pre-contact period.

Balerno 2 assemblage is small and comprises a low number of lithics when compared to sites such as Balerno Main and Tshisiku Shelter. The formal tool assemblage forms 2.4% of the total assemblage which is closer to what is seen at Balerno Main and Tshisiku Shelter than the percentage of tools recovered from Balerno 3 and Little Muck. Lithics increase from "spit GB 15-20 to peak in the ceramic period in GB 0-5, before decreasing sharply in the surface level" (van Doornum 2005: 117). Furthermore, "small end scrapers are the most dominant formal tool type, while backed pieces are almost non-existent in this assemblage (in contrast to high numbers recovered at Tshisiku Shelter)" (van Doornum 2005: 121). The formal tool category of Balerno 2 (2.4%) is denser than Little Muck (1.06%) despite being significantly smaller than the assemblage of Little Muck however, Little Muck does contain low numbers of backed tools where Balerno 2 does not.

The assemblage of Balerno 3 comprises of formal and miscellaneously retouched tools that make up 1.09%, the balance comprises edge-damaged retouched and abraded stone artefacts 0.16%, and ground stone artefacts 0.03% (van Doornum 2014: 132). The Little Muck assemblage comprises of 1.06% formal tools and retouched tools which is comparatively close to that of Balerno 3. In contrast to the much lower number of segments in relation to scrapers observed at Little Muck. A low number of segments has been documented at Balerno 3 with only four segments recovered from the assemblage (van Doornum 2000: 53). These segments also occur prior to the contact period with their numbers contrasting with the higher concentration of scrapers. Both Little Muck and Balerno 3 are dominated by the raw material CCS, followed by quartz and the formal tool assemblage is dominated by small end scrapers where frequencies of backed tools are low (van Doornum 2014: 142).

The data regarding Skirbeek Shelter I am referencing is from my honours project, stone tool material removed from Square 2I-J and not the overall data of Skirbeek Shelter. Formal tools comprised a total of 3.15% with scrapers being the dominant formal tool type 79%, followed by backed tools 10% and other 11% (Pentz 2020: 21). Skirbeek is dominated by end scrapers (69.17%) with the highest density of scrapers resulting from the surface layer, although the sample size of the surface layer is the smallest when compared to the rest of the stratigraphic layers (Pentz 2020: 22). Stone raw material categories are dominated by quartz (45%), followed by chalcedony (39%) and quartzite (15%). Dolerite (N=57) and the unidentified category (N=4) represent less than 1% (Pentz 2020: 14).

Skirbeek is a unique site within the region that sets itself apart from other sites such as João, Balerno Main and Little Muck. The quartz material type dominates Skirbeek whereas CCS has previously dominated elsewhere within the region. It has a similarity with the other neighbouring sites, by sharing a scraper-dominated formal tool assemblage. The occupation of Skirbeek Shelter is relatively dated to be "within Phase 2 (2000 – 1000 years ago), due to the presence of ceramics across all strata, the presence of metal is also a strong indicator that the site has been occupied within the Phase 2 period" (Pentz 2020: 37). Skirbeek is likely to be a site that was occupied during the contact period due to the presence of ceramics and metal that was recovered. Due to the presence of scrapers and backed tools, there may be a possibility of a Wilton period at the site, as seen at other neighbouring sites or, that the tools were brought to the site from somewhere else.
The lithic assemblage of João is smaller than that of Tshisiku Shelter and comprises mostly of chips N=3166; 51.4% (Forssman 2014b: 253). Forssman (2014b: 253-254) explains that while the assemblage is dominated by CCS, it does not do so convincingly until one combines the numbers with agate, followed by quartz. The dominance of CCS is observed at João just as it has been at other neighbouring sites within the region. From the 66 formal tools that were identified, the most common type are small end scrapers (19.2%), then MRPs (13.7%), segments (11%) and medium end scrapers (6.9%) (Forssman 2014b: 260). Forssman (2014b: 266-267) explains that unlike the other sites on the Greater Mapungubwe Landscape, "there is no distinctive pattern between the

ratio of scrapers and backed tools throughout the levels at João". Forssman (2014b) suggests that this may be the result of mixing, thereby making the numbers of scrapers versus backed tools inaccurate (Forssman 2014b: 267).

There is a common series of patterns that emerge across the sites within the middle Limpopo Valley, these sites often share a common material type namely CCS (chert individually or combined with other CCS materials) followed by quartz. There is a common dominant tool type, scrapers, more specifically end scrapers of varying sizes. This occurs at Tshisiku, Balerno Main, Balerno 2 and 3, Little Muck and sites within the interior, Rooikrans and Westbury rock shelters. It is a possibility that the sites share a preference for the CCS raw material type as it may be the most abundant and easily accessible material to source from the area. The highest density of scrapers retrieved is within the pre-contact phase whereas the findings by Hall and Smith's (2000) excavation noted their highest density occurring within the Zhizo period. With the change in density of tools between the pre-contact and contact periods, it is possible that the site may have been utilised differently as time went on or alternatively, the pattern of discarded tools changed. The space in which the tools were recovered may have been utilised for different purposes within the different periods of occupation and this may also affect discard patterns and the density of recovered materials.

Jubilee Shelter contains a diverse LSA toolkit with the formal tool assemblage being dominated by small convex scrapers, made of fine-grained rocks such as chert, jaspilite, chalcedony and fault breccia" (Wadley 1986: 56). These formal tools were dated to 1840 – 1550 B.P. (Wadley 1986: 56). The formal tools were further dated to 1350 B.P. and <1350 B.P. (see Wadley 1996: 211). Described as bearing a resemblance to the 'classic' Wilton assemblages of the 'Interior' Wadley concluded that these tools should be within the Wilton Complex (Wadley 1986: 56-57). By assuming that Jubilee Shelter is a Wilton Industry based on the evidence provided by Wadley (1996), it is possible to identify similarities between Jubilee Shelter and Little Muck.

Little Muck does shares similar attributes with Jubilee Shelter, the stone tool kits that fall within the Wilton Industry, a scraper-dominated assemblage, and the same material types such as chert and chalcedony which falls within the broader CCS category. Both sites contain microlithic assemblages. From Jubilee Shelter, the scraper class contains microlithic (<20mm) side scrapers, medium (20-30mm) and large (>30mm) end/side scrapers (Wadley 1986: 57). Little Muck has a similar scraper class size range with microlithic scrapers (from 9.5<20mm), medium scrapers (20-28mm) with the overall average length (13.21mm).

This EIA site was originally excavated, and the Iron Age materials were analysed by Mason (1981). The lithic assemblage had been analysed later by Wadley (1996: 211) where she notes that during the EIA contact period, the stone tools are morphologically identical to Jubilee Shelter. The stone tools are made on CCS material and there were no cores from this material at the site, leading Wadley (1996) to conclude that the tools were brought to the site as finished tools. This could be similar to what is seen within the Little Muck assemblage, where there is a low frequency and density of cores and SFD. Little Muck contains low frequencies of cores across the stratigraphy, this also occurs during the contact period. However, there is an increase in scraper density during the contact period which Hall and Smith (2000) have described as an uptick in craft production activities. It may be plausible that formal tools like scrapers were brought into the site as finished tools during the contact period. Whereas previously they may have been knapped at the site during the Wilton occupation.

There are similarities between Rose Cottage, a Wilton Industry assemblage, and Little Muck within the formal tools, specifically the scraper formal tool type. Rose Cottage and Little Muck are both dominated by scrapers, scrapers constitute 55.0% at Rose Cottage and 57.23% at Little Muck (Table 14) of formal tool assemblage respectively. End scrapers make up 70.0% of the scraper class in PT of Rose Cottage (Wadley 2000: 93). Whereas the end scrapers of Little Muck make up 63.16% of the scraper class. Backed tools of Little Muck comprise of backed pieces and backed + retouched piece types, this comprises 13.86% (Table 13). Similarly, to what is found at Rose Cottage, most of the backed tools are segments 7.83% (Table 14).

Rooikrans rock shelter is dominated by small scrapers, particularly end scrapers that dominate the assemblage from all three contact levels (Thorp 1997: 239). In the Rooikrans shelter, large and medium scrapers are found in small numbers with a small number of segments. Westbury shelter contains medium scrapers and a large scraper and dates to the nineteenth or twentieth century (Thorp 1997: 246). Thorp (1996: 246) identified that small end scrapers dominated the formal tool assemblages from all levels and comprised between 40 and 56% of the assemblages. Whereas the occurrence backed bladelet is described to be less frequent in recent hunter-gatherer assemblages.

Opaline, the raw material utilised at these sites is unique to these shelters. While these shelters are in the interior of South Africa, they do share similarities with Little Muck such as the dominance of end scrapers. While Rooikrans and Westbury contain large and medium scrapers, Little Muck contains small and medium scrapers.

Synthesis

Little Muck draws similarities with sites from within the middle Limpopo Valley region, including sites from Botswana, Zimbabwe, and sites from the interior. In terms of material type, there is a strong preference for CCS material followed closely by quartz. This is observed at several sites including Little Muck. Whereas opaline, although part of the CCS material type, was identified as the dominant material at Rose Cottage and Rooikrans rock shelter and Westbury rock shelter in the interior, and at Induna Cave in Zimbabwe.

Regarding my second question, is there a notable change from pre- to post-contact levels in stone tool production and preferences. From the data that was generated, I can identify a change in preference from having both scraping and backed tools during the pre-contact period, to having a scraper dominated toolkit within the post-contact period. Using the data regarding raw material preference, the densities of any one specific raw material type had changed from pre-contact to post-contact period however, the dominance of CCS material remains consistent across the stratigraphy.

End scrapers are often the dominant formal tool from the sites with varying sizes and densities and have become an indicator for change from pre-contact to post-contact periods. Scrapers are dominant within contact periods, and this is reflected in the increase in their frequency and density. The increase in trade goods such as shell beads (OES and glass beads) forms part of indicating the uptick in activity as seen by the examples in Chapter Two. With the low number of segments relative to scrapers from Little Muck, I have argued that the site does not conform in its entirety to the Wilton Industry. However, I do not disagree that there is a clear presence of segments that occur during the Wilton period but rather that their number, like with what is seen with core densities, remains lower than what could be used to accurately reflect the changes in the assemblage over time.

Chapter Six: Conclusions

Little Muck demonstrates an unusual set of changes that relate to the production of craft goods and the appearance of trade wealth from farmers appearing in this forager context (Hall & Smith 2000; Forssman *et al.* 2023). Understanding these changes in the context of this study has been attempted by looking more closely at the stone tool assemblage and how it changed alongside shifts in activities and craft production. The high density of scrapers during the Zhizo period has been used as an indicator with trade items to study the interaction between foragers and farmers. Through the changes in stone tool density, dominant material and tool type, this information informs the nature of change with social interactions in the valley, through the changes reflected in forager stone tool production patterns.

The information gathered from the analysis of the Little Muck material culture has shown that there are differences in the number, density, and percentage values of materials across the stratigraphic units. Using the relative chronology that was established through the work of Barnard (2021), Little Muck's primary occupation is within the first millennium AD, which corresponds with Hall and Smith's (2000) results. A second period of occupation occurred within the Zhizo period with increased densities of stone tool materials. The number of scrapers is at its highest in the early first millennium AD with a relatively low number of backed tools, this correlates with Hall and Smith's (2000) findings. As posited by Hall and Smith (2000), the use of these scrapers was likely used to produce craft goods from rigid materials and possibly hide. Similarly, as seen in Dzombo (Forssman 2014a) where hunting activities were emphasised, the inclusion of meat and related goods for trade is likely.

Forager activities, tracked through the stone tools and other materials from the assemblage shows a close relationship between social relations, as the relationship changed between foragers and farmers so does the archaeology of the foragers. There are consistencies across the contact divide with increasing densities in the lower layers of complete flakes and incomplete flakes as well as increases in formal tool density in units of VDG1 and PBG1+. The trend of participation by foragers in the local economies of the middle Limpopo Valley is evident with an uptick in the density of stone tools in VDG1 and PBG1+, between the pre-contact period and the Zhizo period

(AD 900 – 1000) which corresponds with the increased densities of complete and incomplete flakes. There is an emphasis on scrapers, most likely for craft production that began in the early first millennium AD and continued until the peak in the Zhizo period. Cores reached a peak density in VDG1 and declines into PBG1+ and further to the surface in the top layers. This corresponds with an uptick in the density of tools at the site from the end of the first millennium AD/ pre-AD 900, Happy Rest/Bambata period as it progresses into the Zhizo period. This change is unique because core density is in decline towards the surface units (apart from the peak density in GB2), complete flakes, incomplete flakes and formal tool densities are at a peak in PBG1+. This suggests that although more flakes were produced for tools, it is not reflected within the core densities during this period. One scenario could be that flakes may have been prepared elsewhere and brought to the site for retouch. This would leave cores outside of the site with little being deposited on-site during this period of occupation. Whereas in the first millennium AD, cores would be higher in number and density due to the production of tools and working, being conducted on-site at Little Muck. Another possibility is that cores may not appear within the quadrants that were subject to my analysis and may be located elsewhere within the site. This can be studied in future through the analysis of additional lithic materials from other areas of the site and subjected to statistical analysis.

In my hypothesis I expected to see similarities between Little Muck and neighbouring sites within the extended region (aim one), it was also hypothesised that the changes would be shown in a change in the preference of tool types (aim 2). The results of the analysis from Little Muck illustrate that there are similarities with other sites that are a part of the broader landscape. The dominant raw material (CCS) and formal tool type (scrapers being dominant) as well as low frequencies of backed tools are commonly found in both Little Muck and neighbouring sites. The density of backed tools has remained low and concentrated in the first millennium AD with the highest density occurring in VDB1. Backed tools fall within the Wilton Industry period and Little Muck conforms in part with this industry. This also shares similarities with the Amadzimba Industry however, as there are no triangles and trapezes (geometrics) present in this assemblage, it shares more similarity to the Wilton Industry. There is the appearance of backed pieces in the upper units of the stratigraphic profile, namely an uptick seen in PBG1 Zhizo associated period. The backed pieces in the top layers (GB2; GB1) is affiliated between the transitional K2 period and Mapungubwe periods. It is important to acknowledge that the densities of these tools are low and may be the result of any number of factors such as mixing and further research is needed to better understand why backed tools would occur into non-Wilton Industry affiliated stratigraphic units.

Little Muck may not completely fit the typologies prescribed to categorise the site as a typical Wilton assemblage. Its assemblage contains limited numbers of segments and although it resembles a Wilton Industry assemblage, lithic material recovered from Little Muck in terms of frequency and density of segments, may not fit within the expectations of lithic material density found within the interior of South Africa. This, in part, necessitates the need for continued work, from further excavations and analysis of Little Muck and neighbouring sites such as Leokwe Hill and the Mbere Complex within the region. This will allow a broader understanding of the region, better cross-site comparison and contribute to the study of forager-farmer relations. The change in tool preference from pre-contact to post contact period indicates that both backed tools and scraping tools were present during pre-contact. During the pre-contact period there was a high density of stone tools produced and with the arrival of farmers, backed tool densities declined and a preference for scraping tools dominate during the second millennium AD. The dominance of CCS material type throughout the assemblage spans across both pre- and post-contact periods for stone tool production.

Little Muck is densely dominated by SFD material (60.36%) and a site that shares this similarity is João (51.4%). Little Muck is projected to have the highest density of SFD occur between pre-AD 100 and late BC to early first millennium AD periods. This might suggest that stone tool production or trimming was likely at its highest at the earliest occupation of the site. This also corresponds with the high density of lithic materials deposited in the stratigraphic units of this period.

The dominant core type of Little Muck changed from single platform cores to double platform cores in the first half of the site's occupation to a combination of single platform and bipolar platform cores in the second millennium AD. Future studies should investigate whether this pattern is this limited to one small area or can this pattern be found across the site. Core distribution patterns may change with additional analysis as a limited number of cores were recovered from the assemblage. Little Muck seems to be an outlier compared to other LSA sites within the valley, as many sites are dominated by bipolar cores. It may be worthwhile for future research to conduct statistical analysis to estimate whether the presence of bipolar flakes to single platform cores make any impact on the number and density of formal tools in each stratigraphic unit. Due to the limited number of cores occurring within the analysed materials, it is not unreasonable to assume that the possibility of additional cores from within the assemblage will appear in future analyses of the recovered materials. Future research may conduct a series of statistical analysis tests to determine the statistical significance between cores and formal tools.

Additional excavations and analysis will further test this hypothesis and whether there were additional activities that had taken place at the site. Little Muck is argued to be a craft production-dominated site, and this is seen by the emphasis on scrapers in the early first millennium. In contrast, Dzombo during the same period was a hunting-dominated site. Backed tools in the upper units of Little Muck may resemble Dzombo's, although in significantly lower numbers and density. Further research on lithic materials from Little Muck may inform whether the site might have been used for hunting purposes (although this may be unlikely) as is seen at Dzombo or whether it remained a strictly craft production-dominated assemblage.

A density analysis between the stratigraphic units with a statistical test may have the potential to test the spatial distribution of the site to understand how the space may have been utilised in different places. Techno-functional analyses may be applied to cores, blanks, and retouched flakes (Guillemard 2020: 200) which may be useful for further study in the future analyses of this assemblage. Statistical tests can also be conducted to see whether periods of stone tool intensification correspond with the densities of recovered craft goods such as glass beads, metals, shells, bone points and stone segments as mentioned by Wadley (1987, 1989) and hides (Sadr 1997). A projection for specific prestige goods could be calculated to estimate the expected number of goods to be recovered per stratigraphic unit, like the SFD projection with a statistical test to calculate the statistical significance of prestige goods and whether they correlate with projected values. With further analysis from Little Muck, excavations conducted inside and outside of the shelter, it may be possible to conduct statistical tests to understand the nature of the use of place and space (see van Doornum 2005, Forssman 2014b). Little Muck can also be studied in comparison to other nearby sites such as Mbere Shelter and Leokwe Hill in terms of lithic materials and craft goods. This will further expand upon the understanding of contact scenarios between foragers and farmers across different interrelated sites within the region.

References

Badenhorst, S. 2009. The Central Cattle Pattern during the Iron Age of southern Africa: a critique of its spatial features. The *South African Archaeological Bulletin* 64: 148–155.

Barnard, C. 2021. Little Muck Shelter: Forager participation in, and contribution to, farmer economies Unpublished Honours project. Pretoria: University of Pretoria

Bradfield, J. Holt, S. and Sadr, K. 2009. The last of the LSA on the Makgabeng plateau. *The South African Archaeological Bulletin* 64: 176–183.

Calabrese, J.A. 2000. Interregional interaction in southern Africa: Zhizo and Leopard's Kopje relations in northern South Africa, southwestern Zimbabwe, and eastern Botswana, AD 1000 to 1200. *African Archaeological Review* 17: 183–210.

Calabrese, J.A. 2007. The Emergence of Social and Political Complexity in the Shashi-Limpopo Valley of Southern Africa, AD 900 to 1300: Ethnicity, Class, and Polity. Oxford: Archaeopress.

Campbell, A., Denbow, J., and Wilmsen, E. 1994. Paintings like engravings: rock art at Tsodilo. In: T Druson, T. & Lewis Williams, D. (eds) *Contested images: diversity in southern African rock art research:* 131–58. Johannesburg: University of the Witwatersrand Press

Deacon, H.J. and Deacon, J. 1980. The hafting, function and distribution of small convex scrapers with an example from Boomplaas Cave. *The South African Archaeological Bulletin* 35*:* 31–37.

Deacon, H.J. 1993. Planting an idea: an archaeology of Stone Age gatherers in South Africa. *The South African Archaeological Bulletin* 48: 86–93.

Deacon, J. 1972. Wilton: An Assessment after Fifty Years. *The South African Archaeological Bulletin* 27: 10–48.

Deacon, J. 1974. Patterning in the radiocarbon dates for the Wilton/Smithfield Complex in Southern Africa. *The South African Archaeological Bulletin* 29: 3

Deacon, J. 1984. The Later Stone Age of southernmost Africa. International Series 213. Oxford: British Archaeological Reports.

Denbow, J.R. 1990. “Congo to Kalahari: data and hypotheses about the political economy of the western stream of the Early Iron Age.” *African Archaeological Review* 8: 139–176.

Denbow, J.R. and Miller, D. 2007. “Metal working at Bosutswe, Botswana.” *Journal of African Archaeology* 5: 271–313.

Denbow, J.R. 2017. Interactions among precolonial foragers, herders, and farmers in southern Africa. Oxford Research Encyclopedia of African History.

Denbow, J.R. and Wilmsen, E.N. 1986. Advent and course of pastoralism in the Kalahari. *Science 234:* 1509–1515.

Forssman, T. 2013. Missing pieces: the significance of surface scatters on the Mapungubwe landscape, South Africa. *Southern African Humanities* 25: 53–73.

Forssman, T. 2014a. Dzombo shelter: A contribution to the later stone age sequence of the greater Mapungubwe landscape. *The South African Archaeological Bulletin* 69: 182–191.

Forssman, T. 2014b. The spaces between places: a landscape study of foragers on the Greater Mapungubwe Landscape, southern Africa. Unpublished PhD thesis. Oxford: University of Oxford.

Forssman, T. 2015. A macro-fracture investigation of the backed stone tools from Dzombo Shelter, eastern Botswana. *Journal of Archaeological Science*: *Reports* 3: 265–274.

Forssman, T. 2016. Blurring Boundaries: Forager–Farmer Interactions in the middle Limpopo Valley. In: Esterhuysen, A., Sievers, C. & Sadr, K. (eds) *African Archaeology Without Frontiers:* 143–164.

Forssman, T. 2017. Foragers and trade in the middle Limpopo Valley, c. 1200 BC to AD 1300. *Azania: Archaeological Research in Africa* 52: 49–70.

Forssman, T., Seiler, T. and Witelson, D. 2018. A pilot investigation into forager craft activities in the middle Limpopo Valley, southern Africa. *Journal of Archaeological Science: Reports* 19*:* 287–300.

Forssman, T. 2020. Foragers in the middle Limpopo Valley: trade, place-making, and social complexity. Oxford: Archaeopress.

Forssman, T. 2021. An Archaeological Contribution to the Kalahari Debate from the middle Limpopo Valley, Southern Africa. *Journal of Archaeological Research* 30*:* 1–49.

Forssman, T., Seiler, T., Rossouw, A. and Ashley, C. 2022. Social Landscapes of Euphorbia Kop: A K2 Farmer Settlement with a Forager Presence in Southern Africa. *Journal of Field Archaeology* 47: 1–14.

Forssman, T. and Van Zyl, S. 2022. A preliminary analysis of the backed stone tool assemblage at little muck shelter. *The South African Archaeological Bulletin* 77: 57–66.

Forssman, T. 2022. Approaching Identity in Southern Africa over the Last 5000 Years. *Oxford Research Encyclopedia of Anthropology* 1–30.

Gardner, G. A. 1955. Mapungubwe 1935-1940. *The South African Archaeological Bulletin* 10: 73–77.

Goodwin, A.J.H. & Van Riet Lowe, C. 1929. The Stone Age cultures of South Africa. *Ann. S. Afr. Mus.* 27: 1–289.

Guillemard I. & Porraz, G. 2019. What is a Wilton scraper? Perspectives from the Late Holocene assemblage of Balerno Main Shelter, Limpopo Province, South Africa. *Southern African Humanities* 32: 135–162.

Guillemard, I. 2020. Change and continuity in the lithic technologies from Final to Ceramic Final Later Stone Age, Limpopo Basin, South Africa Unpublished PhD thesis. University of Paris Nanterre & University of the Witwatersrand.

Hall, S. 2000. Forager lithics and Early Moloko homesteads at Madikwe. *Southern African Humanities* 12: 33–50.

Hall, S. & Smith, B. 2000. Empowering Places: Rock shelters and ritual control in farmer-forager interactions in the northern province. *South African Archaeological Society* 8: 30–46.

Huffman, T. N. 1989. Ceramics, settlements and late Iron Age migrations. *African archaeological review* 7: 155–182.

Huffman, T.N. 1993. Broederstroom and the Central Cattle Pattern. *South African Journal of Science* 89: 220–226.

Huffman, T.N. 2000. Mapungubwe and the origins of the Zimbabwe culture. *Goodwin Series* 14–29.

Huffman, T.N. 2001. The Central Cattle Pattern and interpreting the past. *Southern African Humanities* 13: 19–35.

Huffman, T.N. 2007. Handbook to the Iron Age: the archaeology of pre-colonial farming societies in southern Africa. Scottsville, University of KwaZulu-Natal Press.

Huffman, T.N. 2009. Mapungubwe and Great Zimbabwe: The origin and spread of social complexity in southern Africa. *Journal of Anthropological Archaeology* 28: 37–54.

Huffman, T. N. 2015. Mapela, Mapungubwe and the origins of states in southern Africa. *The South African Archaeological Bulletin* 70: 15–27.

Kuper, A. 1982. Wives for cattle: bridewealth and marriage in southern Africa. London: Routledge & Kegan Paul.

Lane, P. J. 1994. The use and abuse of ethnography in the study of the southern African Iron Age. *Azania: Archaeological Research in Africa* 1: 29–30.

Lane, P. J. 2005. "Barbarous Tribes and Unrewarding Gyrations? The Changing Role of Ethnographic Imagination." In *African Archaeology. A Critical Introduction*, edited by A. B. Stahl, 24–54. London: Blackwell.

Lombard, M., Wadley, L., Deacon, J., Wurz, S., Parsons, I., Mohapi, M., Swart, J. and Mitchell, P. 2012. South African and Lesotho stone Age sequence updated (I). *The South African Archaeological Bulletin* 67: 123–144.

Lombard, M., Bradfield, J., Caruana, M.V., Makhubela, T.V., Dusseldorp, G.L., Kramers, J.D. and Wurz, S., 2022. The Southern African stone age sequence updated (II). *The South African Archaeological Bulletin* 77: 172–212.

Lotter, M.G., Forssman, T. & Caruana, M. 2018. Lithic Analysis Workbook. Unpublished report prepared for PGS Heritage.

Mason, R. J. 1981. Early Iron Age settlement at Broederstroom 24/73, Transvaal, South Africa. *South African Journal of Science* 77: 401–416.

Mazel, A.D. 1989. Changing social relations in the Thukela Basin, Natal 7000-2000 BP. *Goodwin Series* 33–41.

Mazel, A. D. 1997. Hunter-gatherers in the Thukela Basin during the last 1500 years, with special reference to hunter-gatherer/agriculturalist relations. In: *The Proceedings of the KhoiSan Identities and Cultural Heritage Conference. Organised by the Institute for Historical Research, University of the Western Cape, held at the South African Museum, Cape Town* 12–16.

Mitchell, P.J. 1997. Holocene later stone age hunter-gatherers south of the Limpopo River, Ca. 10,000-2000 BP. *Journal of World Prehistory* 11: 359–424.

Pentz, J. 2020. Skirbeek Shelter: stone tool analysis of a Later Stone Age assemblage. Unpublished Honours project. Pretoria: University of Pretoria

Orton, J. 2014. SALSA: The Holocene technocomplexes, a reply to Lombard and colleagues. *The South African Archaeological Bulletin* 69: 110–112.

Sadr, K. 1997. "Kalahari archaeology and the Bushman debate." *Current Anthropology* 38: 104–112.

Sadr, K. 2015. Livestock first reached southern Africa in two separate events. *PloS one* 10: 1–22.

Schoeman, M. H. 2006. Clouding Power? Rain-control, space, landscapes and ideology in Shashe-Limpopo state formation. Unpublished PhD thesis, University of the Witwatersrand.

Sherwood, N. L., & Forssman, T. 2023. Macro use-wear identifiers on lithic scrapers and behavioural shifts at Little Muck Shelter, Shashe-Limpopo confluence area. *Journal of Archaeological Science: Reports* 49: 1–14.

Thorp, C., 1997. Evidence for interaction from recent hunter-gatherer sites in the Caledon Valley. *African archaeological review* 14*:* 231–256.

Thorp, C. 2010. Induna Cave, southeastern Zimbabwe: a 'contact period' assemblage in a changing social landscape. *Southern African Humanities* 22: 113–47.

Van Doornum, B.L. 2000. Spaces and places: Investigating proximity between forager and farmer sites. Unpublished MA dissertation. Johannesburg: University of the Witwatersrand.

Van Doornum, B.L. 2005. Changing places, spaces and identity in the Shashe Limpopo region of Limpopo Province, South Africa. Unpublished PhD dissertation. Johannesburg: University of the Witwatersrand.

Van Doornum, B. 2007. Tshisiku Shelter and the Shashe-Limpopo confluence area hunter-gatherer sequence. *Southern African Humanities* 19: 17–67.

Van Doornum, B. 2008. Sheltered from change: hunter-gatherer occupation of Balerno Main Shelter, Shashe-Limpopo confluence area, South Africa. *Southern African Humanities* 20: 249–284.

Van Doornum, B. 2014. Balerno Shelter 3: a Later Stone Age site in the Shashe-Limpopo confluence area, South Africa. *Southern African Humanities* 26: 129–155.

Van Riet Lowe, C. 1936. Mapungubwe. First report on excavations in the northern Transvaal. *Antiquity*. Cambridge University Press 10: 282–291.

Voight, EA and Plug, I. 1984. Happy rest: the earliest Iron Age fauna from the Soutpansberg. *South African Journal of Science* 80: 221–227.

Wadley, L. 1986. Segments of time: a mid-Holocene Wilton site in the Transvaal. *The South African Archaeological Bulletin* 54–62.

Wadley, L. 1987. Later Stone Age hunters and gatherers of the southern Transvaal: social and ecological interpretation. Oxford: British Archaeological Reports.

Wadley, L. 1989. Legacies from the Later Stone Age. *South African Archaeological Society. Goodwin Series* 6: 42–53.

Wadley, L. 1996. Changes in the social relations of precolonial hunter–gatherers after agropastoralist contact: an example from the Magaliesberg, South Africa. *Journal of Anthropological Archaeology* 15: 205–217.

Wadley, L. 2000. The Wilton and pre-ceramic post-classic Wilton industries at Rose Cottage Cave and their context in the South African sequence. *The South African Archaeological Bulletin* 55: 90–106.

Walker, N. J. 1980. Later Stone Age research in the Matopos. *The South African Archaeological Bulletin* 19–24.

Walker, N. 1994. The Late Stone Age of Botswana: Some Recent Excavations. Botswana Notes and Records 26: 1–35.

Walker, N. 1995. *Late Pleistocene and Holocene hunter-gatherers of the Matopos, an archaeological study of change and continuity in Zimbabwe*. Uppsala: Societas Archaeologica Upsaliensis.

Wilmsen, E.N. 1989. *Land filled with flies: a political economy of the Kalahari*. University of Chicago Press.

Wood, M. 2000. Making connections: relationships between international trade and glass beads from the Shashe-Limpopo area. *South African Archaeological Society Goodwin Series* 8: 78–90.

Appendix A

The recording techniques and approaches followed those outlined by Lotter *et al.'s* (2018) stone tool analysis workbook which are outlined in Appendix A.

Raw material definitions

The raw material definitions in this paper are borrowed from (Forssman 2014b) for the identification of the stone tool artefacts within the assemblage.

Quartz

This is the most common stone tool material in southern Africa and is flaked by MSA and LSA stone tool producers. Quartz can be found in the form of nodules or within other rocks and comes in a variety of colours, of which only clear and milky quartz are found in archaeological assemblages. There is a degree of unpredictability during flaking because of the presence of crystals in the rock.

Quartzite

Quartzite is a fairly coarse-grained sedimentary rock, composed of sand grains that have become interlocked due to recrystallisation making it a particularly hard rock.

Crypto-crystalline (CCS) materials

This term is used to cover a variety of different fine-grained siliceous rocks, notably chert and chalcedony. CCS materials vary in colour and composition due to the formation processes and the contexts of formation. For the purposes of this paper, CCS combines chalcedony, chert and agate into one CCS category.

Dolerite

Dolerite is considered a medium-grain igneous rock consisting of plagioclase (calcium, aluminium, and silicate) and pyroxene (calcium, magnesium and iron silicate) and is found in dykes or sills.

Artefact Types:

Artefact types in this paper are borrowed from (Walker 1994; van Doornum 2005; Forssman 2014b; Lotter *et al.* 2018), these will include both lithic artefacts, debitage and formal tool types. These will cover the types recovered from Little Muck Shelter in square J42, quadrants A and B.

Cores (van Doornum 2005; Forssman 2014b):

These are nuclei from which at least three flakes have been removed.

- *Bipolar or bladelet core*: a core from which blades or bladelets were removed.
- *Double platform core*: two striking platforms that are not opposite from one another.
- *Irregular core*: cores with multiple flake scars in no regular pattern.
- *Rice seed core*: a long narrow bipolar core that has been reduced in size and resembles rice seed. They are on average smaller than 15mm in length, and 5mm in width.
- *Casual core*: cores with random or haphazard removals of flakes (approximately 2-3 removals) in no regular pattern that are fewer than what would be deemed appropriate for the irregular core category.

Flake Pieces (Flakes) (Walker 1994)

Removed from cores, blocks or chunks showing characteristic bulbs of percussion etc.

They are separated into the following classes:

i. Blades – these narrow flakes, at least twice as long as they are wide.
ii. Wide-flakes – where length is less than twice width.
iii. Bladelets are pieces that are twice as long as they are wide and are smaller than blades.

Debitage stone artefacts:

- Waste material, has no evidence of utilisation or damage even though they may have been the result of use.
- Small Flaking Debris (SFD)/‘Chips’ (Walker 1994)*:* SFD pieces measure less than 10mm in maximum length. Some may be broken but may also be the by-products of tool or core production. No secondary working is evident on the SFD pieces.

- Chunks (Walker 1994): Angular nuclei have relatively few flake scars from flake production. Some could be shattered or worked out cores or flakes but are not recognisable as such. Other lumps collected for core manufacture and do not contain diagnostic features.

Formal artefacts:

Tools which have been retouched or backed to produce a standard shape.

Backed tools (Walker 1994; Forssman 2014b)

- More accurately backed bladed tools. The length is at least twice the width of the stone tools. The arc is steeply retouched or blunted. The chord is usually unmodified but may have irregular utilisation damage and rarely shaping along the whole edge. These are thought to have mainly been used as arrow inserts or tips. It is possible that some were also used as either knives or needles. All but the largest would have been hafted.

Geometrics (Walker 1994; Forssman 2014b)

- This is a type of backed tool with backing typically opposite the retouched edge. More commonly these are called segments or crescents. The steep retouch or blunting of the arc meets the chord on both ends. Sometimes the arc is angular or unretouched in the centre.

Backed blade (Lotter *et al.* 2018)

- Any blade that shows intentional backing along a lateral edge (≥25 mm).

Backed bladelets (van Doornum 2005; Lotter *et al.* 2018)

- Typically, these are pieces that are twice as long as they are wide, with backing along one of the straight, longitudinal margins (≥10 mm and <25 mm).

Miscellaneously backed piece (Misc. BP)

- Misc. BP form part of the backed tools as described by (Walker 1994; Forssman 2014b). These pieces may be similar to MRPs whereby they may be pieces discarded during the reduction process, unfinished tools or may not have required additional working, or are broken.

Segmented backed bladelet (Walker 1994)

- A backed bladelet with a steep retouch or blunting that resembles a segment.

Segments (Forssman 2014b)

- Steep retouch or blunting of the arc meets the chord on both ends. Sometimes the arc is angular or unretouched in the centre.

Miscellaneously retouched piece (MRP) (Forssman 2014b)

- MRPs have part backing along the mid-length of the arc. Others may be pieces discarded during a reduction process or simply unfinished tools. Others may not have required additional working or are broken.

Scrapers (Walker 1994; van Doornum 2005; Forssman 2014b)

Scrapers were determined as end, side, side-side, multiple, and thumbnail and based on the location of the retouch relative to the bulb. Scrapers have at least one edge with fairly acute angled 35˚ to 75˚ sharpening retouch, although subsequent damage may give the actual edge a more stepped profile. They were used for working hides, sticks and bone. They are variable in shape, and some have multiple working edges from being turned and retouched, thumbnail-shaped or long slivers. The variability in shape has no functional basis or temporal significance. Tools were separated into small (up to 20mm), medium (20mm-30mm) and large (more than 30mm).

- End scraper (Lotter *et al*. 2018): Removals occur parallel to the long axis of the artefact (at the polar end).
- Side scraper (Lotter *et al*. 2018): Removals occur 90° to the long axis of the artefact, forming a fairly straight scraping edge.
- Multiple scraper (Lotter *et al*. 2018): Complex scrapers with three scraper edges (e.g., double side and end).
- Convex scraper (Walker 1994; Lotter *et al*. 2018): A scraper with a convex working edge. Removals that occur along a face which is slightly convex in shape.
- Concave scraper (Walker 1994): A distinct concavity has been produced on the working edge. Generally believed to have been spokeshaves or woodworking tools.
- Backed scraper (Walker 1994): The side opposite the working edge has been blunted in a neat curve. These are also called biconvex or double crescents.
- Miscellaneous scraper (Walker 1994): The working edge is irregular, straight or denticulate.

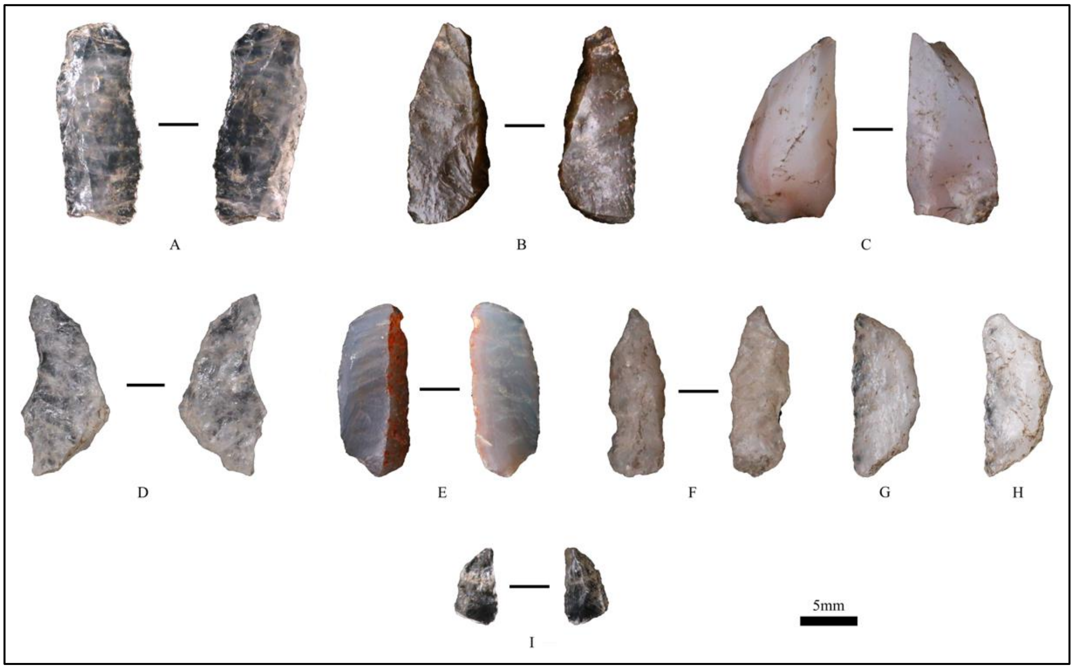


Figure A: Little Muck Shelter backed bladelets A-C and E, CCS backed bladelets; D, F, G-I, quartz backed bladelets.

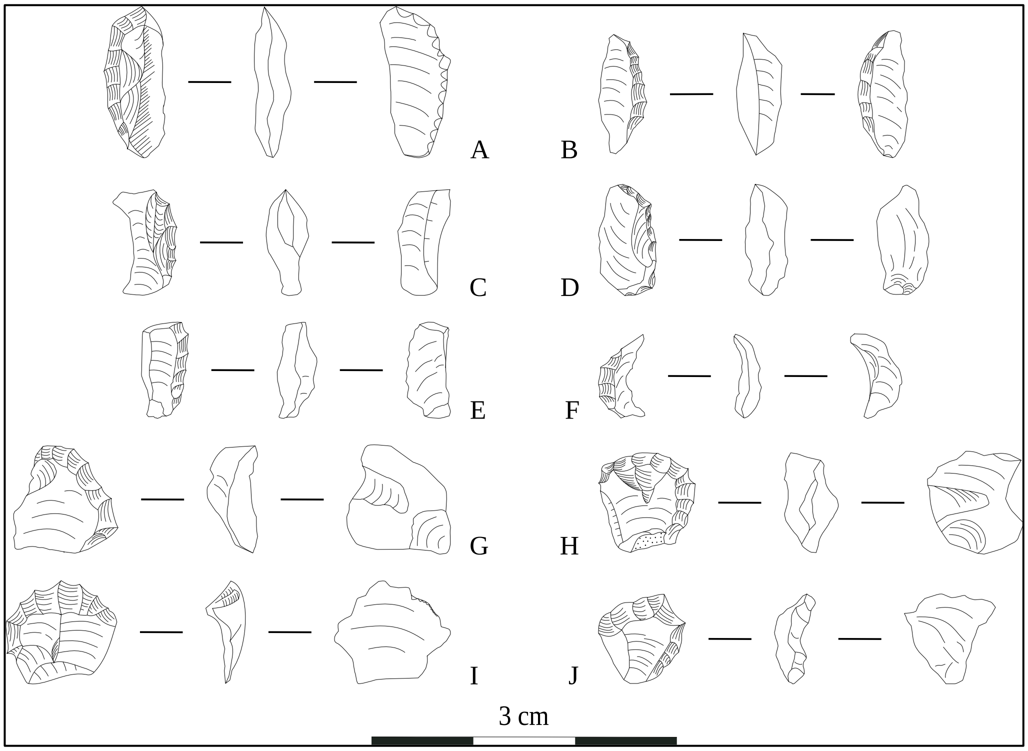


Figure B: Little Muck Shelter backed tools (A–F) and scrapers (G–J) from the second-millennium AD levels (left, dorsal; middle, profile; and right, ventral views) (Borrowed from Forssman *et al.* 2023, Drawing by Siphesihle Kuhlase).

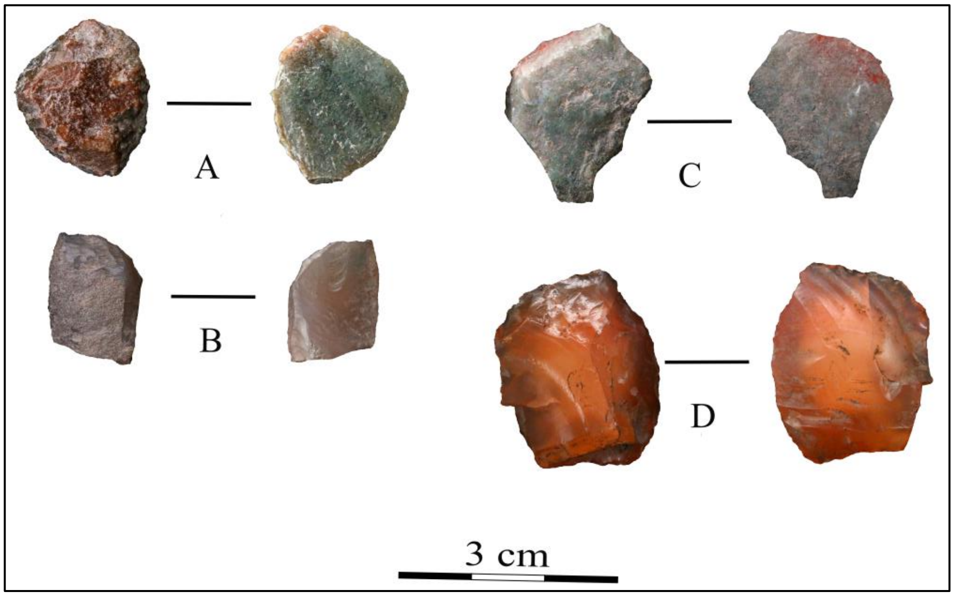


Figure C: Little Muck Shelter photograph of the dorsal and ventral views of scrapers. End scraper (A); side scraper (B); end-side scraper (C–D).

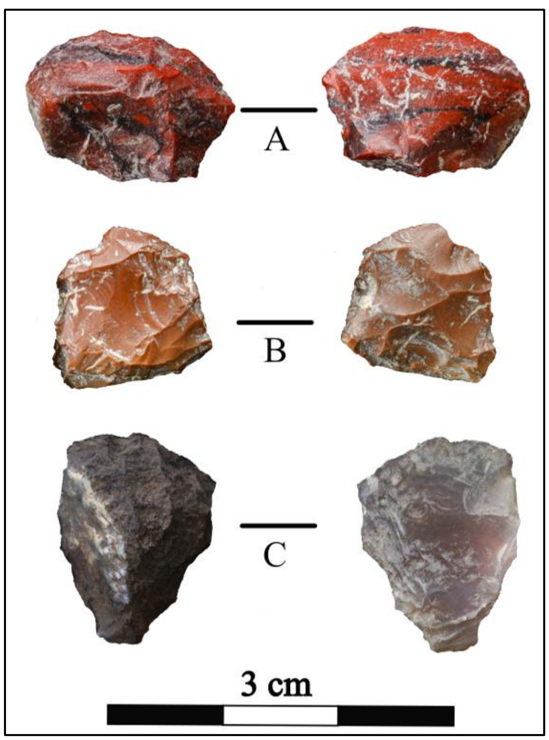


Figure D: Little Muck Shelter photograph of the dorsal and ventral views of cores. Single platform core with multiple removals (A); double platform core with multiple removals (B); single platform casual core (C).