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A CRITICAL ZOOARCHAEOLOGICAL EXAMINATION OF ANIMAL USE AND PROCESSING AT THE EARLY IRON AGE SITES LE6 AND LE7 IN THE KRUGER NATIONAL PARK.

by
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Declaration

I declare that the dissertation, which I hereby submit for the degree Magister Artium (Archaeology) at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution.

Ethics statement

The author, whose name appears on the title page of this dissertation, has obtained, for the research described in this work, the applicable research ethics approval.

The author declares that he/she has observed the ethical standards required in terms of the University of Pretoria's Code of ethics for researchers and the Policy guidelines for responsible research.

ABSTRACT

Le6 and Le7 are Early Iron Age settlements located in north-eastern South Africa in the Kruger National Park. These two open-air sites, immediately adjacent to one another on the west bank of the Letaba River, likely date to circa 500-800 AD. The wild-dominated Le6 and Le7 faunal assemblages allow for a site-level examination of the treatment of wild species within the highly variable spectra of Early Iron Age animal use.

Using previously unanalysed faunal material, this study moves beyond basic procurement interpretation to examine more than just the pure subsistence choices present at these hunting-dominated sites. Instead, new socially-focussed zooarchaeological questions are asked by coupling traditional morphological analysis with taphonomic analyses and theoretical frameworks of intensification.

Through this, both the procurement and processing methods utilised at Le6 and Le7 are identified and the significance of these choices are discussed. The occupants at these sites showed an intensive preference for predominantly adult large wild mammals. These were then processed in similarly consistent manners, with explicit focus on the largest, most easily accessible muscle groups and in-bone fat sources. Among other factors, the scant evidence of cooking and signs of speed in processing suggests the majority of preparation was focussed not on immediate consumption, but possibly on secondary transport of the animal resources off these sites. Altogether, rather than traditional residential Early Iron Age sites, Le6 and Le7 are considered as repeatedly re-used, shorter-term hunting bases for intensified, and possibly specialised, large wild mammal-use—a potentially new faunal use strategy and site type for the period and region. The socio-economic implications and potential drivers of these faunal choices are then considered within the broader context of the southern African Early Iron Age. The place of expanded zooarchaeological methods and theories in social archaeological questions—and more emic lines of site interpretation—is also introduced, here specifically presented in the context of re-exploring the role and significance of wild animals at two Early Iron Age sites.

Keywords: archaeology, social zooarchaeology, South Africa, Early Iron Age, intensification, taphonomy, butchery, Early Farming Communities, Mzonjani, archaeozoology

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PART I: BACKGROUND

Chapter 1: Introduction

From time immemorial, animals have played intrinsic roles in human history (e.g. Russell 2011). Whether as simple dietary contributions, markers of cultural identity, or symbols of wealth and ritual import, animals are a key part of society in any time or place (e.g. deFrance 2009; Russell 2011). Within archaeology, there has been increasing recognition both of these myriad roles and of the type of questions zooarchaeologists can both ask and answer (e.g. Sykes 2014). Beyond simple species' lists, whole new realms of archaeological questions are open to exploration through faunal analyses (e.g. ibid.). From these, one can gain insight not only into animal use itself, but also into the human intent and choices behind it (e.g. Russell 2011; Sykes 2014).

By acknowledging this potential, zooarchaeology offers very promising new routes for exploring the spectrum of Early Iron Age (EIA)[1] animal exploitation in southern Africa and the broader socio-economic implications therein. This thesis seeks to do so through an in-depth study of previously un-analysed faunal material from Letaba 6 (Le6) and Letaba 7 (Le7), two small EIA sites located in the Kruger National Park (KNP).

1.1 The Early Iron Age in Southern Africa

Around 1,800 years ago Bantu speakers began moving into southern Africa (e.g. Huffman 2007: xi). With them came new production methods and technology (e.g. domesticated flora and fauna, metal tools), various associated ceramic styles, and distinctive settlement characteristics (ibid.). These materials and agro-pastoral practices have come to serve as defining factors for the identification of Iron Age (IA) peoples within the southern African archaeological record (ibid.). Far from a uniform presentation of material culture and

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[1] The earliest period of Iron Age settlement, identified as 200 to 900 AD in southern Africa (e.g. Huffman 2007: xi, 331).

subsistence strategies, southern African IA sites express a great deal of variation in the manifestation of these elements (e.g. Huffman 2007; Maggs & Whitelaw 1991; Voigt 1986). This diversity is evident in both ceramic industries and food use, particularly at EIA sites.

Though partly coinciding in time and space, EIA and Later Stone Age (LSA) peoples are seen as distinct groups (e.g. Huffman 2007: 331). Yet there are economic similarities between the two, as LSA foragers occasionally herded (e.g. Sadr & Plug 2001; Sadr et al. 2003) and EIA Bantu-speaking agro-pastoralists also hunted (e.g. Plug 1989a). However, EIA and LSA groups are treated as significantly different entities (e.g. Huffman 2007: 331). As there can be overlap and confusion within the terminology employed (e.g. herder, hunter-gatherer), I will exclusively use ‘agro-pastoralist’ to describe the EIA mixed-farming Bantu-speakers, and ‘forager’ when referring to LSA peoples.

Presenting such cleanly delineated terms (e.g. EIA versus LSA, and agro-pastoralist versus forager) implies strict dichotomies that may not truly reflect more fluid realities (*cf.* Maggs & Whitelaw 1991; Mitchell 2002: 259). However, I retain them here, as I work within the previous interpretations and hope to shed new light on more emic details pertinent to the nature of these sites and their place within the broader frameworks of the period.

1.2 Research Aims

A central aim of this thesis is to incorporate faunal analyses into broader social questions—to move beyond procurement and into an exploration of the types of socio-economic factors that shape and drive choices in animal use.

While some work in southern Africa has focussed on the social implications and use of domestic species (e.g. Hall 1986; Huffman 2001; Kuper 1982; Voigt 1986), there has been significantly less attention paid to the role of wild species during the EIA. Le6 and Le7 are both sites at which the procurement strategies suggest an almost exclusive reliance on wild animals. Therefore, to better understand these sites, their place within the EIA landscape, and what motivated these animal-use choices, it is essential to recognise two points. One is the role of the wild animal component in EIA foodways and society. The other is how the manner of processing may further illuminate faunal exploitation strategies—a focus not only on how animals were acquired but also how they were then used, and what those choices imply.

Previous work done on the EIA in the KNP area has identified a regional pattern of hunting-reliant subsistence strategies (Plug 1989a). However, the post-procurement practices remain to be established. Therefore, this project seeks to identify both site-level procurement strategies as well as processing patterns at Le6 and Le7. This may aid in refining the view of animal exploitation beyond ‘mostly wild’ and allow the identification of nuances in use that illuminate the priorities within that hunting focus. Additionally, I address the possible implications of such use and explore a potential manifestation of intensive hunting and processing at these two small, wild-dominated sites. The questions framing this study and the theoretical framework behind them are discussed in Chapter 3.

1.3 Thesis Outline

This study is broken into three parts: Background material [Part I], Results [Part II], and Conclusions [Part III]. In Part I, Chapter 2 introduces the KNP itself and the geographic location of the sites. The previous archaeological work done in the KNP and on Le6 and Le7, as well as their excavation histories and the other materials within their assemblages, are discussed in this chapter. New radiocarbon dates are also presented. The EIA context of animal use—and the zooarchaeological investigations of it—are discussed Chapter 3, along with the new analytical and theoretical approaches that have arisen in the field. This chapter also outlines the theories of intensification and specialisation that shape this study’s research aims, along with the research questions derived from those aims. The methodology of the zooarchaeological and taphonomic analyses employed are described in Chapter 4. Part II then presents the results of these analyses. Chapter 5 discusses the types of species present, while Chapters 6 through 11 explores the taphonomy of these assemblages. The potential interpretation of these faunal patterns and what that may mean in terms of the active economic strategies in use at Le6 and Le7 are discussed in Part III in Chapter 12. This chapter concludes with the impact of these findings for the nature and classification of Le6 and Le7, their place within the broader background of EIA animal use, and potential routes for further research.

Chapter 2: Background

Providing an overview of both the physical and archaeological background of the KNP and Le6 and Le7, this chapter begins by examining the location and climatic details of the KNP (section 2.1). Section 2.2 moves on to discuss the history of human presence in the park. From there, the specific details of Le6 and Le7's location will be described as well as the excavation history of these sites (2.3). Section 2.4 discusses the physical attributes of these sites, as well as the various materials recovered from them. The dates available for these sites are examined in section 2.5. Chapter 2 concludes by listing the Le6 and Le7 features employed in this study (2.6).

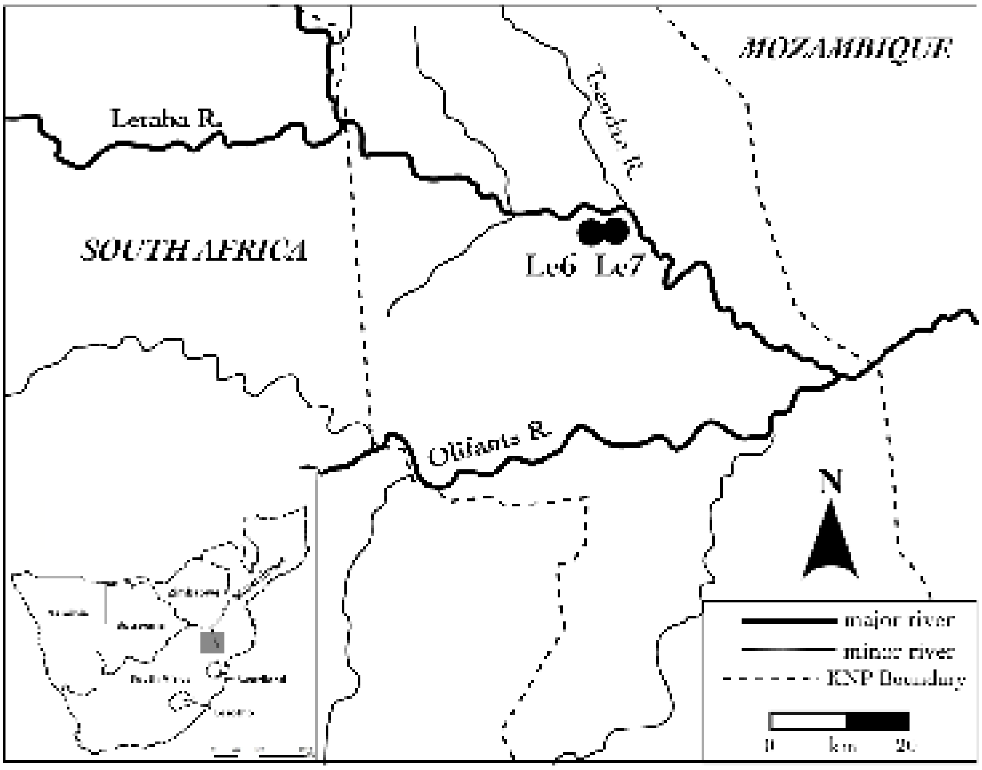

Fig. 2.1 Location of Le6 and Le7 within the KNP (the eastern boundary of the KNP marks the border between South Africa and Mozambique).

2.1 The Kruger National Park

The KNP lies in the north-eastern corner of South Africa (Fig. 2.1), bordering Mozambique along its eastern edge. The park covers nearly two million hectares of land (Joubert 1986), with elevations ranging from 100m to almost 1000m above sea level (Meyer 1984). Mostly between 200m and 500m above sea level, the landscape shifts from granitic rolling hills in the west to predominantly basalt flatlands in the east, where the Lebombo Mountain range punctuate the eastern border (Joubert 1986). Temperatures range from a summer maximum of 40°C in the northern areas of the park down to winter minimum of 10°C in the south-western section (*cf*. Gertenbach 1980; Joubert 1986; Meyer 1984). Annual rainfall levels also fall on a gradient, from around 450mm per annum in the northern half to 700mm in more southerly regions (Gertenbach 1980). These rains help feed the main rivers that cross the park: the Limpopo, Shingwedzi, Sabie, and Crocodile, and their main tributaries, including the Letaba, as well as seasonal streams (Joubert 1986).

Broadly classified as either savanna or mixed savanna and woodland areas, the park consists of a mosaic of arid lowveld and mopane veld environments (Gertenbach 1983). Gertenbach (1983) identified 35 different landscapes types within the park borders. This vegetative diversity supports a vast variety of animal species, from birds and reptiles to myriad antelope species and mammalian predators of all sizes, as well as giraffes, rhinoceros, hippopotamus, and elephants (e.g. Joubert 1986).

Despite the wild biodiversity in this region, the climate and ecology of the KNP is generally classified as unfavourable for both agriculture and domestic animals (e.g. Meyer 1984; Plug 1989a). Soil types[2], low annual rainfall, and erratic droughts (*cf*. Gertenbach 1980) combine to inhibit agricultural potential in most of the park (e.g. Meyer 1984; Plug & Pistorius 1999). The predominant vegetation zones present mixed grazing value for domestic livestock (e.g. Plug 1989a). In the northern mopane veld, grass is sparse but mopane leaves proffer nutritious browse so long as the low carrying capacity of the environment is not breached and the livestock can tolerate the hot and arid conditions (ibid.). The arid lowveld of

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[2] KNP sites are composed of ferisiallitic soils, shallow sands and clays with little water retention, and saline, alkaline soils (e.g. Gertenbach 1983; Plug 1989a).

the southern half of the park offers poorer grazing and an even lower and more sensitive carrying capacity, further depressing the potential size of sustainable herds (ibid.). There are also a variety of diseases endemic to the region, including nagana, foot-and-mouth disease, African horse sickness, malignant catarrhal fever, and other fly and tick-borne diseases, as well as periodic bouts of Tse-Tse fly presence (Plug 1989a; Wint 2008). While wild species are natural hosts and rarely exhibit any symptoms, domestic animals have little, if any, tolerance for these diseases and they often prove lethal (e.g. Plug 1988: 313-314, 1989a; Titoy 1994; De Vos n.d.). Together, these factors make the KNP region a relatively hostile environment for both domestic plant and animal species (e.g. Meyer 1986: viii; Plug 1988, 1989a).

The paleoenvironmental work carried out in the Kruger National Park indicates that the climate there today is much as it was during the first millennium AD, although there was possibly greater water availability during the EIA (whether due to greater annual rainfall or other, anthropogenic causes) (e.g. Gillson & Ekblom 2009; Plug 1989a: 63; Plug & Pistorius 1999: 162).

2.2 Humans in the KNP & Past Archaeological Work

The KNP also boasts a rich archaeological record (e.g. Meyer 1986). The history of human presence in the park stretches from the present and historical periods (e.g. Van Vollenhoven et al. 1998) back into the Stone Age, spanning more than 9,000 years (e.g. Meyer 1984; Plug 1988: viii). Meyer (1986: 219, 297) believed the first IA peoples moved into the park between AD 400 and AD 600. Mahlangene 38 (Ma 38) was dated to AD 470 ± 50 (Pta-3725) (Meyer 1986: 221), making it the earliest IA site in the park. Therefore, it is clear that agro-pastoralist peoples had moved into the KNP region within the first few hundred years of the first millennium AD. This IA presence continued until the end of the nineteenth century (e.g. Meyer 1986: viii). There is an evident gap or sparsity in occupation of the KNP from around AD 900 through AD 1500, as few sites found date to that period (Meyer 1986: 220).

To explore this human presence in the park, the University of Pretoria's Archaeology Department started research in the KNP in 1976 that continued through the 1980s (Meyer 1986: 5; Plug 1984a; see also Eloff 1977, 1978, 1979, 1980). What began as a regional survey of sites expanded into a broad-scale analysis of the IA sites in the KNP (e.g. Meyer 1986: 4-6; Plug 1988). The aim was to identify the various cultural groups present and construct "a cultural historical framework" (Meyer 1986: viii) for the KNP. Meyer (1986: 304) identified at least seven ceramic industries within the park EIA sites' assemblages (but see Maggs & Whitelaw 1991 for a different interpretation of the ceramic data). Within these broader traditions are many subsets of differentiated complexes and clusters (e.g. Huffman 2007; Meyer 1984, 1986). This variation led Meyer (1984) to classify the KNP as a transitional or frontier area. He described different populations moving into the area, creating a diverse ceramic landscape in this zone of overlapping influences emanating from traditions in areas such as Zimbabwe, Mozambique, the Soutpansberg area, and KwaZulu-Natal (e.g. Meyer 1984). Moreover, the majority of EIA sites were smaller than two hectares, indicating small populations (e.g. Meyer 1986; Plug 1988: 310-311, 1989a). Neither Plug nor Meyer saw evidence of status differences amongst these sites, which added to this designation of "peripheral" (Plug 1988: 357) or "marginal" (Meyer 1984: 225, 1986: viii) for the KNP region.

Complementarily to the cultural history work, Plug (e.g. 1988: 8) examined both economic activities and environmental conditions in the KNP during the EIA. Plug assessed the subsistence strategies employed in this period (1988: 302-326, 1989a), and used archaeological animal distributions to identify the state of the natural environment during the IA in the KNP region (1988: 288-298, 1989b). Plug's (1988: 317) research showed IA KNP subsistence patterns were predominantly reliant upon wild species to meet animal protein needs. While domestic species such as cattle, sheep, and goats were present at most of the IA sites in the KNP, they never constitute the majority of the faunal remains (Plug 1988: 312). Therefore, Plug (e.g. 1988: 317,327) characterised the IA in the KNP as having a mostly hunting economy, with differing degrees of snaring, gathering and fishing adding to the wild resource exploitation at each site. In terms of the broader interpretations of EIA life in the KNP, the relative rarity of domesticates at most sites also tied into notions of peripherality (Plug 1988: 357).

It should also be noted that while Plug (1988: 326) did explore age profiles as a means for identifying seasonal hunting patterns in the KNP, she found that data inconclusive. She attributed this in part to potential selective transport of adult animals back to the sites after communal hunts, as well as to the fact that lambing/calving seasons may last for many months (ibid.). This latter aspect means the presence of young animals in an assemblage may “not allow reliable determination of hunting seasons” (Plug 1988: 326).

There was also some discussion of taphonomy within Plug’s (1988) dissertation. However, as her (Plug 1988: 56,71,277) aim was not the exploration of processing patterns, these taphonomic analyses were mostly focused on the problems associated with differential destruction of skeletal elements. This type of attrition can substantially affect species identification, and these identifications were the most fundamental element of analysis in that type of subsistence study. Therefore, such focus in the taphonomic analyses is understandable. The butchery and burning data Plug (1988: 330-338) did record from sites was collated into a single set and synthesised to produce a KNP and IA-wide model of butchery and preparation habits.

The work of Meyer (1984, 1986) and Plug (1988, 1989a, 1989b) provided invaluable overviews of life throughout the IA and across the breadth of the KNP. These wide ranging, cumulative studies provided the broad base upon which to carry out this current fine-scale examination of animal use at Le6 and Le7.

2.3 Le6 & Le7: Location and Excavation

Le6 and Le7 immediately neighbour each other on the west bank of the Letaba River (Meyer 1986: 149) (Fig. 2.1). Only about 100 metres apart, these sites are currently separated by a large donga, although when the donga formed is unknown (e.g. Meyer 1986: 149; Plug

1988: 135). Erosion gullies also threaten the sites, as they are intersected by many game trails and elephant tracks leading to the river (Plug 1988: 135).

In general, the EIA sites in the KNP are open air sites that sit on the sandy banks of a river (Gertenbach 1983; Meyer 1984; Plug 1989). Moreover, these EIA sites often appear in mopane and arid veld landscapes that proffered at least some grazable land for domestic species (ibid.). Le6 and Le7 fit this pattern (ibid.). As mixed agro-pastoralists, a suitable water supply, soil appropriate for crops, and grazing land for livestock would all have shaped the selection of settlement locations (e.g. Huffman 2007: 3,340; Meyer 1986; Plug 1988: 307). However, as the soils in the KNP, and around the settlement sites chosen, tend to be alkaline and "brackish" (e.g. Plug 1989a: 63), it is unlikely that there was much agriculture practiced at Le6 and Le7. This is in addition to the general grazing restrictions for domesticates in the region (see above).

2.3.1 Excavation(s)

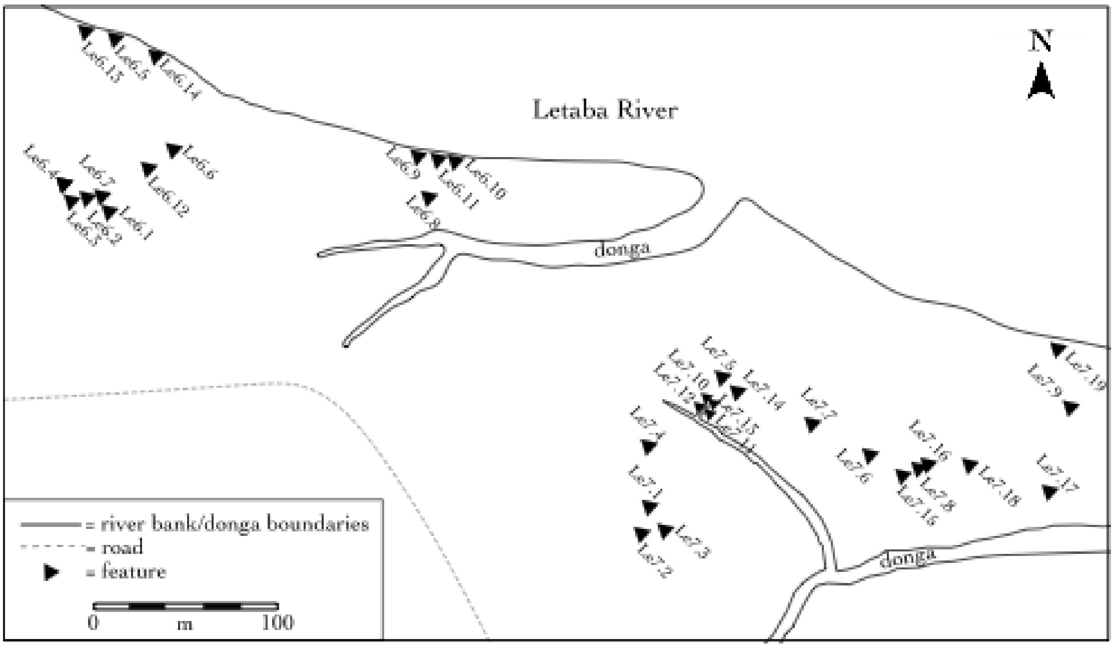

Fig. 2.2 Location of excavated features from 1979 season at Le6 and Le7 (adapted from Meyer 1986: 149).

Surveyed in 1977 and 1978 (Eloff 1977, 1978), Professors Eloff and Meyer excavated Le6 and Le7 in 1979 (Eloff 1979) (Fig. 2.2). Meyer's doctoral dissertation (1986) contains full details on the excavated features (ibid.: 102-106), diagrams of the sites and profiles of features (ibid.: 149-155), and a summary of all material found on the two sites (ibid.: 187). Plug's (1988: 135-144,147,152-176) doctoral dissertation also presents full descriptions of the faunal material she analysed from the two sites.

As per Meyer's (1986: 65) method, Le6 and Le7 sites were surveyed and mapped then gridded. Identified and selected features were then marked and recorded within this grid, and either surface concentrations were collected, test trenches were opened, or the full extent of the feature was plumbed, depending on the size and type of feature (e.g. Meyer 1986: 102-106). Test trenches were generally opened in ash heaps (e.g. feature Le7.7) while pits were fully excavated to sterile soil (e.g. ibid.) (see section 2.4.1 for discussion of feature types). Eloff and Meyer mostly focused on features closest to the river (I. Plug pers. comm.), as they believed these features faced increased danger of erosion either through flooding or by animals cutting down through the banks to the river. This does mean that the features present are not a random sample of the sites nor a quantitatively representative selection of features on these sites. However, from what was visible on the surface, no ash heaps nor hut floors were identified on Le6, and only two hut floors were identified on Le7 (Meyer 1986: 102-106, 149-155). This suggests that the dearth of those types in the analysed features is at least partly due to real absence rather than selection bias.

The faunal material presented in this thesis was neither recovered from the 1979 excavations nor part of Plug's (1988) analyses. Instead, it was recovered during later excavations that Professor Eloff led at Le6 and Le7 in June and July of 1987 and 1988 (I. Plug pers. comm.). As yet, no records, reports, nor permits from these excavations have been found in the University of Pretoria libraries, in the South African Heritage Resources Agency (SAHRA) databases, or elsewhere. The only context and excavation information available is that proffered by three sources. One, labelling on the assemblages' original packaging, which indicate the site (Le6 or Le7), feature name, level, and occasionally the date excavated. Two, through personal accounts by excavators on those projects, who confirmed that these features were in fact from Le6 and Le7 and that similar excavation and collection techniques to Meyer's (1986: 65) were used (I. Plug pers. comm.). Thirdly, from contextual information yielded by the assemblages themselves. These sources make it clear that the material presented here comes from the same types of features as those discussed in Meyer's (1986) and Plug's (1988) work (i.e. ash filled pits, ash middens, surface concentrations - discussed further in Chapter 4) and was recovered using similar techniques to those discussed below.

- *Excavation & Collection Methodologies*

The methods used in excavation and collection are particularly influential in terms of the composition of a collected faunal assemblage and the depths of interpretations that can be derived from it (Cannon 1999; Lyman 2008: 141; Plug 1988: 48; Reitz & Wing 1999: 117-118, 146-151). Aspects such as the use or presence of certain species and the degree of identifiability simply cannot be accurately answered if certain standards of retrieval have not been met (ibid.). Problematic excavation methods include the biased collection of remains by untrained or non-specialists (e.g. Reitz & Wing 1999: 150-151), and the use of no or too large sieves. The latter may result in the loss of micro-remains (such as fish and rodents) (e.g. Stahl 1996; Zohar & Belmaker 2005) and as well as bones from small carnivores, small bovids, and other small mammals, which can greatly affect the comparison of small versus large taxa on a site (e.g. Cannon 1999).

Given the importance of collection strategies, it is ideal that a zooarchaeologist (I. Plug) both designed and personally implemented the faunal retrieval methods at Le6 and Le7. As with the material used in her doctoral dissertation, Plug (1988: 48) dictated that where found, faunal material was hand collected and that all other excavated soil was sieved first through large screens, then a 5mm x 5mm screen, and finally through a mosquito mesh of 2mm x 2mm. All faunal material, however small, was collected (ibid.). This ensured both the retrieval of large, easily spotted, and easily identified remains as well as those that would otherwise slip through larger screens, be missed, or be considered inconsequential by the non-specialist. Plug's (1988) methodology means this material may be considered to have minimal excavation and collection biases.

In addition to personal confirmation that these practices were used at these later excavations of Le6 and Le7 (I. Plug pers. comm.), the composition of the assemblages themselves testify to such methods. The faunal remains range in size from almost complete giraffe scapulae down to fish vertebra that are only just over a millimetre in diameter (and would certainly have been missed if very fine sieves had not been used). The assemblages also include easily identifiable complete bones as well as minute, non-identifiable miscellaneous bone fragments, suggesting that all faunal material was collected. The presence of these very small, and especially non-identifiable, pieces provide sound evidence that such careful collection strategies were utilised. Additionally, Meyer (e.g. 1986: 102-106) and Plug (1988: 48) used trowels for most of the excavating. The presence of trowel damage on some fragments testifies to their use in the later excavations as well.

- Post-Excavation History of the Material

Since their excavation in the late 1980s, the later Le6 and Le7 assemblages were originally housed at the Ditsong National Museum of Natural History (DNMNH - formerly the Transvaal Museum). Around 2010 they were moved to the University of Pretoria (UP) (S. Badenhorst pers. comm.). At both locations, parts of the assemblages had been partially sorted and certain bags assigned in-house labels. At UP, a small part of Le6 had been re-packaged and partly re-labelled with assigned in-house ‘Kruger Park' (KP) accession numbers belonging to a database now lost. Three bags from Le7 also contained ‘Transvaal Museum’ (TM) numbers (‘TM 39’, ‘TM 40’, ‘Tmh04’), which also appear to belong to an obsolete database. The efforts made to identify and rectify these, and other, collections issues are discussed in section 4.1.

2.4 Le6 & Le7: Site Attributes and Recovered Material

2.4.1 Site Attributes

Spanning almost eight hectares each, Le6 and Le7 are two of the largest EIA sites identified in the KNP (Meyer 1986: 149; Plug 1989a). Like most other EIA sites in KNP, Le6 was identified as a single occupation event (Meyer 1986: 226). Conversely, Meyer (1986: 223) identified two occupations events on Le7: an earlier occupation (Le7a) and a later, re-occupation (Le7b). Based on ceramic style and radiocarbon dates from Le6 and Le7b (section

2.5), Meyer (1986) believed that Le6 and Le7 were created by settlement shifting and re-occupation of the same area, resulting in an amorphous, palimpsest-like distribution of features. Consequently, he believed that Le7a was the earliest occupied. This occupation was followed by a gap, after which Le6 was occupied, with a final shift back over to Le7b after a relatively short period of time (ibid.). It should be noted that the two occupations at Le7 were not distinguished through stratified, overlapping deposits, as all features excavated were interpreted as single depositional events (Meyer 1986: 102-106,149-155). Instead, features relating to either Le7a or Le7b were differentiated by their ceramic contents (Meyer 1986: 223). Certain features lacked the ceramics necessary to align them with either Le7a or Le7b. These ambiguous features were ascribed to ‘Le7c’ in Plug's (e.g. 1988: 140) analyses, to label the assemblages with more indeterminate temporal and cultural association. These possible phases of occupation will be re-addressed below in section 2.5.

The features on these sites fall into four categories: ash-filled pits, ash heaps, hut floors, and surface concentrations of artefacts (Meyer 1986: 102-106; Plug 1988: 139, 142). As these surface concentrations were usually circular, they are likely to have been eroded pits (Plug 1988: 142). Pits are the most common feature in the excavated EIA sites of the KNP as a whole as well as at Le6 and Le7 (Plug 1988: 337). In terms of examining faunal use over times, these small pits are ideal as they fill up quickly and so “represent small capsules of time” (Plug 1988: 337). In contrast, ash heaps are expected to present a slightly longer period of use (ibid.). Therefore, the presence of pits and ash heaps at Le7 and pits at Le6 offer the opportunity to study animal use within depositions events of varying lengths.

As many of the features utilised in this thesis did not possess contextual labelling, the possible context type of each feature will be discussed in section 4.1. However, as pits, ash heaps, hut floors, and surface concentrations were the only types of feature identified on Le6 and Le7 (Meyer 1986; Plug 1988; A. Meyer and I. Plug pers. comm.), it is likely that each feature in this study is one of those types.

There were not equal representations of each type of feature on each site. Unlike Le7a and Le7b, no ash heaps were identified on Le6 (Meyer 1986: 102-106,149-155; Plug 1988:

142). All Le6 features consisted of either ash-filled pits or circular surface concentrations similar to those on Le7 (ibid.). Only two hut floors were identified, both on Le7: Le7.6 and 7.19 (Meyer 1986: 104,106,152,155).

2.4.2 Material Culture & Previous Work

- *Ceramics*

Meyer (1986: 223-224) described the ceramics of Le7a as early Eiland Matola, related to Mutlumuvi industry of the Soutpansberg, a type now described as the Mzonjani facies (Antonites 2005: 24). Ceramics of Le7b as belonging to the Balule industry (Meyer 1986: 227), although these can be seen as a later variant within the Mzonjani facies (e.g. A. Antonites pers. comm.). This Mzonjani facies would place the ceramics of Le7 within the Kwale branch of the Eastern Stream.

Meyer (1986: 226-227) ascribed the Le6 ceramics to the Tsende industry, with elements from both the Gokomere-Ziwa complex in Zimbabwe and the Dambwa complex of south-western Zambia, which belong to the Nkope branch of the Central Stream.

Alternatively, Huffman (2007: 239) classifies the ceramics from Le6 and Le7b as belonging to the Malapati facies, which would associate them with the western stream Kalundu tradition. Plug (1988: 139, 142) also discussed the possibility of the ceramics from Le6, Le7a, and Le7b instead being related to the western stream Plaston (now known as part of the Malapati facies [*cf.* Huffman 2007: 239]) and Klein Africa ceramics.

More recently, Jordaan (2011) reanalysed the ceramics from select features of Le6 and Le7. Using ceramics from Le7a (features 7 and 7.9), Le7b (7.7 and 7.8), and Le6 (all features), Jordaan (2011) carried out a fine-scale functional and stylistic analysis so as to examine inter-/intra-site variation and diachronic relationships between these two sites. He (Jordaan 2011) found subtle variations that did not rule out associations between the occupations, but needed more dating of the features and material to clarify their actual temporal relationship.

Having been separately attributed to all possible streams and multiple facies, past ceramic studies of Le6 and Le7 lack interpretive consensus. While needing a more in-depth analysis, a brief examination of the ceramics from the more recent excavations show both similarities to past work (in the facies present), as well as new aspects in the pottery presence at Le6 and Le7.

- *Ceramics from Features in this Thesis*

On Le6, two features (6.29 and 6.31) appear to be Mzonjani (in the later, more recent range of the phase), two features (6.25 and 6.26) are possibly Mzonjani or Garonga, while others (6.28s and 6.30) appear as a distinct Malapati phase (A.Antonites pers. comm.). This Malapati phase is most likely a different occupation event from that yielding the Mzonjani-containing features (ibid.). This would differ from Meyer's (1986) single occupation interpretation of the site, and will be discussed in chapter 12.

On Le7, all features used here present some form of Mzonjani ceramics, with Le7/F4/e2 (Le7.9) ceramics likely belonging to the earliest end of that phase, and the other features (Le7.30, 7.31, 7.32, and 7.33) showing later variations within Mzonjani (A.Antonites pers. comm.) This again demarcates those Le7b features as a later occupation (or occupations) than that of Le7a. This is not incongruous with Meyer (1986) and Jordaan's (2011) findings.

Altogether, Antonites (pers. comm.) believes that the Le7 features and the Mzonjani-associated features on Le6 represent a long term though discontinuous Mzonjani presence in this area. These features present a great deal of variability within their Mzonjani classification, with no express stylistic continuity beyond the broader characteristic of their associated facies (ibid.). This would align with Jordaan's (2011) findings of small-scale but notable stylistic variations between the described occupation events. The implications of this interpretation will be discussed in chapter 12.

- *Fauna*

Plug's (1988) faunal analyses will be discussed in greater detail in conjunction with the results of this analysis in later chapters, but are presented here in brief.

Plug (1988: 140,142) specifically mentioned the wide variety of taxa present at both sites. This includes species not commonly found at EIA sites, such as baboon, lion, aardvark, crocodile, bushpig, and ostrich bones (Plug 1988: 152-154, 168). Plug (1988: 141) also noted that on Le7 the majority of both domestic and wild animals identified were adults, with very few young or very old specimens. On Le6, the wild species were also mainly adults, while a number of the cattle remains were from young or very young individuals (Plug 1988: 143). She believed this evidently high juvenile mortality at Le6 likely represented the impact of a fatal disease (Plug 1989a). She mentions that other socio-cultural activities (such as ritual slaughter) may have created this mortality profile, but believes that lack of spatially concentrated disposal of these animals points to environmental rather than more anthropogenic causes (ibid.). In general, Plug (1988, 1989a) discusses the very high prevalence of wild species, and large wild species in particular (e.g. 1989a), at these sites, which again fits in with the overall EIA faunal use patterns in the KNP.

The taphonomy of these assemblages is briefly mentioned (Plug 1988: 140,141,143) and tallied in summary tables (ibid.: 162,73). Plug (1988: 141,143) mentions the common occurrence of chop and cut marks on the bones present.

- *Shell Beads*

Both ostrich eggshell (OES) and achatina beads were found on both Le6 and Le7 (Meyer 1986: 187; Plug 1988: 351-352). The majority of beads from both sites were finished, with no OES bead blanks identified from either site (ibid.). One Achatina blank was found on Le7 (ibid.). Achatina beads greatly outnumber OES beads at Le6 and Le7, which is a trend Plug consistently found at EIA sites in the KNP (1988: 341,351-352). There was also one OES bead from Le7 with “traces of red colouring matter” (Plug 1988: 344). A greater discussion of both Plug’s (1988: 340-344) bead findings and the results of the current analysis will be discussed in section 5.6.

- *Bone Tools*

Both Le6 and Le7 yielded bones tools, as did most of the other sites in the KNP (Plug 1988: 141,143,345). The tools from Le6 and Le7 were very well polished and thoroughly smoothed. The bone tools from Le6 consisted of mainly of “projectile sections” (Plug 1988: 143), i.e. segments of bone points or arrow linkshafts. Le7’s bone tools also consisted mainly of either complete or fragmented points and/or linkshafts, with a few informal tools as well

(Plug 1988: 141). Other formal bone tools were also found at Le7, as well as a rib fragment (with one end wholly polished smooth and rounded) and a bone tube (made from the tibia shaft of a Bov. I size shaft) (Plug 1988: 345). Plug (1988: 347) also describes two long bone fragments from Le6 and Le7 that had “one side each flaked into a scraper edge”. Additionally, another bone fragment from Le6 displayed a surface marked with distinct shallow striations, all following the same direction (ibid.).

- Metals

Meyer (1986: 187) identified slag and ore on both Le6 and Le7. He also found remains of iron on Le6, and remains of blast pipe(s) and copper on Le7 (ibid.). However, Meyer’s (1986: 187) tables do not describe from which features or occupations these metal remains stem, which may influence interpretation of occupation and activities on these sites.

- Lithics & Stone Implements

A variety of lithics were found on both sites. Meyer lists a general “stone age tool” type (1986: 187, own translation) at both sites (which presumably includes microliths and other stone points typically associated with foragers) as well as ‘Iron Age’ (i.e. agriculturalist) implements. These included a grind stone at Le7, and grooved stones on Le6 and Le7 (Eloff 1979; Meyer 1986: 187). It is interesting to note that, just as with the bone tools, projectile type artefacts are the most common at both sites.

- Other Materials

“Perforated pottery disks”, tentatively identified as spindle whorls, were found on the surface of Le7.7 (Le7b feature - dated to AD 830 ± 50 (Pta-3478)) (Plug 1988: 139). If contemporary with the EIA occupations, this would be an early appearance of spinning technology. However, the disks in question are smaller than typical spindle whorls from later periods and their interpretation should be approached with caution (A. Antonites pers. comm.). A clay figurine fragments was also listed from Le7 (Meyer 1986: 187).

A variety of glass beads were found in other grid features excavated during these 1987/1988 excavations of Le7. The presence of these beads indicate an additional, much later occupation on Le7, which may relate to the potential spindle whorls found on the surface and the metal working described above. The material from these features was not included in this thesis.

2.5 Dating

Meyer (1986: viii) saw two peaks of IA settlement (in terms of number sites found that date to those periods) within the KNP. The first was in AD 700-900 and the second AD 1700-1900 (ibid.).

Initially, two radiocarbon dates were analysed for Le6 and Le7, both from bone collagen (Meyer 1986: 326-327). Le6 (feature 6.14) yielded a date of AD 790 ± 50 (Pta-3491), while a feature from the later occupation at Le7 (Le7.7) produced a date of AD 830 ± 50 (Pta-3478). The earliest occupation at Le7 was relatively dated to AD 300-600 based on ceramic style (*cf*. Meyer 1986: 223). Ten new samples (three on charcoal, and seven on bone) were submitted for dating in 2014.

The Le6 and Le7 samples (Fig. 2.3) are from six different features (including Meyer's samples). As both charcoal and bone collagen (hereafter merely collagen) were used, a few features were dated using both materials to identify any divergence between their resultant dates.

There are disparities between samples from the same contexts (e.g. D-AMS 005489, D-AMS 010519, and D-AMS 010520, all of which come from feature Le7/F4/e2). The charcoal-based dates (as marked by an asterisk) are consistently earlier than those produced from collagen in the same features. Apart from D-AMS 010519 (Le7/F4/e2), the collagen data generally group together over a roughly 300 year period. These collagen dates are also a few hundred years younger than those generally associated with Mzonjani ceramics (e.g. Huffman 2007: 126). The charcoal dates from these three sites more comfortably align with those expected of this facies.

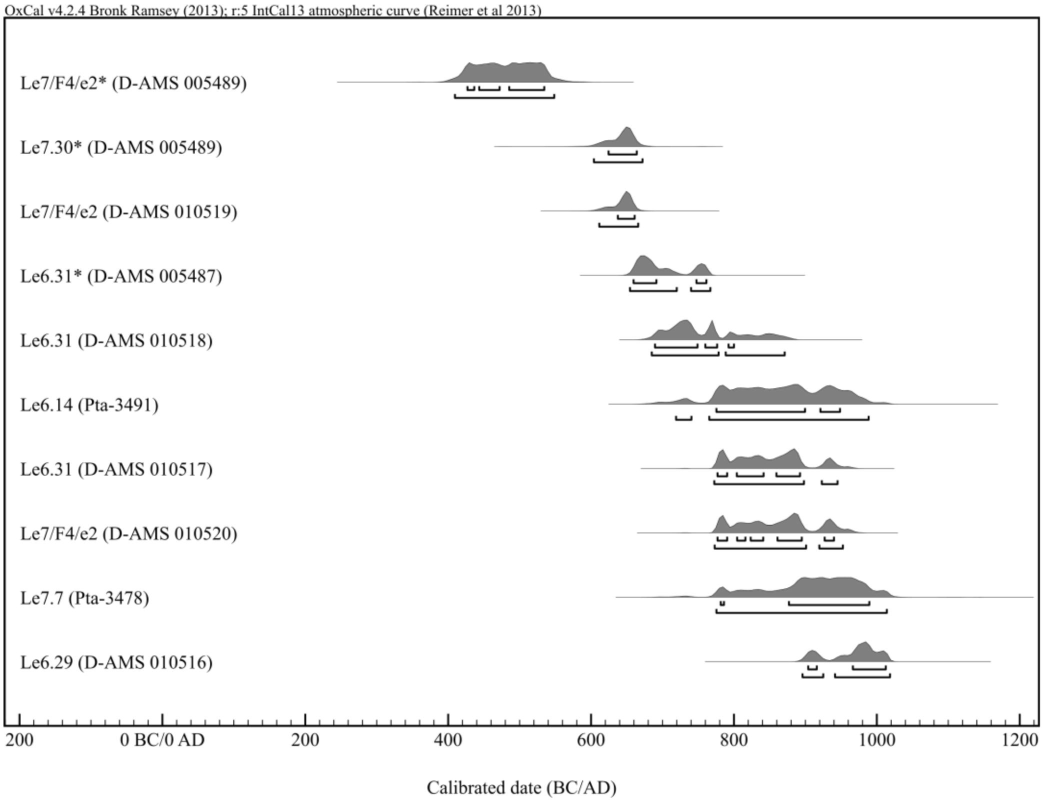

Fig. 2.3 Calibrated radiocarbon dates for Le6 and Le7 features. Sigma 1 and 2 ranges are indicated and charcoal dates are marked by an asterisk (*). 'Pta' dates from Meyer (1986: 326-327). Dates were calibrated with OxCal v4.2.4 (Bronk Ramsey 2013) using the southern hemisphere atmospheric curve (Hogg et al. 2013).

The consistently later dates from the bone collagen suggest that other influences on these dates must be considered. It is unlikely to be a specific contaminant or preparation issue, as both the samples I prepared and sent to Direct AMS (the 'D-AMS' samples) and those done at the Council for Scientific and Industrial Research (CSIR) lab in Pretoria in the 1980s (the 'Pta' samples, in Meyer [1986: 326-327]) yielded comparable dates. Additionally, both the samples submitted to Direct AMS and those in the original study had high collagen yields[3] (ranging from 5-39‰ by weight, for the recent sample). As one part per mille by weight is generally the minimum standard for collagen use (*cf*. Higham et al. 2006), the Le6 and Le7 samples exceed that requirement. Although an assessment of the carbon to nitrogen ratios could confirm the quality of this collagen (e.g. Ambrose 1990; Brock et al. 2007), the overall

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[3] I have excluded one of the samples submitted: the collagen from feature Le7.32 yielded a very recent date (i.e. in the last few centuries), but this is likely due to degraded collagen as the overall yield for that specimen was only 0.6‰ by weight.

yields serves as some testament to its preservation quality. This means that the variation between the collagen and charcoal results are likely not driven solely by collagen degradation.

Charcoal and collagen are known to produce different results even when ostensibly sourced from the same contexts (e.g. Higham 2011; Potter & Ruether 2012). In assessing such divergences, Potter and Ruether (2012) also noted certain trends within the results from these materials. For one, their collagen results tended to cluster, particular at two standard deviations (ibid.). The charcoal dates were also consistently older than the collagen dates (ibid.), a pattern also seen in other studies (e.g. Higham et al. 2006).

It has been noted that relatively fine contaminants (which are not removed by common collagen preparation methods) can significantly alter the collagen results (e.g. ibid.). Both Potter and Ruether (2012) and various Oxford laboratory projects (e.g. Brock et al. 2007; Higham 2011; Higham et al. 2006) found that this contamination could be rectified by ultrafiltration of the collagen during preparation. This method generally produced older dates, which were thus more similar to the charcoal. In light of this, including such a procedure in re-dating efforts could help resolve the differences seen in the Le6 and Le7 results, but falls outside the scope of this dissertation.

If the calibrated charcoal dates are accepted, and combined with the expected dates for the ceramics, it appears that occupation of these sites occurred circa 500-800 AD. The ceramics suggest a relatively limited period of use, as the majority of features on these sites are associated with the Mzonjani facies.

There is a possibility that the phases of occupation Meyer (1986: 223,226) described (i.e. Le6, Le7a, Le7b) are not truly discrete events. It may be that the features within these purported phases are instead a series of shorter-term repeated re-use and re-occupations of these sites. This will be a topic of discussion in chapter 12. Nevertheless, I do employ these phases as relative chronological and spatial groups with which to present and discuss the data. In this manner, I am able to explore broad difference (as seen by Meyer) and similarities (as seen in the ceramics, and in the subsequent chapters here) between the features at these sites.

2.6 Le6 & Le7 Features in this Study

In total, 14 features were selected for use in this study (Table 2.1). In general, all unstudied samples from Le6 and Le7 (a and b) in the UP collections were utilised. There were a few exceptions to this, and more details on the selection of these samples, along with feature types (e.g. surface concentration or ash-pit), are discussed in section 4.1.

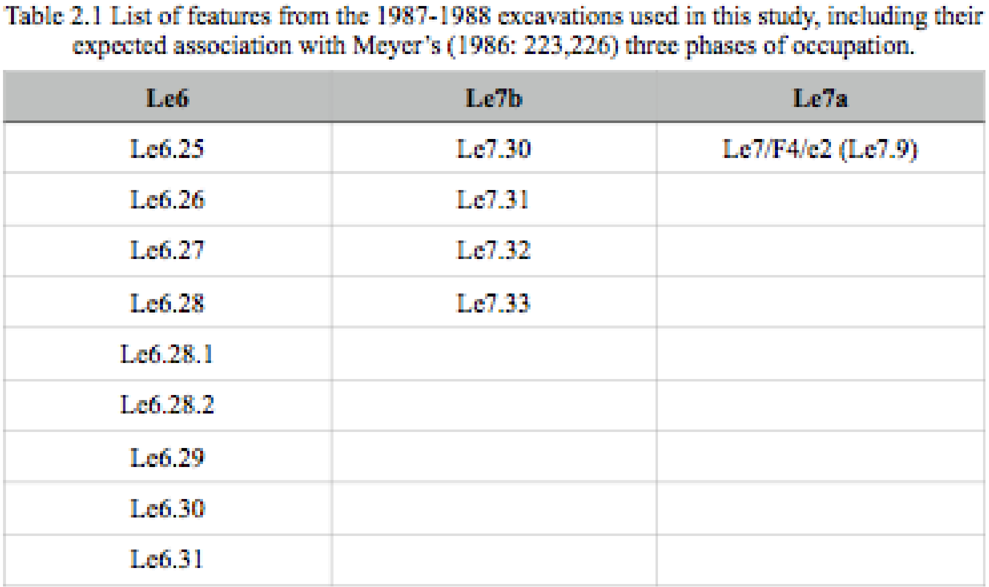


Table 2.1 List of features from the 1987-1988 excavations used in this study, including their expected association with Meyer's (1986: 223,226) three phases of occupation.

Le6	Le7b	Le7a
Le6.25	Le7.30	Le7/F4/e2 (Le7.9)
Le6.26	Le7.31	
Le6.27	Le7.32	
Le6.28	Le7.33	
Le6.28.1		
Le6.28.2		
Le6.29		
Le6.30		
Le6.31		

Chapter 3: Literature Review and Research Questions

To picture the broader EIA landscape of animal usage within which the Le6 and Le7 communities operated, it is necessary to consider both the zooarchaeological and archaeological information available about the period, as well the main questions and paradigms that guided and shaped that research. Therefore, this chapter begins by discussing the southern African EIA in general, before addressing the work done on the human-animal relationships within it (section 3.1). Then the focus shifts to taphonomy and its potential for application within the southern African context (3.2). The ways in which zooarchaeological questions and theory have expanded are then explored (3.3). This chapter concluded by discussing how theory may be applied in zooarchaeological studies and the research questions that guide this study (3.4).

3.1 Animal-Use in the Southern African Early Iron Age

The movement of IA agro-pastoralists into the region introduced new socio-political and economic systems to southern Africa (e.g. Huffman 2007: xi). This marked the EIA as a time of great transitions and a multiplicity of economic and socio-cultural modes. Yet there were no real “political centres” nor were there other clearly differentiated and centralised political structures in the region until the end of the first millennium AD (*cf.* Huffman 2000, 2007: 367-368).

Thus, mobility was a major component in the EIA of southern Africa: the movement of people, the spread of ideas and cultural habits, and, particularly, the introduction of domesticates to this region (e.g. Huffman 2007: xi). Given this, the archaeology of southern Africa has largely been focused on mapping and distinguishing these movements and the groups within them (section 2.2). Ceramics have been and remain a main material focus in the creation of these culture-history sequences (e.g. Huffman 2007: xi; Meyer 1986, but see Pikirayi 1999 for critiques of ceramic use). However, the zooarchaeological record also provides a useful line of evidence to explore these questions and transitions. For example, the presence of these (new) domestic species have been used as a cultural proxy with which archaeologists can track these agro-pastoralist peoples into and across the southern African landscape (e.g. Voigt 1986). Domesticate studies have also facilitated the exploration of agro-pastoralist interactions with autochthonous foragers (e.g. Denbow 1990; Sadr & Plug 2001; Sadr et al. 2003; Sampson 1984; Smith 1986; Thorp 1997) and the examination of the varying developments between and within the agro-pastoralist groups (e.g. Huffman 2007; Kinahan 1986; Maggs & Whitelaw 1991).

Zooarchaeological information has also been key in understanding settlement patterns within groups and the socio-cultural implications of those patterns (e.g. the Central Cattle Pattern, see Kuper 1982 and Huffman 2001). It also addresses the role domesticates have played, both as wealth and in the accumulation thereof, in increasing political complexity (e.g. Fraser & Badenhorst 2014; Huffman 2000; Plug 2000; Voigt 1983).

There has also been work on herd management strategies, using ageing and sexing of remains to look for signs of competence so as to distinguish between ‘true herders’ and ‘foragers with sheep’ (e.g. Klein 1984; Maggs & Whitelaw 1991). Others have used management strategies to establish if meat or other secondary products like milk and wool were the focus of herd production (e.g. Balasse et al. 2003; Plug & Badenhorst 2006). Variable use of the environment during herding, such as in transhumance pasturing, is another topic within this group (e.g. Arnold et al. 2013; Maggs & Ward 1984; Smith et al. 2007). Zooarchaeological signs of domestic herd health have also been used as evidence of environmental conditions, where certain osteological pathologies are used as evidence of chronic malnutrition (e.g. Plug 1993; 2000) or “catastrophic mortality” profiles as potential indicators of disease affecting herds (e.g. Plug 1989a: 65; Voigt 1984a). There has also been much attention played to the role of domestic species both as food (in terms of primary and secondary products: e.g. Voigt 1986) and their broader role as social or political capital (e.g. Hall 1986; Huffman 1998; Voigt 1983). The variable importance of small (sheep/goat) versus large (cattle) stock throughout the EIA has also been discussed and debated at length (e.g. Badenhorst 2006, 2009; Huffman 2007; Maggs & Whitelaw 1991; Plug 2000; Voigt 1986).

Concurrent with this has been the development of techniques to distinguish between sheep and goat (e.g. Balasse & Ambrose 2005; Boessneck 1969; Halstead et al. 2002; Payne 1985; Zeder & Lapham 2010; Zeder & Pilaar 2010). The difficulties of differentiating cattle from buffalo remain (e.g. Peters 1988, and sections 5.2.3 and 6.3.2).

The almost exclusive focus on the domestic component of EIA assemblages is an artefact of the major archaeological question(s) that have shaped southern African zooarchaeological studies thus far. Especially given the potential links between economic strategies (i.e. herding) and tradition or cultural complexes (e.g. Plug 1988: 354), domesticates can be an archaeologically valuable tool for identifying socio-cultural distinctions.

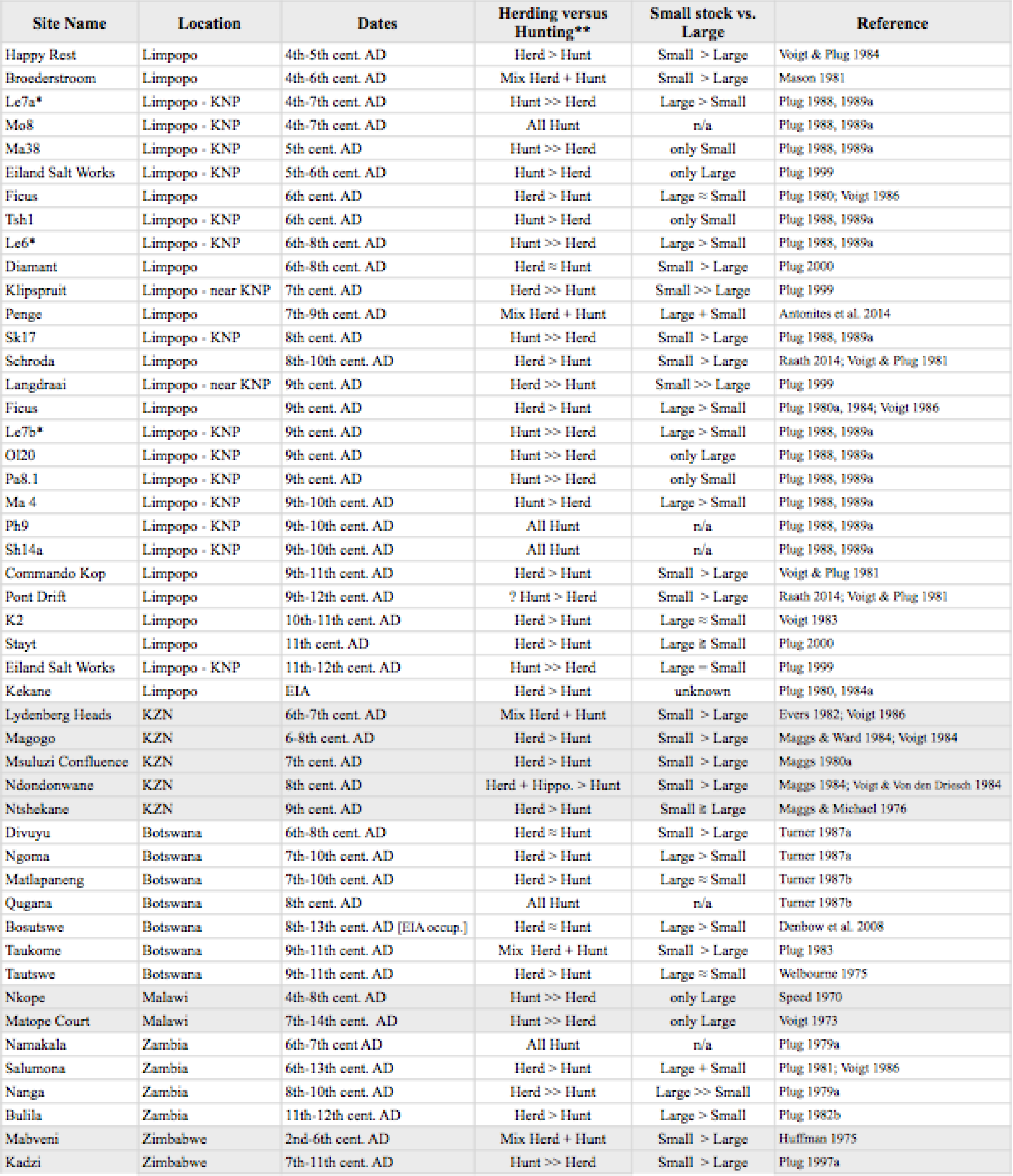
3.1.1 Domestic Versus Wild: The Early Iron Age Spectrum

A narrow focus on domesticates has left considerable lacunae in our understanding of the full spectrum of the human-animal relationship during the EIA of southern Africa. For example, there is arguably still a good deal of ambiguity in our understanding of the role wild animals played in the lives of agro-pastoralists in the EIA. There is also relatively little known about how both wild and domestic species were processed and prepared during this period. These gaps are consequential for our understanding of EIA animal use. There is substantial variety in the proportion of wild species present at southern African EIA sites and, on the whole, this variation is as yet unexplained (e.g. Plug 2000; Voigt 1986).

EIA faunal assemblages shift between those entirely dominated by wild species to sites wholly reliant upon domesticates for their animal protein needs (e.g. Voigt 1986). Such differentiation in subsistence habits is also not always accompanied by great divides in time and/or space (e.g. Turner 1987b; Plug 2000; Voigt 1986). Some contemporary, neighbouring sites display wholly dissimilar subsistence strategies in terms of the presence and preponderance domestic species (ibid). The EIA sites of Nanga and Namakala in Zambia are two such sites (Plug 1979a; Voigt 1986). Remains excavated from Nanga were dominated by domesticates, while the nearby Namakala assemblage contained only wild species (ibid). Site reports from throughout the EIA of southern Africa paint a similar varied picture of animal use throughout the region and period (Table 3.1).

Across southern Africa, EIA faunal assemblages range from domesticate dominated (e.g. Plug 1979a, 1999; Turner 1987b; Voigt 1983; Voigt & Von den Driesch 1984), a balance of wild and domestic (e.g. Antonites et al. 2014; Maggs & Michael 1976; Plug 1983; Turner 1987a, 1987b), to almost or wholly wild (e.g. Plug 1979a, 1983, 1989a; Turner 1987b). At some sites, cattle outnumber ovicaprines (e.g. Maggs & Michael 1976; Voigt 1983) while elsewhere it is reversed (e.g. Huffman 1975; Mason 1981; Voigt & Von den Driesch 1984). Later periods in southern African history are mostly marked by patterns of more-or-less homogeneous animal use (e.g. Meyer 2000; Voigt 1986). However, research seems to point to wide variation in animal use during the first millennium AD (e.g. Voigt 1986).

Table 3.1 Basic faunal presence at a selection of southern African Early Iron Age sites.



Site Name	Location	Dates	Herding versus Hunting**	Small stock vs. Large	Reference
Happy Rest	Limpopo	4th-5th cent. AD	Herd > Hunt	Small > Large	Voigt & Plug 1984
Broederstroom	Limpopo	4th-6th cent. AD	Mix Herd + Hunt	Small > Large	Mason 1981
Le7a*	Limpopo - KNP	4th-7th cent. AD	Hunt >> Herd	Large > Small	Plug 1988, 1989a
Mo8	Limpopo - KNP	4th-7th cent. AD	All Hunt	n/a	Plug 1988, 1989a
Ma38	Limpopo - KNP	5th cent. AD	Hunt >> Herd	only Small	Plug 1988, 1989a
Eiland Salt Works	Limpopo - KNP	5th-6th cent. AD	Hunt > Herd	only Large	Plug 1999
Ficus	Limpopo	6th cent. AD	Herd > Hunt	Large ≈ Small	Plug 1980; Voigt 1986
Tsh1	Limpopo - KNP	6th cent. AD	Hunt > Herd	only Small	Plug 1988, 1989a
Le6*	Limpopo - KNP	6th-8th cent. AD	Hunt >> Herd	Large > Small	Plug 1988, 1989a
Diamant	Limpopo	6th-8th cent. AD	Herd ≈ Hunt	Small > Large	Plug 2000
Klipspruit	Limpopo - near KNP	7th cent. AD	Herd >> Hunt	Small >> Large	Plug 1999
Penge	Limpopo	7th-9th cent. AD	Mix Herd + Hunt	Large + Small	Antonites et al. 2014
Sk17	Limpopo - KNP	8th cent. AD	Hunt >> Herd	Small > Large	Plug 1988, 1989a
Schroda	Limpopo	8th-10th cent. AD	Herd > Hunt	Small > Large	Raath 2014; Voigt & Plug 1981
Langdraai	Limpopo - near KNP	9th cent. AD	Herd >> Hunt	Small >> Large	Plug 1999
Ficus	Limpopo	9th cent. AD	Herd > Hunt	Large > Small	Plug 1980a, 1984; Voigt 1986
Le7b*	Limpopo - KNP	9th cent. AD	Hunt >> Herd	Large > Small	Plug 1988, 1989a
Ol20	Limpopo - KNP	9th cent. AD	Hunt >> Herd	only Large	Plug 1988, 1989a
Pa8.1	Limpopo - KNP	9th cent. AD	Hunt >> Herd	only Small	Plug 1988, 1989a
Ma 4	Limpopo - KNP	9th-10th cent. AD	Hunt > Herd	Large > Small	Plug 1988, 1989a
Ph9	Limpopo - KNP	9th-10th cent. AD	All Hunt	n/a	Plug 1988, 1989a
Sh14a	Limpopo - KNP	9th-10th cent. AD	All Hunt	n/a	Plug 1988, 1989a
Commando Kop	Limpopo	9th-11th cent. AD	Herd > Hunt	Small > Large	Voigt & Plug 1981
Pont Drift	Limpopo	9th-12th cent. AD	? Hunt > Herd	Small > Large	Raath 2014; Voigt & Plug 1981
K2	Limpopo	10th-11th cent. AD	Herd > Hunt	Large ≈ Small	Voigt 1983
Stayt	Limpopo	11th cent. AD	Herd > Hunt	Large ≥ Small	Plug 2000
Eiland Salt Works	Limpopo - KNP	11th-12th cent. AD	Hunt >> Herd	Large = Small	Plug 1999
Kekane	Limpopo	EIA	Herd > Hunt	unknown	Plug 1980, 1984a
Lydenberg Heads	KZN	6th-7th cent. AD	Mix Herd + Hunt	Small > Large	Evers 1982; Voigt 1986
Magogo	KZN	6-8th cent. AD	Herd > Hunt	Small > Large	Maggs & Ward 1984; Voigt 1984
Msuluzi Confluence	KZN	7th cent. AD	Herd > Hunt	Small > Large	Maggs 1980a
Ndondonwane	KZN	8th cent. AD	Herd + Hippo. > Hunt	Small > Large	Maggs 1984; Voigt & Von den Driesch 1984
Ntshekane	KZN	9th cent. AD	Herd > Hunt	Small ≥ Large	Maggs & Michael 1976
Divuyu	Botswana	6th-8th cent. AD	Herd ≈ Hunt	Small > Large	Turner 1987a
Ngoma	Botswana	7th-10th cent. AD	Herd > Hunt	Large > Small	Turner 1987a
Matlapaneng	Botswana	7th-10th cent. AD	Herd > Hunt	Large ≈ Small	Turner 1987b
Qugana	Botswana	8th cent. AD	All Hunt	n/a	Turner 1987b
Bosutswe	Botswana	8th-13th cent. AD [EIA occup.]	Herd ≈ Hunt	Large > Small	Denbow et al. 2008
Taukome	Botswana	9th-11th cent. AD	Mix Herd + Hunt	Small > Large	Plug 1983
Tautswe	Botswana	9th-11th cent. AD	Herd > Hunt	Large ≈ Small	Welbourne 1975
Nkope	Malawi	4th-8th cent. AD	Hunt >> Herd	only Large	Speed 1970
Matope Court	Malawi	7th-14th cent. AD	Hunt >> Herd	only Large	Voigt 1973
Namakala	Zambia	6th-7th cent AD	All Hunt	n/a	Plug 1979a
Salumona	Zambia	6th-13th cent. AD	Herd > Hunt	Large + Small	Plug 1981; Voigt 1986
Nanga	Zambia	8th-10th cent. AD	Herd >> Hunt	Large >> Small	Plug 1979a
Bulila	Zambia	11th-12th cent. AD	Herd > Hunt	Large > Small	Plug 1982b
Mabveni	Zimbabwe	2nd-6th cent. AD	Mix Herd + Hunt	Small > Large	Huffman 1975
Kadzi	Zimbabwe	7th-11th cent. AD	Hunt >> Herd	Small > Large	Plug 1997a

*data from Plug's (1988, 1989a) work only - does not include new faunal data nor dates.

** based on original author's interpretation of data (e.g. their interpretation of NISP or MNI data)

Sites are roughly organised by region, then by period of occupation

What causes this variable animal presence and use remains unclear (ibid.). Speculations about the roots of this diversity include suggestions that status or cultural tradition created differential access to certain (domestic) species, meaning more wild species mark lower status settlements (e.g. Plug 2000; Turner 1987a; Voigt 1983). Ritual activity (e.g. Brunton et al. 2013; Plug 2000; Schoeman 2009) and elite hunting (Voigt 1983) have also been proposed as reasons for the presence of wild species in agro-pastoralist assemblages. The presence of wild animals has also been explained as evidence of "symbiotic relationships with hunter-gatherers" (e.g. Voigt 1986: 17; Plug & Pistorius 1999), or that the overall differentiation in species composition and use between sites was driven by population pressures and environmental constraints (e.g. Turner 1987b; Plug 2000; Voigt 1986). Yet, the extreme variation in species presence follows no clear spatial or temporal patterns during the EIA. Therefore, these often vague explanations of wild presence at a site are not always wholly satisfactory. Part of this continued ambiguity is due to the aforementioned domesticate focus. A general trend to use the species list as the main, if not only, data utilised in zooarchaeological investigation has also contributed to this issue.

There has been work done on and with the wild component of southern African assemblages. A small portion of this has been done with EIA assemblages (e.g. Plug 1997a), but the majority stems from other periods. Though differing in time, these studies at least proffer southern African examples of how the presence of wild species can be used within archaeological questions.

- Wild Use

Environmental reconstructions are one of the most common uses to which wild species are put archaeologically in southern Africa. Zooarchaeologists utilise the known habitat preferences of certain species (using both large species such as bovids [e.g. Plug 1993; Plug & Engela 1992] as well as micromammals [e.g. Avery 1988, 1991]). In doing so, they have used faunal material as environmental proxies for changing conditions over time (e.g. Clark & Plug 2008; Plug 1997b), to indicate differences from modern conditions in those regions (e.g. Plug 1988: 140, Plug 1989b), or for general reconstruction of the palaeoenvironment of the period and region (e.g. Abell & Plug 2000; Klein 1984). Additionally, an assemblage consisting mostly of species generally classified as famine foods (i.e. less palatable or desirable meats), has been taken to indicate resource scarcity, environmental degradation, or other climatic pressures (e.g. Plug 1988: 359).

There is some discussion of the implications of wild use, usually focusing on the proportions of wild versus domestic species within a site's assemblage, and how they compare to more domesticate-rich sites (e.g. Plug 2000; Voigt 1986). Often this is done through comparing the meat yields of various species in the assemblage (e.g. ibid.). This helps quantify, in a rather pure subsistence and nutritional sense, the importance of the various species present. This has led to designations of lower or "marginal" status (e.g. Meyer 1986: viii; Plug 1988: 357) based merely on the relatively low numbers of domestic species in an assemblage. It has also led to interpretations of faunal use decisions as wholly shaped by environmentally determined necessity (e.g. Plug & Sampson 1997). In contrast, a notable presence of (at least certain types of) wild species has also been presented as evidence of high status areas within a site, where elite hunting is believed to have contributed to the expanded species list (e.g. Voigt 1983).

On the whole, many of the zooarchaeological projects in southern Africa have a similar general economic focus, with many exploitation and procurement strategy studies (e.g. Badenhorst 2008; Campbell et al. 1996; Clark & Plug 2008; Hall 1980; Maggs & Michael 1976; Maggs & Ward 1984; Plug 1979a, 1979b, 1984a, 1988, 1989a, 1989b, 1993, 1997a, 1997b, 2004; Plug & Badenhorst 2006; Plug & Engela 1992; Plug & Sampson 1996; Sadr et al. 2003; Turner 1987a, 1987b; Voigt 1984b; Voigt & Von den Driesch 1984; Wadley 2010). There are some that have contemplated wild presence at certain sites as a proxy for trade of archaeological invisible products like meat and skins (e.g. Badenhorst 2008; Denbow et al. 2008; Mitchell 1996; Plug 1989a; Plug & Pistorius 1999; Thorp 1996; Voigt 1986). Others have looked for different types of relationship between foragers and agro-pastoralists, such as clientship (e.g. Maggs 1980b) or a more general trade of domesticates (e.g. Plug 1988: 317; Turner 1987b). There has also been some discussion of the role of certain wild animals in the relationship between agro-pastoralists, foragers, and rain rituals (e.g. Schoeman 2009).

For all of these suggested interpretations—be it ritual, status, or pure environmental determinism—they rarely address the variety in wild use that is expressed across the southern African EIA sites. Indeed, some of these suggestions, such as the trade in meat (e.g. Badenhorst 2008; Denbow et al. 2008; Plug 1989a; Plug & Pistorius 1999; Voigt 1986) have never been entirely substantiated in the southern African context.

The identification of subsistence and modes of production at a site are an indispensable keystone of zooarchaeological work and have been invaluable in establishing our current understanding of EIA animal use. However, there is more to be garnered from a faunal study. Beyond the mode of procurement, there are further details to derive from a fine scale inspection of the human actions and behaviours that ultimately created these faunal assemblages. It is the increasing recognition of this latter component that most marks the expansion of zooarchaeology in the past few decades (e.g. Gumerman 1997; Mintz & Du Bois 2002; Twiss 2012), and offers some very promising routes with which to shed new light on EIA faunal use. Before discussing these new modes of zooarchaeological thought (section 3.3), I briefly present one of the methods for identifying social parameters of animal use that has come to the fore in recent years: taphonomy.

3.2 Taphonomy

Taphonomy is the study of the various processes that affect animal remains from the moment of death, through burial, and up to the recovery of those remains during excavations and any damage incurred in storage or curation (e.g. Efremov 1940; Lyman 1994:1, 3-4). These include both human actions (such as cooking and disposal) as well as carnivore damage and other diagenetic processes (i.e. weathering) (see section 5.3 for more detailed discussion of taphonomy).

Taphonomy has not yet garnered much attention in the southern African zooarchaeological context relative to the amount of work centred on economic studies. Of the taphonomic work carried out locally, much of it is on Stone Age assemblages (e.g. Thompson 2010; Thompson & Henshilwood 2011) or is only lightly treated upon at a rough resolution in the midst of a greater focus on economic questions (e.g. Plug 1988, 1993, 1997a; Turner 1987a, 1987b). There have been some Iron Age projects with greater attention to taphonomy. Work done at uMugungundlovu examined the patterning of faunal material and its links to different status and activity areas (Plug & Roodt 1990). In the EIA, Plug (1997a) discussed the cooking habits and other processing aspects visible in the assemblages created by the EIA buffalo hunters on the Kadzi River in Zimbabwe.

Detailed taphonomic analyses, in their exploration of potentially differential site-specific processing patterns, may help elucidate the intra-site relationships (and variations) that remain unclear in the EIA. As the economic variation correlates with neither ceramic variety nor geographical or temporal proximity, and as claims of marginal designation versus central sites ring hollow for most of the EIA, the catalyst of this variance is not entirely clear (e.g. Plug 2000; Voigt 1986). Given this, expanded taphonomic studies may proffer another route of evidence to supplement the already established economic and ceramic research and help explicate this variability (e.g. ibid.).

Taphonomy can be used to explore a number of factors, from establishing the bone-accumulation agents responsible for an assemblage (e.g. Brain 1981) to identifying other peri- and post-depositional factors that may significantly influence and shape an assemblage (e.g. Cleghorn & Marean 2007; Hill 1979; Lyman 1987, 1994, 2002; Munson 2000; Orton 2012; Payne & Munson 1985; Phoca-Cosmetatou 2005; Sadr et al. 2003). Taphonomic analyses are also an essential tool for exploring socio-cultural elements within animal use and preparation: in distinguishing differential use patterns between species (e.g. Brown & Emery 2008; Hill 2011), different gender roles (e.g. Gifford-Gonzalez 1993), specialised use of animal remains (e.g. Emery 2009), specialised skills in terms of butchering (e.g. Seetah 2006a, 2006b, 2008), and the identification of different activities in various features of a household or settlement (e.g. Friesen & Betts 2006). Taphonomy can be indispensable in the identification of different types of sites, such as permanent settlements versus acquisition and processing sites (e.g. Byerly et al. 2005, 2007; Driver 1990). This last point is a good example of the need for integrated use of multiple analytical methods.

Processing and settlement sites may have comparable species compositions (e.g. Driver 1990). As the animals being procured and processed at the former type of site are being eaten and disposed of at the latter, this may potentially make them indistinguishable in terms of the species list. Yet, the skeletal elements present at these different types of sites may be distinctive (e.g. Driver 1990). Additionally, processing sites may display taphonomic factors such as intensity of butchery (e.g. Bamforth 2011) and other signs of “bulk processing strategies” (e.g. Widga 2004: 52) that one would not expect at a settlement site. When combined with the data from other material studies, such as a demonstrable preponderance of projectile points (and the associated bone link shafts) on processing sites (e.g. Bamforth 2011; Hill 2007), the distinctions between different types of sites become much clearer.

Taphonomy can also clarify what was being ‘procured’ beyond the meat, such as traces of cut marks made during skinning (e.g. Binford 1981), breakage patterns indicative of marrow and bone grease extraction (e.g. Byers 2002; Karr et al. 2014; Outram 2001), even the variation in processing seen between different meat preservation methods (e.g. Friesen 2001; Friesen & Stewart 2013). All of which add detail to our understanding of faunal use habits that extend beyond initial procurement choices.

It is also useful to have a framework within which to examine or consider these various methodological techniques.

3.3 The Role of Animals in Society & Archaeological Questions

In the last 50 years, zooarchaeology has arisen as one of the most rapidly expanding archaeological disciplines (Crabtree 1990; Lyman 1994). In that time, the foci of zooarchaeological questions have evolved as rapidly as the anthropological treatments of animals and foodways (e.g. Crabtree 1990; deFrance 2009; Mintz & Du Bois 2002; Russell 2011; Sykes 2014). From the nutritional focus and “behavioural-ecological perspectives” that characterised it in the 1970s and 80s, zooarchaeology today incorporates an extensive variety of theoretical frameworks (e.g. Twiss 2012: 359-360). These diverse frameworks structure a wide spectrum of questions. Expanding upon the initial “simple dietary and husbandry reconstructions" (Maltby 2006: 3), research ranges from systems of trade, exchange, and social stratification (e.g. Crabtree 1990), to questions of intensification (e.g. Betts & Friesen 2004; Lupo et al. 2013; Morgan 2015), specialisation (e.g. Cannon & Meltzer 2004; Spielmann 2002), and even the rise of professionalism amongst butchers and other animal trades (e.g. Seetah 2006a, 2008; Sykes 2014: 15)

In this, zooarchaeological investigations are moving beyond the species list and integrating their analyses into questions of broader social, economic, cultural, ritual, and political import (e.g. Brown & Emery 2008; deFrance 2009; Emery 2004a; Maltby 2006; Marciniak 2005; Twiss 2012), as well as exploring the fine degree of intra-societal variation and behaviours that can be visible within a single site's assemblage (e.g. Friesen & Betts 2006; Orton 2012). This growth stems from an increasing recognition of the importance of societal values associated with animals and entwined in the manner of their utilisation (e.g. deFrance 2009: 107; Marciniak 2005; Russell 2011).

It is through this focus on the role of animals in society, beyond their base nutritional value, that this study will build off the previous work done in the KNP. Specifically, I will be using theories of intensification and specialisation as a lens through which to both examine the types of wild animal use evident at Le6 and Le7 and to consider the broader socio-economic implications of those choices. Terms such as specialisation and intensification require carefully definition (e.g. Costin 1991; Morgan 2015; Morrison 1994).

3.4 Theory in Practice: Social Zooarchaeology & Questions of Intensification

Theories of intensification and specialisation largely deal with themes of production, be it craft (e.g. Costin 1991), agriculture (e.g. Morrison 1994), or otherwise. But these concepts are still highly applicable to zooarchaeological material and animal-based food choices (e.g. Betts & Friesen 2004; Morgan 2015; Spielmann 2002). In terms of zooarchaeology, 'intensification' has been used to describe many different situations (e.g. Betts & Friesen 2004; Lupo et al. 2013; Morgan 2015), but Morrison's (1994) definitions serve to encompass most of them, as will be discussed below.

- Terms of Intensification

Morrison (1994: 142-144) lists three main components to intensification: "intensification proper", specialisation, and diversification. 'Intensification proper' is described as "increased labor and/or capital inputs" (ibid.: 142) into a given mode of production. This may also include "increased investment" (ibid.: 142) in particular practices associated with production. Betts and Friesen (2004: 357) clarify this as "the development of new technologies and procurement strategies". Archaeologically, this could manifest in the development of specific hunting strategies or processing tools.

Specialisation—or "the reduction of diversity" (Morrison 1994: 143)—is a focus on a type of production or product, such as on a narrow range or specific type of resource. In terms of hunting strategies, this could be seen in a predilection for hunting and/or consistent targeting of a specific type of animal or the use of selective processing patterns. Diversification, on the other hand, is marked by an "increase in the number of components of a productive system" (ibid.: 144). In other words, this would be a concerted effort to utilise an expanded number or type of resources. This could come across archaeologically as a broad mix of taxa types and/or complete use of all available animal products within the carcass. For example, Lupo et al. (2013) utilise this type of diversification to explore intensifying efforts to utilise a wider range of resources during times of resource scarcity. Specialisation and diversification may thus appear to be opposites, but they both present possible processes through which intensification may occur.

There are numerous drivers of intensification: from the aforementioned environmental issues (e.g. Lupo et al. 2013), to social and ritual activities (Spielmann 2002), population growth (*cf.* Morrison 1994), and changing social complexity (e.g. Costin 1991). The possibly drivers of intensification at Le6 and Le7, and the purpose of this production in the southern African EIA context, will be discussed in Chapter 8.

How may these abstract notions of intensity and human choice be addressed within a physical faunal assemblage? In part, this involves examining what is present (i.e. what was selected for use) and then at how it was used. Therefore, I present my research questions before laying out the methodology in the next chapter.

3.4.1 Research Questions

As discussed in the previous chapters, this dissertation seeks to move beyond subsistence, economic habits, and environmental reconstructions in EIA faunal patterns. As a result, the following questions frame this exploration of animal use at Le6 and Le7.

- How were animals prepared and utilised once acquired from the KNP landscape?

Beyond a broad regional economic classification as hunting reliant (e.g. Plug 1989a), are there patterns in the procurement and processing at Le6 and Le7 that point to more precise strategies within these choices?

- Are the patterns seen socially modulated or driven by other factors?

Animal use may be shaped by both environmental and social parameters. Given this, attention will be paid to determining if such factors can be distinguished within the faunal record. Does the assemblage largely reflect external forces (e.g. procurement strategies determined by environmental scarcity or taphonomic patterns driven by post-depositional forces)? Or do the patterns of animal use instead indicate the social choices?

- Do procurement or processing choices at Le6 and Le7 speak to intensity or scale of activity? What might this imply in terms of skill or priorities?

3.5 Summary

Coupled with an expanded focus on the significance of both the wild and domestic species, the multidisciplinary methods and theoretical frameworks discussed above together form a complementary platform from which to re-examine the role and use of animals in the southern African EIA. Taphonomic studies of processing habits and site type distinction coupled with expanded procurement questions and theories of intensification can certainly shed new light on the various and “sharp[ly] contrast[ed]” expressions of faunal use during this period (Plug 1988: 312). Thus, within that wide spectrum of EIA animal use, the material from Le6 and Le7 is ideal for a fine-scale examination of wild-dominated assemblages and the implications that lie therein. To explore this data, Chapter 4 presents the analyses employed and their methodologies.

Chapter 4: Methodology

Following the main themes of the project, the analyses fall into two main threads: procurement and processing. Given the interwoven nature of zooarchaeological variables, multiple lines of evidence feed into both threads and the over-arching questions of intensity.

The two biggest factors of this analysis are species identification and evaluation (section 4.2) and taphonomy (sections 4.3 and 4.4). As this project aims to build upon the previous procurement-centred studies, it too begins with an examination of the species present at Le6 and Le7. This is expanded upon by looking at the treatment of these animals once procured (taphonomic analyses). I then compare animal usage, as presented by this framework, to both local and international examples (similar either in species use or processing patterns) to discuss the socio-economic implications of the faunal patterns at Le6 and Le7.

First, I briefly discuss issues with the collections, matters of assemblage maintenance, and sample selection strategy before continuing with the analytical methods (section 4.1).

All destructive analyses were carried out with South African Heritage Resource Agency [SAHRA] clearance (sampling permits 6617 and 6846, export permit 1984 for radiocarbon dating).

4.1 Collections Issues, Assemblage Maintenance, & Sample Selection

The assemblages used in this study have spent almost 30 years in either the DNMNH or UP collections. In that time, they have been affected by common problems afflicting collections. Bones packed too tightly in bags and boxes had been damaged. Some of the original paper bags had torn or become friable, resulting in loose material separated from provenience information.

Evidently, the labelling on the material in this study had always been minimal, at best, in terms of spatial or contextual information (I.Plug pers. comm.). However, additional confusion was introduced by partial re-labelling during past re-packing or sorting efforts. In conjunction with the general lack of notes or records from these excavations (section 2.3.1), these conditions necessitated work to re-establish both spatial (e.g. a feature's location on the site) and contextual (e.g. type of feature) information.

4.1.1 Spatial Information

While some of the features (e.g. Le7/F4/e2) do appear to belong to a grid system, there are no records of how this grid was situated on the site. In total, there is evidence of spatial placement for only two of the features in this study: Le6.1 and Le7/F4/e2. Le6.1 was originally excavated by Meyer (1986: 149) and so appears on the site maps (Fig. 2.2). As the Le6.1 material was not included in Plug’s (1988: 142) assessment of the sites, it is used in this study.

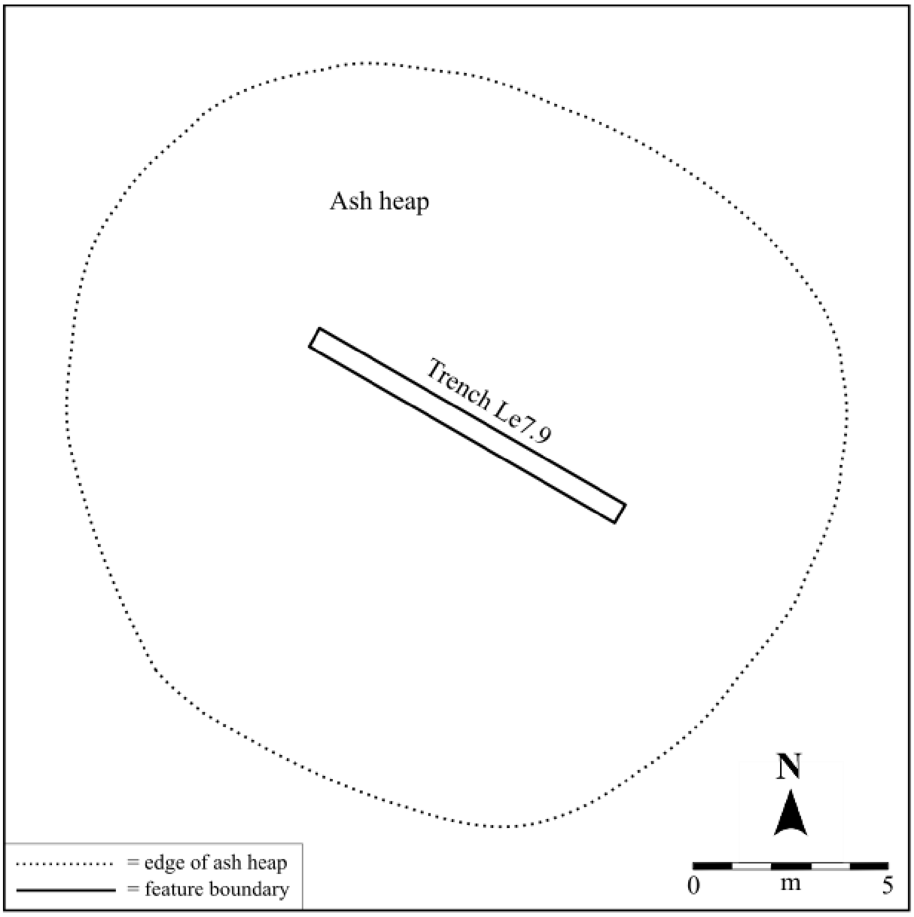


Fig. 4.1 Sketch of test trench Le7.9 from 1979 excavations in ash heap (adapted from Meyer 1986:105,153-154,369).

Within the material from Le7/F4/e2 Level 2, some bags were additionally labelled as ‘F4/e2 (in Le7.9)’. Feature Le7.9, excavated by Meyer (1986: 105,153) (Fig. 2.2), was originally an 0.5m x 9m test trench located in a large ash heap (Fig 4.1). Given the size of this ash heap (roughly 20 metres in diameter) (ibid.: 105), the quantity and type of material produced from both the original test trench and later excavation (section 5.1), and the labelling on the boxes, it seems likely that the material classed as ‘Le7/F4/e2’ is from feature Le7.9. 'Le7/F4/e2' is almost certainly from an expanded excavation of that same large ash heap. The ceramics (section 2.4.2) (A. Antonites pers. comm.) also support this interpretation of Le7/F4/e2's relation to Le7.9. Although I do believe Le7/F4/e2 and Le7.9 are likely the same feature, I continue to refer to it as 'Le7/F4/e2' in this study, in order to distinguish between the material recovered from different excavations.

4.1.2 Contextual Information: Context through Taphonomy, Soil, & Re-fitting

Only Le7.30 had some indication of feature type. Certain Le7.30 labels included "Ashoop [Ash heap]" while others had “Aspit [Ash pit]” in their description, meaning it is likely an ash-filled pit or heap. The features with only a "Surface", "[Grond]oppervlakte", or "± Surface" level are most probably the same type of circular surface concentrations/eroded pits that Meyer (1986: 102-106; Plug 1988: 142) identified. Therefore, those features that include at least a "Level 1" are taken to be either pit or ash heap features. This stratigraphic reasoning is discussed below.

In terms of taphonomy, the alkaline soils at Le6 and Le7 contributed to a relatively high level of preservation for all feature types (*cf.* Plug 1989a). Even the (probable) surface features at these sites contain well-preserved material. Despite the overall preservation quality, Plug (1988:142) did note that faunal remains from the pits were in better condition than those from surface collections. Following this, higher levels of weathering and bleaching, diminished presence of less dense elements (including sterna, sesamoids, and even costal cartilage), and few small species (such as rodents and amphibians) may be indicative of surface conditions rather than a pit or ash heap context. These small specimens are more likely to be lost during erosion events or in conditions less conducive to preservation (i.e. on the surface).

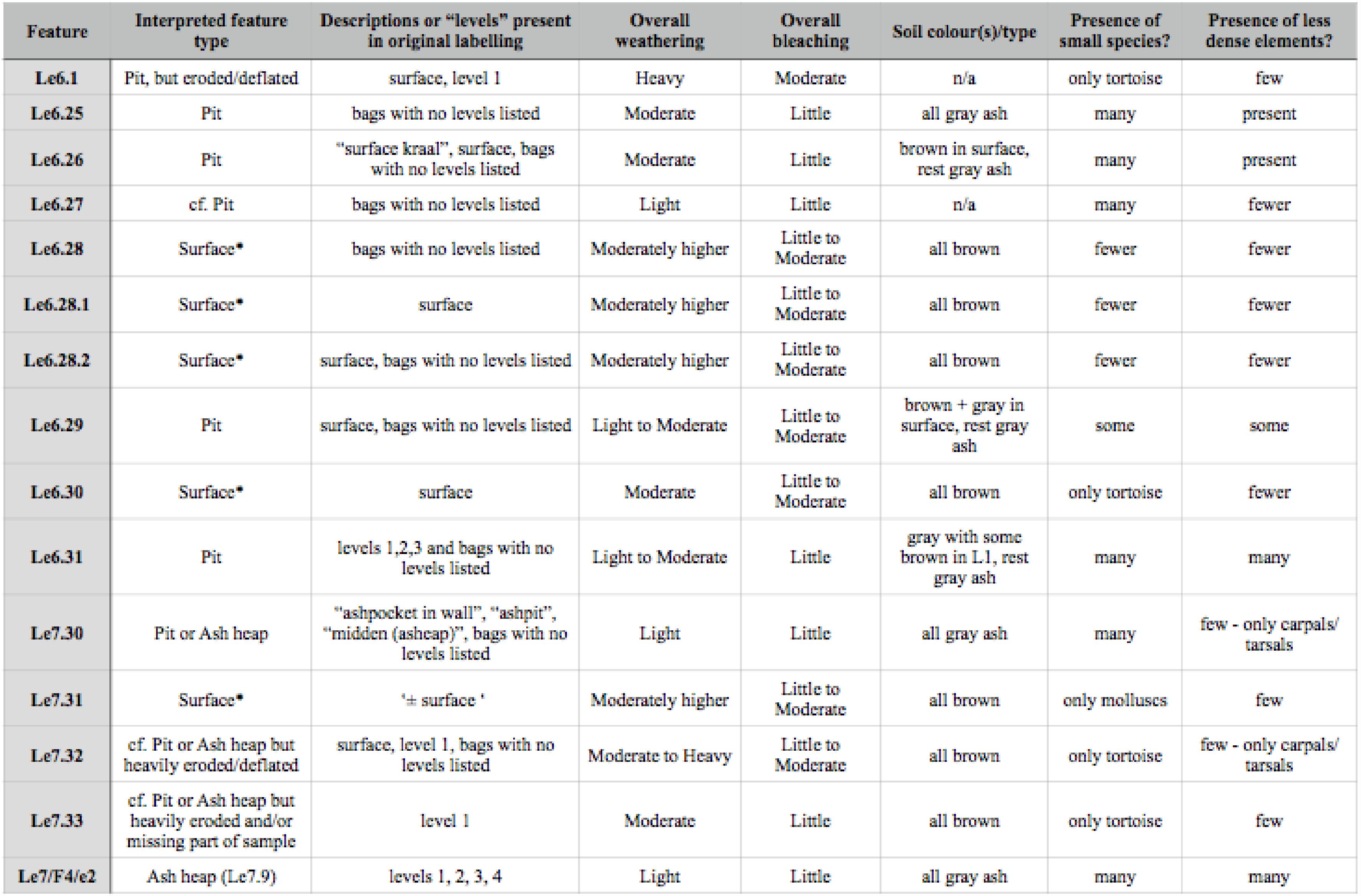
Using the above factors in combination with any labelling present on original packaging and the soil (see below) present on uncleaned material, I classified the features into different context types: surface concentration or pit/ash heap (Table 4.1). As no ash heaps were identified on Le6 (section 2.3.1), all non-surface concentration Le6 feature were labelled as ‘pit’. The Le7 features could be either pits or ash heaps and thus are labelled ‘pit/ash heap’. The exception is Le7/F4/e2, which as discussed above, is believed to be ash heap Le7.9.

The size of a feature’s assemblage was not taken to be a reliable indicator of context type. Plug (1988: 155-157,169-170) recorded a great deal of variation in the size of assemblages from different feature types. While pit features tended to be larger than surface concentrations, deviations from this were common. Indeed, certain surface concentrations on Le6 contained thousands of specimens. Given this, total feature assemblage size is not a clear marker of feature type, and the variables listed (Table 4.1) above were weighted more heavily in assigning context type.

- *Stratigraphy*

Excepting the surface concentrations, all features on Le6 and Le7 reported by Meyer (1986: 102-106,150-155) had roughly the same stratigraphic composition. In all pit and ash heap features, a layer of hard, light brown soil (the surface) overlaid a layer of grey ash and grey-brown ashy soil (ibid.). The vast majority of artefacts were found in this ashy layer (ibid.). Generally, a layer of grey-brown ashy soil followed, that then transitioned to brown and marked the base of each deposit (ibid.). Apart from the defined vertical edges of the

Table 4.1 Charactertics of the features in this study and their interpreted context type.



Feature	Interpreted feature type	Descriptions or "levels" present in original labelling	Overall weathering	Overall bleaching	Soil colour(s)/type	Presence of small species?	Presence of less dense elements?
Le6.1	Pit, but eroded/deflated	surface, level 1	Heavy	Moderate	n/a	only tortoise	few
Le6.25	Pit	bags with no levels listed	Moderate	Little	all gray ash	many	present
Le6.26	Pit	"surface kraal", surface, bags with no levels listed	Moderate	Little	brown in surface, rest gray ash	many	present
Le6.27	cf. Pit	bags with no levels listed	Light	Little	n/a	many	fewer
Le6.28	Surface*	bags with no levels listed	Moderately higher	Little to Moderate	all brown	fewer	fewer
Le6.28.1	Surface*	surface	Moderately higher	Little to Moderate	all brown	fewer	fewer
Le6.28.2	Surface*	surface, bags with no levels listed	Moderately higher	Little to Moderate	all brown	fewer	fewer
Le6.29	Pit	surface, bags with no levels listed	Light to Moderate	Little to Moderate	brown + gray in surface, rest gray ash	some	some
Le6.30	Surface*	surface	Moderate	Little to Moderate	all brown	only tortoise	fewer
Le6.31	Pit	levels 1,2,3 and bags with no levels listed	Light to Moderate	Little	gray with some brown in L1, rest gray ash	many	many
Le7.30	Pit or Ash heap	"ashpocket in wall", "ashpit", "midden (asheap)", bags with no levels listed	Light	Little	all gray ash	many	few - only carpals/ tarsals
Le7.31	Surface*	'± surface '	Moderately higher	Little to Moderate	all brown	only molluscs	few
Le7.32	cf. Pit or Ash heap but heavily eroded/deflated	surface, level 1, bags with no levels listed	Moderate to Heavy	Little to Moderate	all brown	only tortoise	few - only carpals/ tarsals
Le7.33	cf. Pit or Ash heap but heavily eroded and/or missing part of sample	level 1	Moderate	Little	all brown	only tortoise	few
Le7/F4/e2	Ash heap (Le7.9)	levels 1, 2, 3, 4	Light	Little	all gray ash	many	many

feature (e.g. the walls of the pit versus the surrounding soil), the boundaries between these horizontal levels were vague (e.g. Meyer 1986: 154).

Taking into account the stratigraphic continuity among Meyer's excavated features (1986: 102-106), the features from this later excavation likely followed similar trends. Confirming this are the soils present on the material. The faunal material used in this project had not been cleaned prior to my analysis. This allowed me to record the colour and nature of the soil present (e.g. brown soil, grey ash). As expected, the top levels of the potential pit/ash heap features exhibited a mix of brown soil and grey ash. The central layers were dominated by grey ash, and the lowest levels (e.g. Le7/F4/e2 Level 4) were again a mix of grey ash and grey-brown ashy soil. Those features with only a "Surface" level were predominantly coated in a brown soil, concurrent with the top soil described by Meyer (1986: 102-106).

The taphonomy of these samples also assisted in this contextual reconstruction. For example, both the "Surface" only features and the "Surface" levels of multi-level features showed higher levels of weathering than their subterranean counterparts. Weathering will be discussed in chapter 7.

The relationship between these levels also ties into this stratigraphic interpretation. While described as separate layers (e.g. surface, ash layer, grey-brown ashy soil base), Meyer (1986: 102-106,150-155) did not see these levels as differentiated occupation or depositional events. Instead, each feature was seen as a single, and often relatively short, depositional event (e.g. Meyer 1986: 102-106,150-155; Plug 1988: 337).

To assess this, I attempted to re-fit and/or re-articulate bones between the various levels of a given feature. Every feature that had more than one level listed (i.e. all but the suspected surface concentration) had re-fits, re-articulations, or both between levels listed. For instance, although feature Le7/F4/e2 is split into four levels by the labels, material was re-fitted between each of the levels (e.g. between 1 and 2, 2 and 3, 2 and 4, and so on), indicating the material all came from the same occupation/deposition event and confirming the recorded levels were arbitrary spits. This also helped with features such as Le6.31, that not only had labels listing three levels but also multiple bags with no level listed. As material from these ‘level unlisted’ bags consistently re-fit or re-articulated with material from the listed levels, and material from the various levels re-fit with one another, all were included in the Le6.31 set.

Taken together, the consistent refits between levels, Meyer’s (1986: 102-106,150-155) original interpretation, and the generally light weathering (indicative of rapid disposal and burial) (chapter 7) all mark similarly singular, and relatively short, depositional contexts. This means these features will be treated as single depositional events. All data from the separate levels within each feature, where they exist, were combined into a single sample. The potential implications of these types of depositions will be discussed in chapter 12.

4.1.3 Separated Material: ‘KP’ and ‘TM’ Numbers

Similar to the ‘level unlisted’ bags of Le6.31, some portions of the features in Le6 and Le7 had been ostensibly sorted into separate bags and given ‘Kruger park’ (KP) or ‘Transvaal Museum’ (TM) numbers (section 2.3.1). As these numbers belong to databases now inaccessible, the intention behind their separation can only be inferred. These ‘KP’ and ’TM' bags tended to contain only one or two types of element (e.g. miscellaneous fragments) or only be small finds (e.g. fish or rodent bones, shell fragments). It therefore seems that the separation of these bags was solely based on sorting of skeletal element types, rather than on contextual differences that have now been lost. The skeletal complement of evidently complete Le6 and Le7 features generally have specimens from most the skeletal element types (e.g. identifiable including small finds and most non-identifiable categories) (e.g. Plug 1988: 155-157,169-170). Given this, these separated bags of element types all most likely belong to the same levels and/or features and are treated thusly. To validate this choice, efforts were again made to re-fit and/or re-articulate bones between the various 'KP' and/or 'TM' numbers within a single feature or level.

4.1.4 Sample Selection

With the time limits of this project, I did not analyse all material present in the Le7 collection at UP. This predominantly applied to material from feature Le7/F4/e2.

Le7/F4/e2 is, by far, the largest feature in this study (section 5.1). Therefore, I opted to only use the material from the upper two layers of Le7/F4/e2 (Levels 1 and 2). Given the refits between the four levels (see above), and a cursory examination that showed much similarity between the material from all levels, I decided to take the upper two levels as a representative sample of the feature. It is also worth noting that Level 2 made up the vast majority of the material in feature F4/e2. Purely in terms of non-identifiable remains, Level 2 contained well over 8,000 individual pieces. In contrast, Level 3 and 4 consisted of only 1,306 and 1,621 non-identifiable fragments respectively. Although I completed the analysis of all non-identifiable material from all levels Le7/F4/e2, the data from Levels 3 and 4 were not included in this study. The identifiable specimens from these levels remain for future study.

There was also material in boxes labelled 'Le7.9 filling', 'Le7/F4/e2 Opvullingsmateriaal [Fill material]’, 'Le7/F4 Springhare II'. The contextual uncertainty of these labels, and of their contents, motivated their exclusion from the current study. Again, a cursory examination showed very similar material to that in the remainder of the Le7/F4/e2 boxes.

Additionally, there were a few boxes from other grid referenced features (Le7/F3/c5, Le7/F3/f7, Le7/G3/j6) that were not included in this project. Partly, this was a decision based on time. The fact that some of these features appear to be incomplete (e.g. only levels 4 and 5 of G3/j6 were present in the collection) also played role. Moreover, these other features also contained—occasionally numerous—glass beads. With presence of these beads, and the identification of potential spindle whorls on the surface of the site (Plug 1988: 139), these features seem to belong to a more recent period than that of the EIA occupations discussed here. In light of this, these features were left for future study.

All features present for Le6 are included in this study. In total, the features selected for analysis are listed in Table 2.1.

Finally, the scale of analysis alternates between feature and phase-level assessments. I now proceed to the methodologies of the various analyses.

4.2 Basic Zooarchaeological Methodologies

All Le6 and Le7 faunal material discussed here, unless indicated otherwise, was analysed first hand by the author. The material was primarily studied at the University of Pretoria, but all taxonomic identifications took place at the DNMNH in Pretoria with the aid of its extensive comparative collections. Additionally, as most of the material had not been cleaned, I cleaned it prior to analysis. Cleaning consisted of brushing the material to remove excess soil and the gentle application of a damp cloth. This was done to expose the cortical surface of each fragment and any taphonomy therein. Bones were left to dry fully before being repackaged in new storage materials (plastic bags and cardboard boxes).

4.2.1 Recording System

Every identifiable specimen (see criteria below) was labelled with a unique identification number, comprised of the site code followed by a sequential "F" (for fauna) number (e.g. Le6/F01 or Le7/F1999). In the case of conjoined elements, such as teeth still embedded in a mandible or a fused radius and ulna, each separate element was given its own slash number after the F-number (e.g. the mandible would be F90/01 and an embedded molar F90/02). However, teeth embedded in maxillary or mandibular fragments were treated as one element (e.g. a maxilla portion with three molars *in situ* would count as NISP [Number of Identified Specimens] of one, not four) as were fused elements (e.g. fused radius and ulna) (Plug 2014: 12; Raath 2014: 173). Tortoise carapace fragments and mollusc shell fragments, unless definitively distinguishable as different individuals, were grouped under a single F-number per level of a feature, with each fragment given a unique "slash" number (e.g. Le6/F38/01, Le6/F38/02). Each one of these carapace or shell fragments was counted as separate NISP.

Information from both sites was recorded in a MS Access database. In addition to the basic feature, species, element, weight (via digital scale with 0.1g accuracy), and side information, there are fields for element zones (Dobney & Rielly 1988, see below) and portions, age and fusion, pathology, digestion, bone working, carnivore and rodent gnawing, weathering, burning, and butchery marks. I also created fields for termite damage, fresh/recent breakage, ash/calcium carbonate (*cf.* Seetah 2006a: 267), organic staining, articulations, severity of weathering, burning, and gnawing, as well as additional butchery location information (see Appendix A.1 for the full identification sheet). Based on Von den Driesch (1976) and Serjeantson (2009) and using electronic callipers with 0.01 mm accuracy, measurements were taken whenever possible and recorded in a separate MS Excel document. Contrary to Von den Driesch, juvenile specimens were also measured, though clearly labelled as juvenile (*cf.* D. Orton 2008: 51). It was also noted when weathering, carnivore damage, or other taphonomy on a specimen may have effected measurements by up to a few tenths of a millimetre (ibid.).

4.2.2 'Identifiable' Criteria

Although parts of the assemblages had been previously 'sorted' for identifiable remains, I re-sorted all material from Le6 and Le7. The material was sorted with a similar method to Plug (1988: 48) in that all remains were grouped into either 'identifiable' or 'non-identifiable' categories, the latter being those pieces that could not be identified to species, family, or group (e.g. reptiles). 'Non-identifiable' included skull, bone flakes (long bone shafts), enamel, and miscellaneous fragments as well as some ribs and vertebrae.

The criteria for 'identifiable' remains was similar to that of Orton (2008: 52), as all complete and partially complete bones and teeth, bones with articular surfaces, long bone shaft fragments with nutrient foramina, and any other bones that could be identified during sorting were classed as identifiable. Additionally, all long bone shaft fragments with distinctive muscle attachments and shaft fragments with at least half their original diameter where also included with the identifiable material. "Signs of human modification" (D. Orton 2008: 52) were recorded under taphonomy (see below) and not included as identification criteria.

All taphonomy was also recorded on the non-identifiable specimens. This approach not only increased the taphonomic dataset, but also countered potential biases created when using data from identifiable bones only (e.g. Outram 2001). In southern African zooarchaeology, most axial elements (skull, vertebrae, rib) are usually relegated to non-identifiable categories. The presence and treatment of axial elements can shed light on specific butchery decisions (Seetah 2006a), meat preservation techniques (e.g. Friesen & Stewart 2013), and transport strategies both to a processing site and away from the site for trade or consumption (e.g. Byerly et al. 2005; Driver 1990; Lupo 2006; O'Connell et al. 1990). Omitting the presence or taphonomic features from these bones influences interpretations of, for example, dismemberment patterns and comprehensive butchery patterns. Given this, I also recorded the Dobney & Rielly (1988) diagnostic zones wherever possible with the vertebrae and rib fragments. Those rib, vertebrae, and skull fragments that were complete enough to confidently assign to at least mammal size class (or family in some cases) were included in the identifiable category.

In addition, I made every effort to identify long bone shaft fragments, given the analytical issues associated with their absence (e.g. Marean et al. 2004; Outram 2001; Pickering et al. 2003). In those cases where the identification of shaft fragments were unsuccessful, all taphonomic features were still recorded.

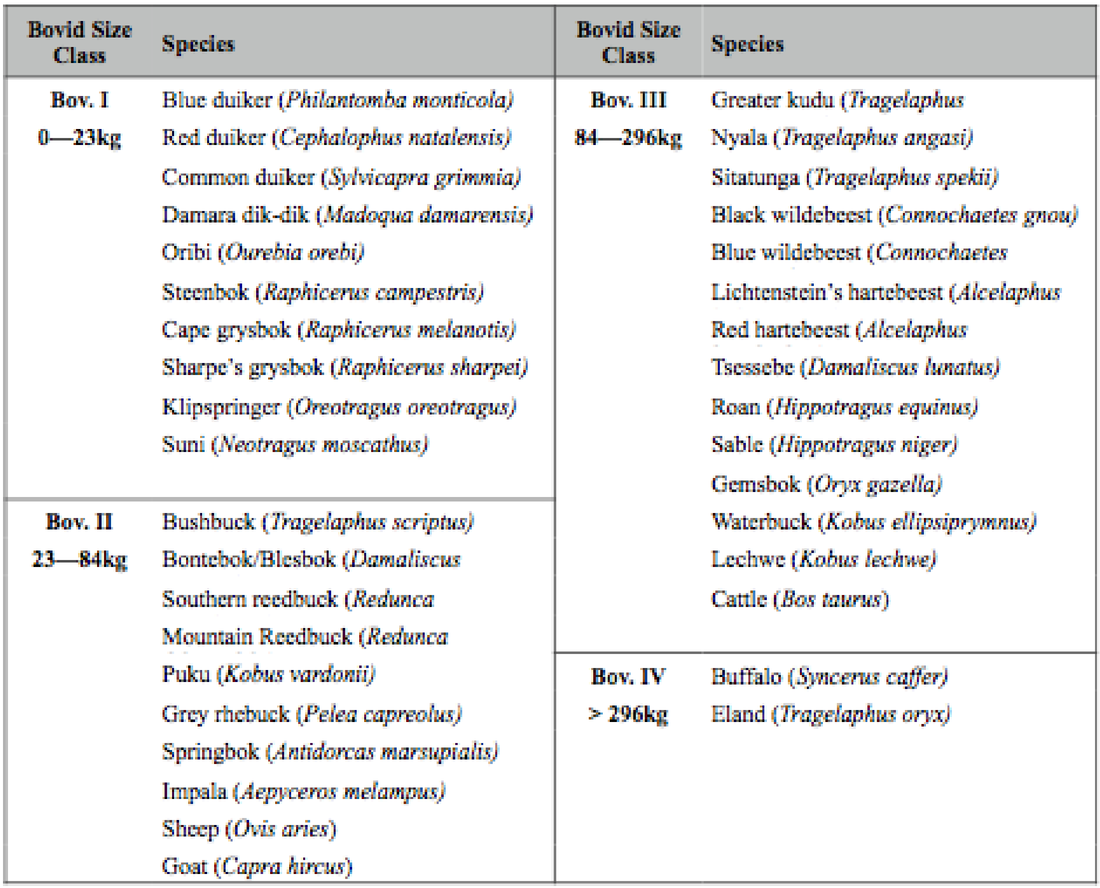
Bones that could only be identified to size class (e.g. 'Mammal, very large' which could be elephant, rhinoceros, hippopotamus, or giraffe) were also included in the identifiable category. Although less taxonomically distinct, these groupings may still shed light on processing choices or procurement trends based on an animal's size.

4.2.3 Species Identification

Taxonomic identifications were made using the comparative collections at the DNMNH in conjunction with published morphological guides. I used Peters (1988) in conjunction with the comparative specimens to distinguish between *Bos taurus* (domestic cattle) and *Syncerus caffer* (African buffalo), with some assistance from Dr. Ina Plug. While there was some reference to Peters' (1986) osteometrics, differentiation was primarily based on morphology due to the size overlap between the two species, especially considering the larger size of EIA cattle compared to those of later periods (I.Plug pers.comm). A tribe (subfamily) category 'Bovini sp.' (Gentry 1992: 2) was used for all those specimens that could not be confidently assigned to either *Bos* or *Syncerus*. For the ovicaprines, Balasse & Ambrose (2005), Boessneck (1969), Halstead et al. (2002), Prummel & Frisch (1986), Zeder & Lapham (2010), and Zeder & Pilaar (2010) were used with comparative collections to distinguish sheep from goat in the assemblage where differentiation was possible, or labelled as 'Ovicaprine' where not.

Given the overall morphological similarity within the Bovid family and the sheer quantity of Bovid species within southern Africa, many specimens could not be identified beyond Bovid size class (see Brain 1974 and Table 4.2). While the table groupings list all Bovid IV (Bov. IV) remains as wild species, only 'Bov. IV - Wild' specimens (i.e. confirmed to be either eland or buffalo, and not cattle) will be included in tallies of 'wild' species for Le6 and Le7. The cattle at these sites were often comparable in size to the buffalo. Therefore, the bones classified as Bov. IV may potentially belong to either domestic or wild species. All Bov. I are classed as wild remains.

Table 4.2 Southern African bovids and their associated size classes, from Brain (1974). Order and taxon nomenclature following Skinner and Chimimba (2005).



Bovid Size Class	Species	Bovid Size Class	Species
Bov. I **0—23kg**	Blue duiker (*Philantomba monticola)*	**Bov. III** **84—296kg**	Greater kudu (*Tragelaphus*
	Red duiker (*Cephalophus natalensis)*		Nyala (*Tragelaphus angasi)*
	Common duiker (*Sylvicapra grimmia)*		Sitatunga (*Tragelaphus spekii)*
	Damara dik-dik (*Madoqua damarensis)*		Black wildebeest (*Connochaetes gnou)*
	Oribi (*Ourebia orebi)*		Blue wildebeest (*Connochaetes*
	Steenbok (*Raphicerus campestris)*		Lichtenstein's hartebeest (*Alcelaphus*
	Cape grysbok (*Raphicerus melanotis)*		Red hartebeest (*Alcelaphus*
	Sharpe's grysbok (*Raphicerus sharpei)*		Tsessebe (*Damaliscus lunatus)*
	Klipspringer (*Oreotragus oreotragus)*		Roan (*Hippotragus equinus)*
	Suni (*Neotragus moscathus)*		Sable (*Hippotragus niger)*
Bov. II **23—84kg**	Bushbuck (*Tragelaphus scriptus)*		Gemsbok (*Oryx gazella)*
	Bontebok/Blesbok (*Damaliscus*		Waterbuck (*Kobus ellipsiprymnus)*
	Southern reedbuck (*Redunca*		Lechwe (*Kobus lechwe)*
	Mountain Reedbuck (*Redunca*		Cattle (*Bos taurus*)
	Puku (*Kobus vardonii)*	**Bov. IV** **> 296kg**	Buffalo (*Syncerus caffer)*
	Grey rhebuck (*Pelea capreolus)*		Eland (*Tragelaphus oryx)*
	Springbok (*Antidorcas marsupialis)*		
	Impala (*Aepyceros melampus)*		
	Sheep (*Ovis aries*)		
	Goat (*Capra hircus*)		

As certain aspects of the *Equus quagga* (Plain's zebra) skeleton are remarkably similar to similarly sized Bovids, a 'Mammal, Large - Bovid or Equid' category was created for those specimens that could be Bovid III/IV or zebra. This is also true for certain elements of the giraffe skeleton and Bov. IV species (e.g. buffalo and eland), hence a 'Bov. IV/Giraffe' category, and a ‘Mammal, medium - Bovid or Suid’ category for specimens that were either Bov. II or Suid.

The taxonomic names are those used in Skinner and Chimimba (2005), and listed in the order given by Meester et al. (1986). Unless listed otherwise, all species information (e.g. grazing preferences and territoriality) comes from Skinner and Chimimba (2005).

Given a dearth of comparative material, most bird and fish remains were identified only to ‘Bird’ or ‘Fish’ and occasionally size class.

4.2.4 Diagnostic Zones

In addition to the Dobney and Rielly (1988) zones, I used zones based on Schmid’s (1972) skull areas for those cranial specimens complete enough to be included in the identifiable material (A.R. Antonites pers. comm). This method allowed for a more thorough and systematic recording of specific skull portions and the location of butchery marks. Following examples from Dobney and Rielly (1988), the zones of the skull were split into left and right halves. If a specimen consisted of parts of both left and right halves, it was recorded using the same system of F- and concurrent slash numbers (see section 4.2.1 above).

I used Serjeantson (2009) for bird bone zones. Tortoise carapace fragments, shells, teeth, and bones of fish, reptiles, amphibians, and micro-mammals were recorded as ‘complete’, ‘half’, or ‘less than half’.

4.2.5 Ageing

Ageing of remains can address both environmental (in this case, seasonal) and social choices. The ages of the animals may mark both hunting preferences and strategies of the occupants, as well as their herd management plans and slaughter preferences (e.g. Maggs & Whitelaw 1991; Plug 1988).

Teeth and epiphyseal fusion are commonly used skeletal proxies for ageing (e.g. Hillson 2005; Plug 1993; Silver 1970; Spinage 1972). Both were used for ageing the Le6 and Le7 skeletal material. Ageing through epiphyses does suffer from differential destruction (e.g. Munson 2000), but it still offers another source of at least anecdotal ageing data.

For this thesis, ageing has only been made to relative age classes (e.g. Plug 1993) rather than establishing actual year or month age ranges (e.g. Silver 1970). Voigt's (1983) age classes as well as Grant's (1982 in Hillson 2005: 319-322) wear stages were used for the teeth of domestic species. The relative age classes for the teeth of wild species and the post-crania of all species were based on Plug (2014: 500, 1993, 1988: 55-56). Fusion was recorded as either 'unfused', 'fusion line still visible', or 'fused'.

- *Miscellanea*

Although intended, virtually none of the remains in these assemblages could be sexed. None of the pelvises were complete in the areas necessary to distinguish sex, and the horn cores present were from species in which both sexes are horned (e.g. African buffalo). Theoretically, it may be possible to distinguish sex through osteometrics (e.g. D. Orton 2008: 146) if there is significant sexual dimorphism (in size) within a species. This remains a topic for future exploration.

Fresh or recently incurred breakage was recorded to distinguish breaks likely made during excavation or subsequent transport and curation from those made during initial processing or peri-/post-depositional events.

The presence of ash (calcium carbonate) was also recorded, both to describe depositional conditions (e.g. an ash-filled pit or midden) but also to indicate possibility of obscured taphonomy on the bone itself (*cf.* Seetah 2006a: 267). The degree of ash coverage was noted, to establish how much of the cortical surface was covered and give a rough idea of the likelihood of missed taphonomic marks (ibid.). 'Ash' is defined as calcium carbonate that could not be removed with the gentle application of a damp cloth, and in places it was thick and implacable enough to cover shallow cuts, gnaw marks, and evidence of weathering.

Where specimens are labelled as "articulated", it means the articulation of these elements was identified in the lab: these specimens may or may not have been found articulated *in situ*.

4.2.6 Quantification

Quantification may be one of the mostly widely debated aspects of zooarchaeology, with no clear consensus as yet about the ideal methods. Various scholars have discussed the issue at length (e.g. Lyman 2008; Marean et al. 2001; Marshall & Pilgram 1993; D. Orton 2008: 54-56; Plug & Plug 1990; Reitz & Wing 1999; Ringrose 1993), and I only include a brief summary of the main points here.

Zooarchaeological studies in southern Africa tend to use two main quantification methods: NISP and/or Minimum Number of Individuals (MNI) (e.g. Antonites et al. 2014; Fraser & Badenhorst 2014; Plug 1984b, 1997a, 2000). NISP is "the number of skeletal elements (bones and teeth) and fragments thereof […] identified as to the taxon they represent" (Lyman 2008: 27). MNI is more of a derived value (Lyman 2008: 79). At its most basic, MNI uses the NISP information to calculate the minimum number of animals needed to produce the assemblage at hand (*cf.* Lyman 2008: 40). For full details of calculating and using MNI values, see Lyman (2008: 38-82).

Occasionally, zooarchaeologists in southern Africa also use "Quantifiable Skeletal Part" (QSP) values (e.g. Plug 1989a; Plug & Sampson 1996). QSP was developed in an effort to correct for the intra-taxon skeletal variability and apparent fragmentation bias some believe NISP suffers, although others debate the severity of these potential issues (e.g. Lyman 2008: 29-38).

Within these various options, I predominantly used NISP for the following reasons:

1) NISP values are simple to calculate, and may be tallied between features, species and sites without constant re-calculation (e.g. Lyman 2008: 28; Plug 2014: 12).

2) Although no quantification method is immune to fragmentation bias, Grayson and Frey (2004: 40) point out that skeletal part frequency analyses based on NISP values "can and do replicate the results of such analyses based on MNE [Minimum Number of Elements], MAU [Minimal Animal Units], and single element MNI values".

3) NISP values may potentially provide a better representative description of relative skeletal element frequency than MNI values (Marshall & Pilgram 1993), which is a key aspect of this project.

4) Generally, NISP values are more applicable for comparisons between features and sites using published data (e.g. Emery 2004b; D. Orton 2008: 51, 54-56).

5) As I am mostly focusing on the treatment of medium to large ungulates, issues relating to NISP calculations between species with vastly differing skeletal composition or complexity (e.g. Plug 1984b; Reitz & Wing 1999: 212) are minimal. There are only relatively minor differences within and between the majority of families and species in question in this project (e.g. Bovid and Equid) (*cf.* Plug 2014). These minor differences can also be dealt with analytically (e.g. Lyman 2008: 30,44).

6) The careful excavation techniques employed at Le6 and Le7 (section 2.3.1) help attenuate the problem of preferential recovery of the remains of large specimens over those of small specimens which could otherwise bias NISP values (*cf.* Lyman 2008: 28).

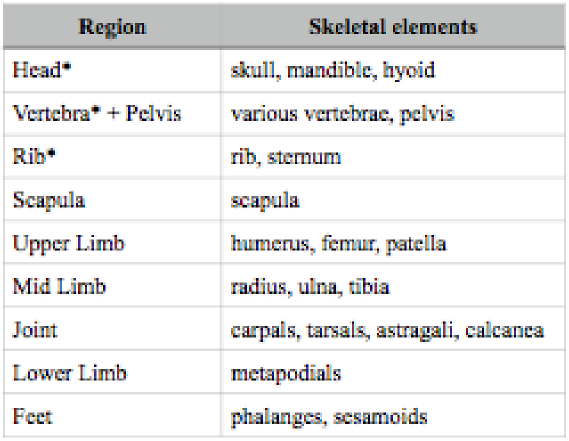
7) The calculation of MNI values is faced with significant aggregative dilemmas (Lyman 2008: 57-66). Depending on how material from various features on a site is combined, the MNI values may differ substantially (ibid.). While exploration of the various MNI values these aggregations produce may provide interesting information about animal presence within a set of features or sites, it will not be carried out in this study.

8) Finally, although Lyman (2008: 69) discusses the problem of “possible specimen interdependence” as essentially the biggest problem facing NISP values, this can also in part be addressed using Dobney & Rielly (1988) diagnostic zones.

In various stages of Orton’s (2012) framework for taphonomic analysis (discussed below in section 4.3) I grouped skeletal material using a modification of Stiner’s (1991) regions to assess the butchery and other taphonomic patterns at a broader level (Table 4.3). Ideally, one should also assess the remains through other conglomerations of skeletal regions, as these different groupings are often based on specific expectations. While all grouped regions must take into account basic morphological details of the skeleton, some are more 'purely' anatomical (e.g. Stiner 1991), while others are derived from a specific sequence of dismemberment (e.g. Seetah 2006a: 169-170). Perhaps the most fitting route would be to use a more intensive analysis of the processing sequence evident at Le6 and Le7 to identify more emic portions within the processing at these sites (*cf.* Seetah 2006a: 152-153).

Time and space prohibit a thorough assessment of such here. However, during the data processing stage I did compare multiple units of skeletal aggregation following Stiner (1991) and Seetah (2206a: 169-170). The results from these two methods were practically indistinguishable from one another. Thus, I opted to use a modification of Stiner’s (1991) regions adapted with elements of Seetah’s (2206a: 169-170) units. The aim of these skeletal regions was to identify more specific activities within the overall processing sequence. These finer elemental groupings are based on simple anatomic sections (similar to Stiner 1991) but taken a step further to assess more finely-scaled inter-region and inter-element differences in how these various elements likely respond to or are effected by the various taphonomic forces discussed here. For example, the more delicate cancellous bones of the vertebra and pelvis respond to weathering and gnawing differently from the dense compact bones of the long bones, as do the small carpals, tarsals, and phalanges versus the larger elements (Behrensmeyer 1978). The varying configurations of these axial elements, joint components, and long bones also all require different processing techniques. Additionally, these anatomical portions may reflect different meat and fat yields, in the sense that the upper limbs (i.e. humerus and femur) possess larger muscle groupings and marrow cavities than the carpals and tarsals. Thus these different groups both proffer different resources but also structurally necessitate separate processing methods. Table 4.3 presents these finer units.

Table 4.3 Adapted skeletal groupings, modified from Stiner (1991) and Seetah (2006a).



Region	Skeletal elements
Head*	skull, mandible, hyoid
Vertebra* + Pelvis	various vertebrae, pelvis
Rib*	rib, sternum
Scapula	scapula
Upper Limb	humerus, femur, patella
Mid Limb	radius, ulna, tibia
Joint	carpals, tarsals, astragali, calcanea
Lower Limb	metapodials
Feet	phalanges, sesamoids

*may include non-identifiable material where noted.

In comparing the skeletal element representation (Chapter 11), these regions will be compared via NISP and MAUs (Binford 1978). This is done to assess the potential impacts of fragmentation on skeletal representation (e.g. Lyman 2008: 238). MAU and %MAU will be calculated following Lyman (2008: 238), with MNE calculated using the Dobney and Reilly (1988) diagnostic zones (following D. Orton 2008: 56).

Additionally, in certain chapters (e.g. 7, 8, and 9), the taphonomic data is evaluated at an intra-element level. For instance, as carnivores are known to preferentially gnaw on long bone epiphyses over mid-shaft sections (Marean & Spencer 1991), it was useful to divide the long bone data in order to examine those portions of the element separately. As each of the long bones consists of up to twelve zones apiece (Dobney & Rielly 1988), these zones were condensed into two categories: epiphysis and shaft. This was done to simplify the data as well as to follow the main division seen in carnivore studies (as scavengers show the greatest differentiation between those two structural areas [e.g. Marean & Spencer 1991]), bone fat utilisation studies (given the differences in in-bone fats in those two portions [e.g. Karr 2015]), and so forth. To create these categories, the zones per element were assigned to either ‘epiphysis’ or ‘shaft’ and, if present, counted as one for that category. For example, if a femoral specimen was recorded as having zones 7, 8, 9, 10, and 11 present, that would equate to one shaft (zones 7 and 8) and one epiphysis (zones 9,10, and 11) portion[4]. In this way, the tallies are still NISP, although an individual specimen may count towards both the epiphysis and shaft categories (and so the two cannot be added together to re-calculate the total number of specimens involved). This same method was then followed for the taphonomic data: if some type of taphonomy, say carnivore gnawing, had been recorded in zones 8, 9, and 10 of a femoral specimen, that would equate to carnivore gnawing on one shaft and one epiphysis portion. Additionally, the non-identifiable bone flake (i.e. shaft fragments) data could be added to the shaft category, to re-incorporate more non-identifiable data.

The intra-element level is also used with other skeletal elements in other chapters, with the data being divided in a similar manner.

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[4] Although this method would have potentially counted a complete long bone (i.e. with both proximal and distal epiphyses) as having only one epiphysis, none of the long bones included here were that complete. At maximum, each specimen consisted of one epiphysis, with or without additional shaft zones.

The quantification of butchery marks will be discussed in section 4.3.3.

4.3 Taphonomy: Framework for Analysis

The wide variety of taphonomic processes leave distinguishable marks on bones that can be identified by the zooarchaeologist and used to reconstruct the ‘life-history’ of each individual bone and the history of the assemblage itself (e.g. Fisher 1995). This analysis examined both the human-modulated aspects of taphonomy (e.g. butchering) as well as the non-human and diagenetic processes (e.g. weathering).

- *Selecting Comparative Taphonomic Material*

The ideal comparative taphonomic material for Le6 and Le7 would stem from archaeological collections, ethnoarchaeological projects, and experimental studies that work with large mammals, uncooked bones, and that explicitly discuss the nature of their assemblages. Given these criteria, this section employs comparative information from experimental studies using the uncooked remains of large mammals (e.g. Egeland 2003; Seetah: 2006a: 109,143), African enthoarchaeological research of the East African Hadza foragers discussing the procurement and processing of large taxa (e.g. Bunn et al. 1988; Lupo 2006; O’Connell et al. 1990), data from other EIA sites in this region of southern Africa (e.g. Plug 1989a, 1997a, 1999, 2000; Turner 1987a/b; Voigt 1986) to provide a comparative baseline of EIA animal use, as well as North American bison kill sites[5] (e.g. Byerly et al. 2005; Frison 1970; Widga 2004) and other sites (e.g. Driver 1990; Seetah 2006a, 2006b) at which large mammals were selectively exploited as examples of intensive hunting and/or processing sites with thoroughly reported taphonomic records.

Some might suggest that it is problematic to compare, for example, a study based on modern butchering experience and non-local archaeological contexts (i.e. Seetah 2006a) to southern African EIA sites. However, there are a few key constants that support the use of

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[5] Stone tools were used at some of these sites (e.g. Frison 1970), which means that the precise nature of the marks cannot be compared to those made by metal tools. However, the processing and selective choices made can still provide a useful comparative example.

such research. Perhaps the biggest is very physical: the bodies of the animals, and so the specific musculo-skeletal demands their carcasses make during butchering, have changed little. There are some inherent requirements to animal butchery that cannot be avoided, regardless of time period (*cf.* Seetah 2006a: 103). Thus, taking into account all the aspects of human choice that also play a role, an understanding of modern techniques and patterns from other places and periods can be applied here.

In assessing potential intensity, taphonomic details from local projects with which I could compare the Le6 and Le7 butchery and processing would have been ideal. However, there is scant processing information published for EIA sites in this region. Where there is some butchery discussion, for example, it rarely extends beyond a few sentences and usually provides minimal quantitative data. Moreover, as these studies rarely employ non-identifiable material (i.e. ribs, vertebrae), an accurate comparison would be difficult. Therefore, while a few East African and southern African examples (e.g. Lupo 1996; Plug 1997a) are employed in Chapter 12 and elsewhere, non-African sites (e.g. the North American bison kill sites) provided the majority of the comparative taphonomic data utilised in this study (e.g. Table 12.1).

- *Analytical Framework*

I broadly followed Orton’s (2012) framework for taphonomic analysis (see D. Orton 2008: 60-77, 2012 for a full exposition). Apart from being a well-structured path for examining and interpreting the complex and interlinked taphonomic variables, his method is also ideal for faunal material with “limited documentation” (Orton 2012: 322). However, my approach differs in certain aspects from Orton’s (2012) framework, mainly to expand on the butchery component using select elements of Seetah’s (2006a) analytical methodology (section 4.3.3).

Orton’s (2012: 323) framework consists of five stages:

1. Evidence for density-mediated attrition
2. Evidence for peri-depositional damage
3. Breakage and fragmentation

4. Visible human modification
5. Assessment of element representation

4.3.1 Stages 1 & 2: Density-Mediated Attrition and Peri-Depositional Damage

Evidence for density-mediated attrition (Stage 1; Chapter 6) and peri-depositional damage (Stage 2; Chapter 7) are treated with relative brevity in this study. To address density-mediated attrition, I examined the completeness of less dense skeletal elements (such as sesamoids and carpals). A strong correlation between density and completeness could indicate attrition based more on intrinsic properties of the elements rather than on human choices (e.g. Orton 2012). For peri-depositional damage, the frequency and severity of both gnawing (section 4.2.6) and weathering (section 4.2.7) were assessed (Orton 2012).

4.3.2 Stage 3: Breakage and Fragmentation

Stage 3 presents breakage and fragmentation patterns, by exploring element completeness and fracture types. Completeness was assessed by following Orton (2012) in using Morlan's (1994: 805) formula for quantifying completeness:

$$\frac{PP/NISP}{PD}$$

where PP is the number of portions preserved (i.e. recorded), PD is portions defined for the element in question, and the resultant yield is the completeness percentage. Dobney and Rielly's (1988) zones are used as the portions in question.

Neither Morlan (1994) nor Orton (2012) specify how they dealt with zones that were present but incomplete. As I recorded if zones were 'complete', 'half', or 'less than half' present, this was factored into the calculations: complete zones scored 1, half present 0.5, and less than half 0.25. For example, a longitudinally split first phalanx (see Fig. 4.2) would have half of zones 1, 2, and 3 (see Dobney and Rielly 1988 for zone descriptions). In calculating completeness, if the simple presence of those three zones were recorded (e.g. three of three possible zones present) it would seem as if the bone were complete, when it is clearly not. By recording these half-present zones as 0.5, the equation stands as: [(3 x 0.5) x 1]/3 or 1.5/3 which = 50%, thereby expressing the reality of the halved phalanx. Only counting 'complete' zones would exclude a relatively large number of specimens, which would artificially inflate the completeness scores.

Fig. 4.2 Selection of longitudinally split first phalanges from Le6 and Le7.

In terms of recording breakage type, I used a less complicated and less time-intensive method than Orton (2012). This method (based on Marshall 1989 in Lyman 1994: 319) involves recording basic types of breakage, such as spiral fractures or stepped/columnar, which relate to 'fresh' (green) or old breakage conditions (section 4.4.3, Table 8.8). Specimens may have more than one type (e.g. both fresh and intermediate fracture types). For example: if a specimen had both fresh and intermediate breakage, it would appear once in fresh, once in intermediate, and only once in the combined fresh and/or intermediate category (e.g. Table 8.9). I also noted if marrow-bearing bones had been axially or longitudinally split, as this could indicate marrow extraction (e.g. Seetah 2006a: 103). I further recorded a 'triangular breakage' (a type of spiral break) category that commonly occurred amongst metapodia, radii, and tibias. While this breakage recording is not as objectively quantifiable as Orton's 'Fracture Freshness Index' (2012: 325), it at least offers a rough picture of bone conditions (e.g. green or older) at the point of fragmentation.

4.3.3 Stages 4a & 4b: Burning and Butchery

Stage 4 addresses "visible human modification", in which Orton (2012: 323) includes both burning (section 4.4.2 and chapter 9) and butchery (section 4.4.1 and chapter 10). Under butchery, I incorporated additional elements from Seetah's (2006a) classification, assessment, and interpretation of butchery marks. I expanded the butchery section of the taphonomic analysis for two reasons. Firstly, because of the exceptional preservation of butchery marks on the Le6 and Le7 material. Secondly, because "butchery data can provide economic inference" (Seetah 2006a: 106) as well as being "an important cultural indicator" (Seetah 2006a: 106, 2008), making it a key tool in socio-economic questions such as those posed in this study.

Seetah's (2006a) full method negotiates the whole *chaîne opératoire* of butchery, from the factors guiding the selection and specific butchering of certain species to the tools created for that butchering. It also includes the socio-economic factors that drove both this consumption and the development of such butchery skills (ibid.). The full extent of this type of examination is beyond the scope of this project. However, parts of Seetah's (2006a) methodology can be incorporated into Orton's (2012) framework to add greater depth to the butchery analysis and subsequent interpretations.

Seetah (2006a: 24) utilises butchery marks beyond a simple identification of their presence: why and how was that butchery mark made? What purpose did it serve? He specifically addresses "location specific butchery activity" (Seetah 2006a: 25). This partly means recording the precise locations of marks on a given element. But the main aim is to also consider what function that butchery action served, as well as how often similar marks were repeated in that same location on other examples of that element (to address repetition) (ibid.). This raises the question of how to quantify repetitiveness and, potentially, intensity. In other words: how to identify specialisation in a skill set or archaeological assemblage.

Some have attempted to quantify butchery intensity through tallying butchery marks and butchery mark frequency (e.g. Halstead 2007; Lyman 1994: 303-306). However, it has been demonstrated experimentally that such methods are not good indicators of processing "intensity" (e.g. Egeland 2003: 39,48; Lupo et al. 2013; Lyman 2005). In an experimental assessment of processing butchery marks, Egeland (2003: 48) found that "no clear-cut relationship exists between the intensity of processing activities and the resulting frequency of butchery damage”. The number of butchered specimens has been suggested as a better indicator of intensity (e.g. Egeland 2003; Lyman 2005). However, Seetah (2006a: 98, 2006b) points out that tool damage on a bone may have more to do with a butcher’s skills, goals, and tools than intensity. Therefore, I examined both the number of butchered specimens but also the propensity with which types of marks occur in certain areas of certain elements in order to identify consistent, repetitive patterns in butchered portions (*cf.* Seetah 2006a: 135-169). This was done both at the specimen level, and at the zone level so as to better capture more precise locational data (*cf.* Lyman 2005).

The aim is thus to identify the specific patterns of processing and begin to address aspects such as the function of the butcher’s choices, repetitiveness, expediency and speed of butchery. This may even shed light on the skills, if not specialisation, of the butchers themselves (e.g. Seetah 2006a, 2006b).

4.3.4 Stage 5: Skeletal Element Representation

The final stage involves the assessment of skeletal element representation and frequency (Orton 2012). Here the additional quantification methods (e.g. MAUs) are employed. These methods involve aggregated anatomical portions of the skeleton described in Table 5.4. When used in conjunction with NISP, these may help distinguish potential differentiation in both fragmentation and element representation (Orton 2012). In doing so, they can aid in identifying transport strategies, as well as further processing choices.

Additionally, the Le6 and Le7 skeletal presence was compared to similarly wild-dominated assemblages. These included international sites that show similar forms of large mammal utilisation, such as North American bison kill and processing sites (e.g. Byerly et al. 2005; Frison 1970) and a few wild-dominated African examples (e.g. Lupo 2001; Plug 1997a) (see Table 12.1 for full list). This assists in exploring the socio-economic situations that may have encouraged such species use and skeletal patterns.

To conclude the taphonomy section, I briefly describe the main taphonomic categories and how I recorded them.

4.4 Taphonomic Factors

All categories were recorded on a full data recording sheet included in Appendix A.1.

4.4.1 Butchery

The stone and metal tools used to skin, dismember, and butcher an animal often leave traceable marks on the skeletal material (e.g. Rixson 1989; Seetah 2006a/b). The patterns of cut and chop marks can help reconstruct the dismemberment patterns used for carcass transport (e.g. Lyman 1987; Plug 2004), meat processing and distribution (e.g. D. Orton 2008; Seetah 2006a, b; Widga 2004), and cooking or preservation purposes (e.g. Friesen & Stewart 2013; Gifford-Gonzalez 1993; Henrikson 2003).

Seetah (2006a: 120-121) identified the following 'butchery parameters': location, surface, multiple occurrences, depth, direction of mark, and implement. For location and surface in the Le6 and Le7 material, both the zone (Dobney & Rielly 1988) and face (according to the bone's original anatomical position) into which the mark occurs were recorded, as well as a description of the mark and its placement (e.g. 'single shallow chop diagonally into zone 1 on cranial edge of proximal radius articulation'). It was recorded if a mark type occurred either singly or in multiples. The number of marks present, if multiple, were not counted. With mark depth, I recorded shallow, deep, and 'cut through' (Seetah 2006a: 121). I only recorded a rough approximation of 'direction of mark' (ibid.), noting if the mark had been made vertically (parallel to the given element's long axis), horizontally (perpendicular to axis), or diagonally into the cortical surface. I made no attempt to record type of implement employed to create each mark, as that type of identification is currently beyond my own knowledge.

Within the 'interpretational parameters' (ibid.), I only employed a coarse, simplified version of the 'type of mark' parameter (ibid., but see Seetah 2006a: 125-130 for full descriptions and illustrations of mark types). As mentioned, this type of in-depth butchery study was not originally envisioned for this project. I recorded only three of Seetah's (2006a: 125-130) eight mark types: cut, chop, and scoop.

An important aspect to note with Seetah's (2006a) categories is that the description or distinction between these marks is based only in part on their form. Just as important is the type of action that could have created that type of mark. For example: a ‘chop’ and a ‘cut’ may be difficult to differentiate both in description and on a specimen. Both are usually V-shaped marks, only sometimes differing in depth and occasionally in location. However, the actions driving said marks are more easily distinguishable. The ‘chop’ stems from the titular chopping (or splitting) action with a butchery tool, usually a cleaver or similar instrument. On the other hand, cutting is a more finely scaled movement, usually with a knife or similar tool. In cutting, the aim is usually slicing something through or off, hence Seetah’s (2006a: 125-127) ‘slice’ and ‘fine slice’ categories. It tends to be a less energetic or powerful action than chopping, and so the nature of the resulting butchery mark is different. A ‘scoop’ mark, which appears as a shallow “scoop” taken out of the bone (also described as a “chisel mark” [Plug 1988: 57]), may occur when an implement is run along the surface of a bone (Seetah 2006a: 128-129). This would generally occur when removing meat or muscle attachments (ibid.).

In terms of recording, ‘chop’ as used here directly relates to Seetah’s (2006a: 125-127) ‘chop’ type, while ‘cut’ aligns with ‘slice’ and ‘fine slice’. ‘Scoop’ is the same as in Seetah (2006a: 128-129). However, I could not confidently distinguish Seetah’s (2006a: 127-129) ‘knicks’, ‘blade insertions’, and ‘point insertions’. For Le6 and Le7, these types of marks exist within the other ‘shallow cuts’ and ‘shallow chops’ recorded. While these marks represent distinct and significant actions within the butchery process, they unfortunately exceed the scope of this project. No evidence of ‘saw’ (Seetah 2006a: 129-130) damage was found and is excluded from further discussion. Potential butchering implements and ‘function’ (Seetah 2006a: 122) will be discussed in Chapter 12.

4.4.2 Burning

As with butchery marks, traces of burning may also preserve a record of past cooking and disposal habits (e.g. Costamagno et al. 2005; Friesen & Betts 2006; Kent 1993). Burning may occur through the roasting of joints over a fire (e.g. Gifford-González 1989) or indirectly by hot ash being deposited onto a midden (e.g. D. Orton 2008). There are multiple aspects of cooking, disposal, and even differential skeletal traits (Stiner et al. 1995) that can be explored through examination of burned remains. Location of burning and severity of burning both assist in distinguishing the main causes of thermal alteration (e.g. Asmussen 2009; Bennett 1990; Nicholson 1993). In the Le6 and Le7 material, I recorded colour [brown, black, white, grey, and blue] and location of burning, along with a severity scale [not burnt (NB), lightly burnt (LB), moderately burnt (MB), and highly burnt (HB)] following Clark and Ligouis (2010: 2651).

4.4.3 Breakage and Fragmentation

Breakage and fragmentation may also be the products of processing and preparation activities or of depositional and post-depositional events (e.g. Higgins 1999; Karr 2015; Karr & Outram 2012a/b; Orton 2012). These include fitting bones into cooking pots (e.g. Plug & Roodt 1990; Seetah 2006a), processing for various preservation techniques (Friesen 2001; Friesen & Stewart 2013; Henrikson 2003), breakage for marrow extraction (e.g. Byers 2002; Karr et al. 2014; Outram 2001; Plug 1988, 1989a, 1997a; Turner 1987a), bone tool manufacture (e.g. Emery 2009), different disposal habits, and post-depositional conditions (e.g. Brown & Emery 2008; Friesen & Betts 2006; Hill 2011). The recognition of similarities in breakage amongst a type of element can also point to butchery techniques and patterns (Seetah 2006a). Given this, I worked on all similar elements (e.g. all humeri) simultaneously to facilitate identification of repeated breakage patterns. See Appendix A.2 for full list of fracture patterns recorded.

4.4.4 Gnawing: Rodent and Carnivore

Gnawing, particularly by carnivores (e.g. Cleghorn & Marean 2007; Payne & Munson 1985) has been studied at length, as the potential destruction and fragmentation caused by gnawing is an intrinsic factor when considering taphonomic patterns. While seemingly purely diagenetic alterations (i.e. via non-human agents such as rodents), these may also indicate culturally relevant factors. Gnawing and weathering (see below) must be considered as they may affect or obscure more directly anthropogenic modifications (e.g. Cleghorn & Marean 2007; Orton 2012; Phoca-Cosmetatou 2005). However, these elements may also indirectly record human habits, such as refuse disposal and site occupation (e.g. ibid.). For instance, carnivore gnawing can be indicative of domestic dogs both at a site and allowed access to the middens (e.g. Kent 1993; Plug 1997a, 2000; Reitz & Wing 1999: 134-136), or of other wild carnivores gaining access to middens, potentially after site abandonment (e.g. Cleghorn & Marean 2007). Differences in gnawing on the remains of various taxa can also hold cultural, social, even ritual clues (e.g. Brown & Emery 2008; Hill 2011; D. Orton 2008). If the remains of wild species are carefully protected while those of domestic animals are given to the resident dogs, it may indicate important cultural or ritual views on the treatment of wild versus domestic species (e.g. Brown & Emery 2008; Hill 2011).

In this study, carnivore and rodent gnawing were recorded as single or multiple mark with their location, following Dobney and Reilly's (1988) diagnostic zones. Similar to D. Orton (2008: 69), a scale of severity [slight, moderate, severe] was used to describe the gnawing identified.

4.4.5 Weathering

Weathering involves the effects of both open-air and sub-aerial mechanisms on bone and tooth surfaces (e.g. bleaching by the sun and the chemical effects of soil and underground water), and can be an important taphonomic agent in assemblage formation (e.g. Behrensmeyer 1978). As with gnawing, weathering can be seen both as a diagenetic taphonomic factor (including the potential erasure of anthropogenic marks), and as indirect evidence of human choices. As it may influence attrition, assessing weathering (and its severity) is one of the necessary steps in considering diagenetic taphonomic biases introduced to an assemblage. Additionally, as weathering may affect the ability to identify other taphonomy, such as butchery marks (e.g. Phoca-Cosmetatou 2005; Seetah 2006a: 23), the possible extent of such damage should be addressed.

In terms of human actions, the type and severity weathering evident on skeletal remains can indicate how long bones were exposed on the surface of a midden before being covered with more refuse or buried by natural processes after abandonment (e.g. Lyman 1994: 404; Phoca-Cosmetatou 2005). In this aspect, weathering may record habits of refuse disposal, in terms of the rate of disposal as indicated by the severity weathering incurred on an assemblage (e.g. Orton 2012; Phoca-Cosmetatou 2005). Differences in weathering amongst the remains of various species may also record differential socio-cultural treatment (e.g. Brown & Emery 2008; Hill 2011).

The type of weathering (erosion, fine-line fractures, flaking, root-etching and chemical pitting [for descriptions see Phoca-Cosmetatou 2005: 137]) present was recorded, as was Orton’s (2008: 69) scale of severity.

- *Taphonomic Miscellanea*

A final note for taphonomic method: although recorded for all species and fragments, I will only use the taphonomic information for mammalian bone in this main analysis. Reptile, fish, mollusc, and bird remains respond to taphonomic factors differently and so may not be directly comparable to mammals (Behrensmeyer 1978; Gifford-González 1989; Higgins 1999; Lyman 1994: 434-450; Wheeler & Jones 1989: 61-78). This is due both to the different composition of their various osteological tissues, as well as their different physiology necessitating different processing (ibid.).

With this methodological framework in place, the following chapters present the results of these analyses.

PART II: RESULTS

Chapter 5: Species

Species presence is the keystone for exploring both environmental conditions and past foodways. The decisions that drive the selection of certain species may be heavily predicated by environmental conditions or basic nutritional need. More often, however, human choices are based on a much wider and varied field of influences, be they social, cultural, political, or even personal (e.g. Twiss 2012). It is these choices, and any patterns within them, that this chapter will address.

Below, I present the types of species identified and their frequency, first at a broader phase level (sections 5.1 and 5.2), and then at a feature level (sections 5.3 through 5.5) to explore ubiquity and finer scale patterns. Ageing data are referred to where appropriate. Section 5.6 briefly presents the worked faunal material found in these assemblages, and section 5.7 summarises these findings.

5.1 General Assemblage Composition

Table 5.1 presents the total samples for Le6 (4,906 NISP) and Le7 (14,567 NISP). Both sites have a notably high proportion of identifiable remains, with Le6 at 54% and Le7 at 22%. If the early (Le7a) and later (Le7b) features at Le7 are separated, the numbers become 29% and 22% respectively. There are significant differences in the proportions of identifiable material and the number of non-identifiable elements in this study compared to Plug (1988) (Table 5.2). Part of this may be a function of sample size, as Plug (1988:139,142) had 12 features for Le6 and 15 for Le7 (six for Le7a, three for Le7b, and six of Le7c[6]) as opposed to 10 (Le6), four (Le7b), and one (Le7a) in this study. The higher identification rate in this study may also be due to increased identification of shaft fragments and vertebrae that are normally

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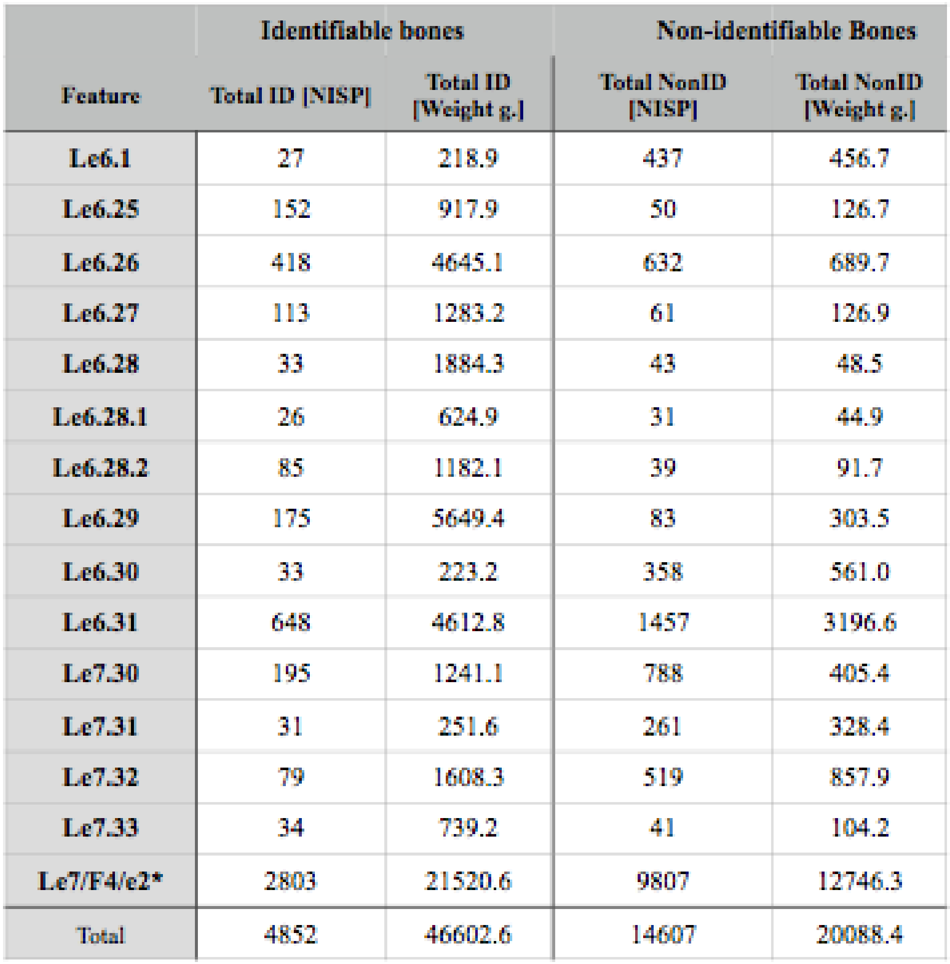
[6] Plug (1988: 147,155) used ‘Le7c’ to describe features on Le7 that could not be confidently assigned to either Le7a or Le7b. Most of these were surface concentrations.

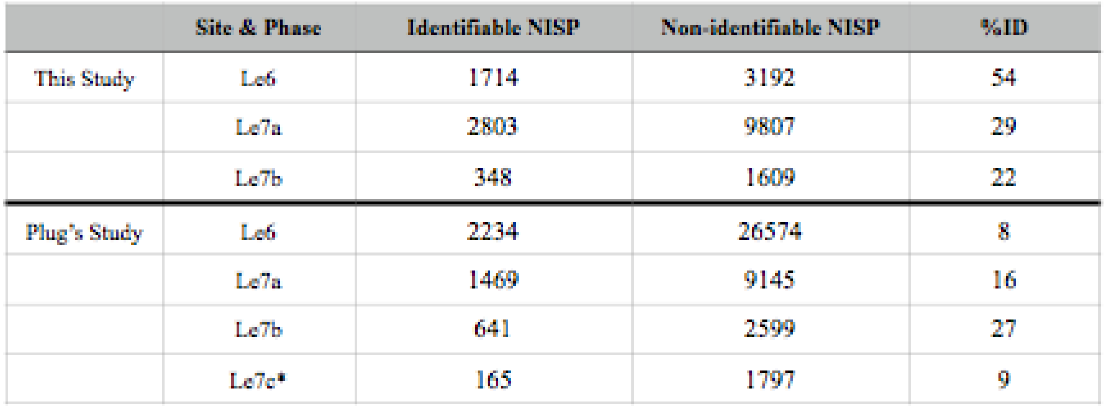
assigned to non-identifiable categories. Indeed, bone flakes (i.e. shaft fragments) were consistently the second largest non-identifiable group (after miscellaneous fragments) across all of Plug's (1988: 147) assemblages. The re-assignment of such fragments to the identifiable category would shift the balance between identifiable and non-identifiable material.

Table 5.1 The total faunal sample from all Le6 and Le7 features used in this study (*only Levels 1 and 2).



	Identifiable bones		Non-identifiable Bones	
Feature	Total ID [NISP]	Total ID [Weight g.]	Total NonID [NISP]	Total NonID [Weight g.]
Le6.1	27	218.9	437	456.7
Le6.25	152	917.9	50	126.7
Le6.26	418	4645.1	632	689.7
Le6.27	113	1283.2	61	126.9
Le6.28	33	1884.3	43	48.5
Le6.28.1	26	624.9	31	44.9
Le6.28.2	85	1182.1	39	91.7
Le6.29	175	5649.4	83	303.5
Le6.30	33	223.2	358	561.0
Le6.31	648	4612.8	1457	3196.6
Le7.30	195	1241.1	788	405.4
Le7.31	31	251.6	261	328.4
Le7.32	79	1608.3	519	857.9
Le7.33	34	739.2	41	104.2
Le7/F4/e2*	2803	21520.6	9807	12746.3
Total	4852	46602.6	14607	20088.4

Table 5.2 The total faunal sample from Le6 and Le7: assemblage used in this study and Plug's (1988:147) (*from features whose temporal association was unknown).



	Site & Phase	Identifiable NISP	Non-identifiable NISP	%ID
This Study	Le6	1714	3192	54
	Le7a	2803	9807	29
	Le7b	348	1609	22
Plug's Study	Le6	2234	26574	8
	Le7a	1469	9145	16
	Le7b	641	2599	27
	Le7c*	165	1797	9

Traditionally in southern Africa little attempt is made to identify vertebrae, as they can rarely be assigned to species. The lower structural density of vertebrae often results in fragmentation, which further complicates identification. The fact that elements such as vertebrae at Le6 and Le7 remain complete enough to identify to at least family also speaks to the somewhat unusual conditions at these sites and likely plays a role in this increased identifiability (*cf.* Plug 1997a, 2000; Voigt 1984a for identification rates at roughly contemporaneous sites).

5.2 Species Presence

Le6 and Le7 display a diverse variety of taxa. There are species from the riverine (fish, freshwater mollusks) and riparian (waterbuck) corridors, upland foragers (eland), open grassland grazers (zebra, wildebeest, buffalo), and forest dwellers (black rhino, kudu). From the largest (giraffe and rhino) to the smallest (fish, frogs, small terrestrial snails), there is substantial breadth in wild taxa present.

A discussion of this presence on a broader phase level will be continued below, but from this point I will use the common names of species. See Table 5.3 for scientific names. Additionally, specimens classified as '*cf.*' (e.g. *cf. Bos taurus*) will be combined with their confirmed counterparts (e.g. *Bos taurus*) in subsequent analyses and discussion.

A few patterns are immediately evident in Table 5.3. For example, there is a preponderance of species in features such as Le7/F4/e2 and Le6.31. As these are the largest features in terms of total sample size, this higher species diversity is not unexpected. It may also be due to specific strategies employed in the formation of those deposits (e.g. a more varied selection of species at Le7a).

There are also clusters of data, with both more numbers (i.e. a species appearing in more features) and larger numbers occurring in certain areas of the list. These groupings mainly centre around large mammals, which will be addressed in later sections. Other species have a considerably less consistent presence, such as the notable gaps within the domestic species.

To explore these and other trends at the feature level, I group the taxa in a variety of ways and scales in sections 5.3 through 5.5.

First, I will briefly compare this study's species findings with the previous work done on Le6 and Le7.

Table 5.3 Full list of species identified per feature at Le6 and Le7 by NISP.

Taxon (common name)	**Le6.1**	**Le6.25**	**Le6.26**	**Le6.27**	**Le6.28**	**Le6.28.1**	**Le6.28.2**	**Le6.29**	**Le6.30**	**Le6.31**	**Le7.30**	**Le7.31**	**Le7.32**	**Le7.33**	**Le7/F4/e2**	**TOTAL**
Papio hamadryas (chacma baboon)			1							12	1				1	15
cf. ***Papio hamadryas***											1					1
Cercopithecus pygerythrus (vervet monkey)										3					2	5
Primate, small/medium - Baboon or Vervet										2						2
Civettictis civetta (civet)												1			1	2
Crocuta crocuta (spotted hyena)															2	2
Panthera leo (lion)			3							1			1			5
Felid, medium - Caracal or Serval															1	1
Felid, medium/large															1	1
Felid, medium/large - Cheetah or Leopard															1	1
Carnivore, small/medium															1	1
Carnivore, medium										2						2
Carnivore, medium - civet size										1		4				5
Carnivore, medium - wild dog/jackal size															1	1
Carnivore, medium/large														1	1	2
Carnivore, large															2	2
Carnivore, large - Leopard or Hyena															1	1
Carnivore, large - Leopard/Hyena Size									1						2	3
Loxodonta africanus (elephant - ivory only)			1													1
Unidet. Ivory (Hippo. or Elephant)															2	2
Rhinocerotidae sp. (rhinoceros)		1						9		1			2		2	15
cf. ***Rhinocerotidae sp.***		1	2												1	4
Diceros bicornis (black rhinoceros)			1					7								8
cf. ***Diceros bicornis***													1			1
Equus quagga (plains zebra)	2	8	40	2	6	3	5	15	2	5	3	2	16	1	93	203
cf. ***Equus quagga***		1	7	1			1		1		2		1		18	32
Phacochoerus africanus (warthog)			1							1					3	5
cf. ***Phacochoerus africanus***									1							1
Potamochoerus larvatus (bushpig)															2	2
cf. ***Potamochoerus larvatus***															1	1
Suid - wild															3	3
Hippopotamus amphibius (hippopotamus)															1	1
cf. ***Hippopotamus amphibius***															1	1
Hippopotamus or Rhinoceros								2		1					1	4
cf. Hippo or Rhino										1						1
Giraffa camelopardalis (giraffe)			5	1	1		3	8		3	1				15	37
cf. ***Giraffa camelopardalis***		1	1	1				1		1				1	4	10
Bos taurus (cattle)		1	3	1	4		2	2		8					7	28
cf. ***Bos taurus***			2	1				2		1					1	7
Ovis aries (sheep)															3	3
cf. ***Ovis aries***															2	2
Ovicaprine (sheep/goat)															6	6
cf. ***Ovicaprine***															2	2
Connochaetes taurinus (blue wildebeest)		3	15	1	3	1		6		12	1		8	2	135	187
cf. ***Connochaetes taurinus***										3	1	1	2	2	43	52
Alcelaphine sp. (wildebeest/hartebeest)		1	1												9	11
cf. ***Alcelaphine sp.***								1							3	4
Sylvicapra grimmia (common duiker)		1					1								12	14
cf. ***Sylvicapra grimmia***											1				3	4
Raphicerus campestris (steenbok)															3	3
cf. ***Raphicerus campestris***															1	1
Raphicerus sharpei (Sharpe's grysbok)															2	2
cf. ***Raphicerus sharpei***															1	1
Aepyceros melampus (impala)	1	1	7	3		1	1	2		10	1			1	7	35
cf. ***Aepyceros melampus***			3							1	2		2		3	11
Hippotragus equinus (roan)												2	1			3
cf. ***Hippotragus equinus***						1									2	3
Hippotragus niger (sable)			2					2							11	15
cf. ***Hippotragus niger***			1												8	9
Hippotragus sp. (roan/sable)								1							2	3
cf. ***Hippotragus sp.***															2	2
Syncerus caffer (buffalo)		4	8	4	5	2	1	3		8	1	3	1		12	52
cf. ***Syncerus caffer***			2	1									1		6	10
Bovini sp. (cattle/buffalo)			8	6		1	1	14	1	15		2			10	58
cf. ***Bovini sp.***															10	10
Tragelaphus strepsiceros (kudu)			2												2	4
cf. ***Tragelaphus strepsiceros***											1				2	3
Tragelaphus oryx (eland)	1	2	4			1		2		1			1		2	14
cf. ***Tragelaphus oryx***			1								1			2	1	5

Table 5.3 Full list of species identified per feature at Le6 and Le7 by NISP.

Taxon (common name)	**Le6.1**	**Le6.25**	**Le6.26**	**Le6.27**	**Le6.28**	**Le6.28.1**	**Le6.28.2**	**Le6.29**	**Le6.30**	**Le6.31**	**Le7.30**	**Le7.31**	**Le7.32**	**Le7.33**	**Le7/F4/e2**	**TOTAL**
***Tragelaphus* sp.** (eland/kudu)															3	3
Kobus ellipsiprymnus (waterbuck)	1		1								5				11	18
cf. ***Kobus ellipsiprymnus***											3	1			8	12
Bovid, small (Bov I)			1								1				17	19
Bovid, small/medium (Bov I/II)				1						1		1			18	21
Bovid, small/medium (Bov I/II - wild)															4	4
Bovid, medium (Bov II)	2	4	22	1			2	1	1	44		3	2		38	120
Bovid, medium (Bov II - wild)			4		1				1	3					13	22
Bovid, medium/large (Bov II/III)			2	2	1		1	1		8	1		3		25	44
Bovid, medium/large (Bov II/III - wild)															2	2
Bovid, large (Bov III)	6	9	37	8	2	4	6	10	2	28	5	1	6	1	237	362
Bovid, large (Bov III - wild)		1	13			2	2	3		3	7		3		40	74
Bovid, large/very large (Bov III/IV)	4	5	31	4		2	6	18	4	26	3	3	8	3	118	235
Bovid, large/very large (Bov III/IV - wild)			1							1				1	4	7
Bovid, very large (Bov IV)	3	13	42	20	1	2	1	16	1	18		1	2	2	41	163
Bovid, very large (Bov IV - wild)								1					1		2	4
Bovid, indeterminate					1										4	5
Pedetes capensis (springhare)															1	1
Hystrix africaeaustralis (porcupine)										1						1
cf. ***Hystrix africaeaustralis***															1	1
Rodent, small		2	1	1						59	6				15	84
Rodent, medium											2				4	6
Rodent, large										1					1	2
Lepus saxatilis (scrub hare)				1											3	4
Lagomorph sp. (hare)															4	4
cf. ***Lagomorph sp.***															1	1
Mammal, small											4				7	11
Mammal, small/medium		1	1	1						2					4	9
Mammal, medium		1	2	1					1	1		1			28	35
Mammal, medium - Bovid/Suid									1	3	1				4	9
Mammal, medium/large	1	1	9		1			2		5					36	55
Mammal, large		3	13	1	1				1	4			2	4	72	101
Mammal, large - Bovid/Equid	3	2	14	6	1	2	1	5	1	15	2	2	7	2	80	143
Mammal, large/very large		3	3				1	1		3	2	1	1		55	70
Mammal, large/very large - Bovid/Giraffe		1	10	1			1	1	1	4	2		2		30	53
Mammal, very large			1				1	3					2		16	23
Struthio camelus (ostrich; eggshell and bone)										2					5	7
cf. ***Struthio camelus*** (bone)			1													1
***Francolinus* sp.** (francolin)											1				1	2
cf. ***Francolinus* sp.**											1					1
***Numididae* sp.** (guinea fowl)											1					1
Bird, francolin size											4				1	5
Bird, hornbill size															1	1
Bird, dove size										2	1					3
Bird, small/medium															3	3
Bird, medium											1				2	3
Bird, medium/large															1	1
Bird, indeterminate (eggshell and bone)										64	2				3	69
***Varanus* sp.** (monitor lizard)															2	2
Snake															3	3
Tortoise	2	17	37	20	5	2	43	1	12	17	18		2	11	468	655
Reptile, small/medium										3	1				4	8
Reptile, indeterminate		1	4							7					8	20
Frog/toad			1			1					1				32	35
cf. Frog/toad										2					14	16
***Clarias* sp.** (catfish)															1	1
***Synodontis* sp.** (catfish)											1					1
Fish, medium/large - catfish size		2	1							2					3	8
Fish			1					1		35	6				129	172
cf. Fish		2		1						8	7				11	29
***Coleoptera* sp.** (beetle)										2						2
***Achatina* sp.** (giant landsnail)		16	14	8				14		17	12	1			360	442
Small terrestrial gastropod		8	1	7			3			135	43				131	328
***Melanoides* sp.** (freshwater gastropod)															2	2
***Unionidae* sp.** (freshwater mussel)		33	15	1		1		20		26	31				181	308
Nonmammal, indeterminate											1				2	3
TOTAL	26	150	404	107	33	26	83	175	32	645	193	30	78	34	2792	4808

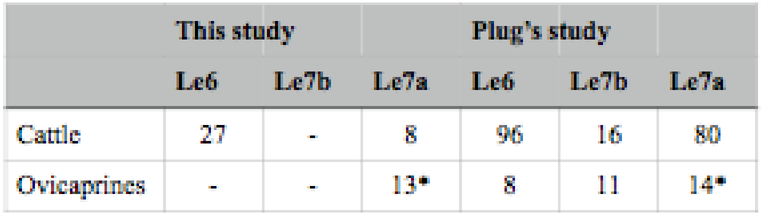
5.2.1 Comparison with Previous Work

For the most part, the species representation between my work and Plug's (1988: 155-157,169-170, 1989a) are very similar. In both datasets, large mammals dominate, with zebra consistently presenting the largest NISP per feature. Wildebeest and buffalo are also fairly common (ibid. and Table 5.3).

There are a few notable differences. Bushpig occur in both Plug's (1988: 155,169) Le6 and Le7a assemblages while only appearing at Le6 here. Steenbok, giraffe, lion, baboon, springhare and hippopotamus are some of the species that appear on both this and Plug's (ibid.) lists, but not always in the same phases. Spotted hyena, porcupine, francolin, freshwater *Melanoides* sp. snails, and snake are all new taxa for Le6 and Le7. Black rhino, sable, scrub hare, and guineafowl were confirmed from either '*cf.*' or genus/family designations in this study. The identification of worked ivory on both Le6 and Le7 is particularly noteworthy, as it was previously known only from a single EIA site in the KNP, Tsh1 (Plug 1988: 341,342,344). I return to these ivory bangle fragments in section 5.6.

Plug (1988: 155-157,169-170) additionally identified aardvark, crocodile, reedbuck, and clawless otter at the sites. Her identifications of tsessebe may be obscured in my Alcelaphines, as they are very similar and have even been grouped under the same tribe in the past (Gentry 1992). Plug's *Canis* sp. (medium carnivore), nile monitor (*Varanus* sp.), African bullfrog (frog/toad), greater cane rat (large rodent), common molerat and hairy-footed gerbil (small rodents) may also be present yet unconfirmed within my findings.

Table 5.4 Presence of domesticates between this study and Plug's (1988) by NISP (* includes confirmed sheep).



	This study			Plug's study		
	Le6	Le7b	Le7a	Le6	Le7b	Le7a
Cattle	27	-	8	96	16	80
Ovicaprines	-	-	13*	8	11	14*

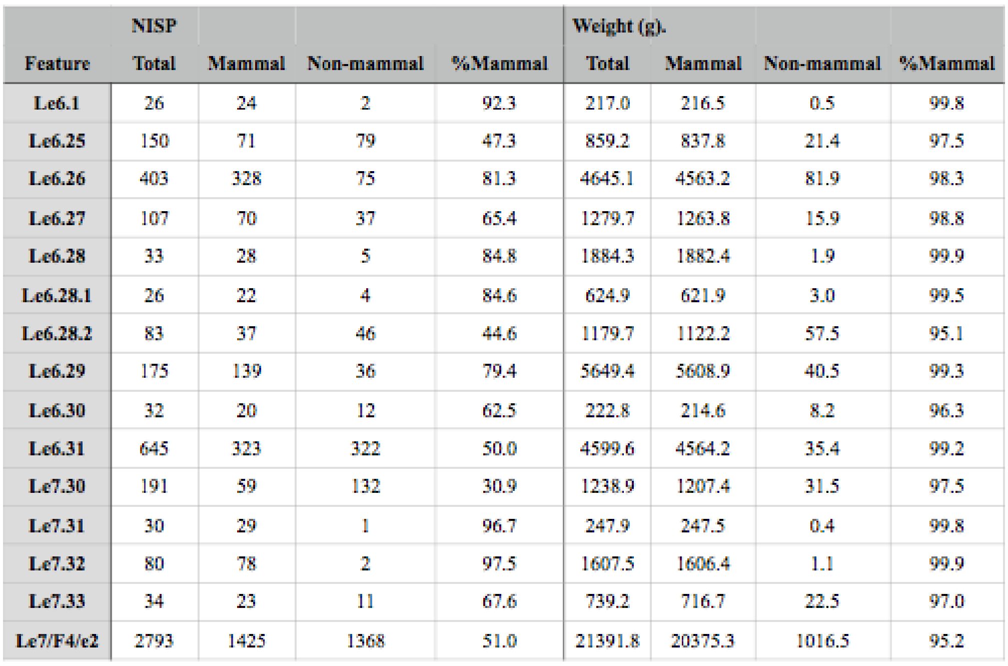
There are far fewer domesticates in this study (Table 5.4). While more cattle than ovicaprines appear in both datasets (although notably absent from the new Le7b assemblage), ovicaprines are only present in the new Le7a data. In Plug's (1988) work, ovicaprines appear in two features in Le6 and one each in Le7a and Le7b. Despite their larger numbers in Plug (1988), they are still a rare occurrence at these sites. Domesticates will be discussed in greater depth in section 5.3.2.

5.3 Species Patterning: Groupings

Patterns within a full species list can be hard to discern given the sheer number of variables (i.e. species) at play. Grouping the taxa can help clarify those patterns and aid in asking specific, human-focused questions. To do this, I work from more general to more specific categories.

The two most basic dichotomies into which an EIA faunal assemblage can be divided are mammal versus non-mammal and domestic versus wild.

Table 5.5 Mammal and non-mammal presence [NISP, weight (g.)] per feature.



	NISP				Weight (g).			
Feature	Total	Mammal	Non-mammal	%Mammal	Total	Mammal	Non-mammal	%Mammal
Le6.1	26	24	2	92.3	217.0	216.5	0.5	99.8
Le6.25	150	71	79	47.3	859.2	837.8	21.4	97.5
Le6.26	403	328	75	81.3	4645.1	4563.2	81.9	98.3
Le6.27	107	70	37	65.4	1279.7	1263.8	15.9	98.8
Le6.28	33	28	5	84.8	1884.3	1882.4	1.9	99.9
Le6.28.1	26	22	4	84.6	624.9	621.9	3.0	99.5
Le6.28.2	83	37	46	44.6	1179.7	1122.2	57.5	95.1
Le6.29	175	139	36	79.4	5649.4	5608.9	40.5	99.3
Le6.30	32	20	12	62.5	222.8	214.6	8.2	96.3
Le6.31	645	323	322	50.0	4599.6	4564.2	35.4	99.2
Le7.30	191	59	132	30.9	1238.9	1207.4	31.5	97.5
Le7.31	30	29	1	96.7	247.9	247.5	0.4	99.8
Le7.32	80	78	2	97.5	1607.5	1606.4	1.1	99.9
Le7.33	34	23	11	67.6	739.2	716.7	22.5	97.0
Le7/F4/c2	2793	1425	1368	51.0	21391.8	20375.3	1016.5	95.2

5.3.1 Mammal Versus Non-mammal

Table 5.5 gives the proportions of mammal versus non-mammal remains per feature. In general, non-mammals NISPs make up a significant portion of the assemblage. However, this is probably a factor of the increased identifiability of certain non-mammalian fauna[7]. Non-mammalian fauna accounts for 2.5-69% of the assemblages by NISP. However, that drops to 0.1-4.9% by weight. While the non-mammalian fauna may be prolific in terms of sheer fragment count, they still only represent a small portion of the overall food resources present. In other words, taxa such as tortoise, fish, and mollusks were probably utilised often but never constituted a significant nor intensively harvested resource.

5.3.2 Domestic Versus Wild

In this section I briefly present the domestic and wild proportions, after which the discussion focusses on the Le6 and Le7 domesticates. The wild taxa are discussed in detail in section 5.4.

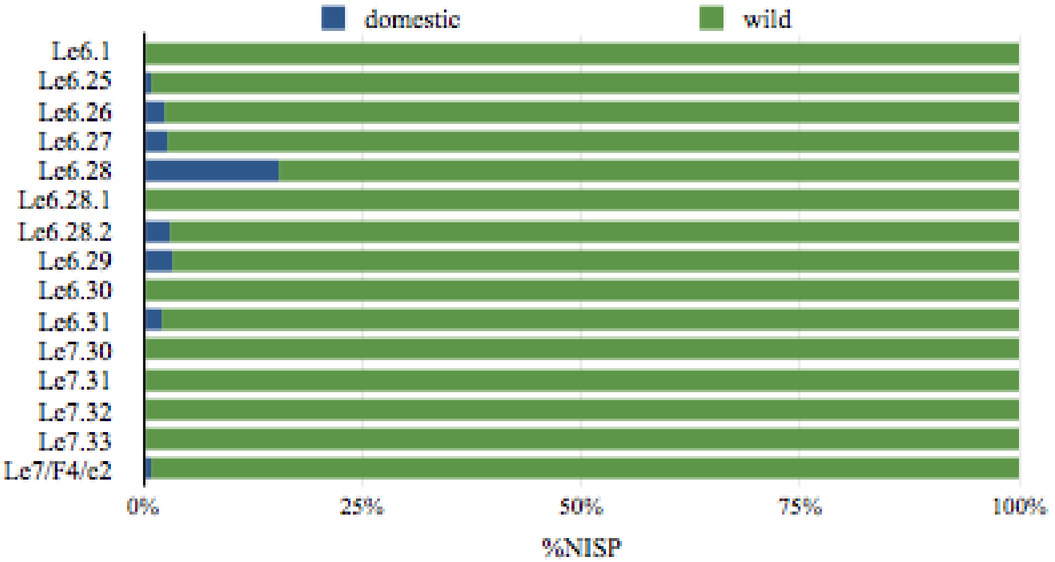


Fig. 5.1 Proportion [%NISP] of domestic and wild grouped taxa per feature.

As Figure 5.1 displays, wild fauna dominates all features at Le6 and Le7. Domesticates never make up more than a minor fraction of material in any given assemblage (Table 5.6). This also holds true when the data from both mine and Plug's (1988: 155,169) features are

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[7] For example, *Achatina* sp. are immediately distinguishable with even the smallest fragment of shell, while a much larger specimen is needed to confirm buffalo and giraffe.

combined, as even then domesticates never account for more then 3.3% of the assemblage by NISP at the phase level.

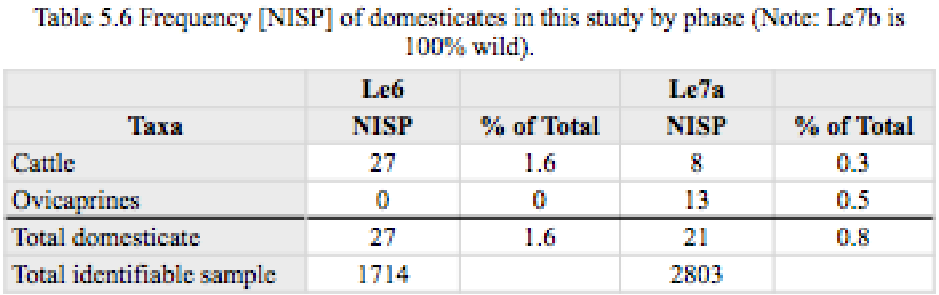


Table 5.6 Frequency [NISP] of domesticates in this study by phase (Note: Le7b is 100% wild).

	Le6		Le7a	
Taxa	NISP	% of Total	NISP	% of Total
Cattle	27	1.6	8	0.3
Ovicaprines	0	0	13	0.5
Total domesticate	27	1.6	21	0.8
Total identifiable sample	1714		2803	

On a feature level, only in Le6.28 do domesticates make up more than 5% of the total grouped assemblage (Fig. 5.1). However, given the small size of Le6.28 (26 NISP in total) this higher presence should be treated with caution. As is indicated above, domesticates are not particularly ubiquitous. Particularly the ovicaprines, as they appear in only four of the 42 features covered in both this study and Plug's (1988).

Cattle do outnumber ovicaprines in terms of total NISP, NISP per feature, and number of features in which they are present. Ovicaprines also always co-occur with cattle in a feature. In terms of the small stock, both Plug (1988: 155) and this study (Table 5.4) only confirmed sheep in Le7a and from the same feature (Le7.9 / Le7/F4/e2). The predominance of cattle rather than ovicaprines at both sites stands in contrast to the general pattern observed for the EIA (e.g. Badenhorst 2008; Fraser & Badenhorst 2014; Plug 1989a; but see Badenhorst 2015 for other exceptions to this trend).

- *Domesticate Ages*

In terms of epiphyseal fusion, all domesticate remains were fully fused. The teeth show slightly more variety. The ovicaprines were slightly younger, with Classes III through IV represented, while the confirmed sheep in Le7/F4/e2 was older at Class V/VI. It may be noted that the ovicaprine teeth were all loose specimens, while the sheep was a molar still embedded in a portion of mandible. The cattle (all loose teeth) were all more developed, being in Classes VI through VII.

The ageing data point to domesticates being slaughtered when at least sub-adult or older. This is in sharp contrast to Plug's (1989a) findings. While she also mainly found older individuals at Le7a and Le7b, Plug identified (1989a) a number of juvenile and neonate cattle remains from Le6. As all of Plug's published (1988: 174, 1989a) age data are quantified as QSP or MNI, it is hard to draw a direct comparison to my own NISP results. However, Plug (1988: 172) lists 17 deciduous and nine un-erupted specimens versus 15 permanent teeth for cattle for Le6. The potential implications of these very young cattle are discussed below.

- *The Bovini Question*

The cattle ages and sample size in Plug's work (Table 5.4) mark the biggest differences between the previous work on Le6 and Le7 and this study. Why there is this discrepancy remains to be established. It could be due to the different features in the two studies. In the case of the differences between Le7.9 and Le7/F4/e2 (cattle NISP 73 and 8 NISP respectively [Plug 1988: 155], and Table 5.4), sampling may be a factor: Plug's Le7.9 was a thin test trench (Meyer 1986: 105) and Le7/F4/e2 is likely a vertically and horizontally expanded excavation off that original trench (section 5.1.1). In fact, the assemblage from Le7/F4/e2 (NISP 12,610) is more than double the size of Plug's Le7.9.

Moreover, cattle and buffalo are notoriously difficult to distinguish (Peters 1988) even in adult remains, let alone juvenile (see section 5.2.3). Complicating this is the sheer size of the Le6 and Le7 cattle. Measurements were taken for all complete and partially complete elements and will be discussed in a future publication. For now it should simply be noted that there was a great deal of overlap in the sizes of the cattle and buffalo remains. Moreover, both were consistently larger than the example specimens at the DNMNH, a pattern also seen in other IA archaeological assemblages (e.g. Plug 1997a).

That the Le6 and Le7 cattle are often as big as the buffalo, and that both are very large for their species, made distinguishing between the two even more difficult. This compelled the inclusion of a 'Bovini sp.' category in my species list. Within this category I do have one neonate and one juvenile tooth (and four adult teeth) at Le6 and one sub-adult tooth (compared to six adult teeth) at Le7a. There is also one partly fused Bovini sp. tibia (i.e. subadult) on Le6, and one neonate/juvenile specimen (unfused distal radius) and one juvenile (unfused distal metapodial) Bovini specimen on Le7a. It is possible that these belong to young cattle (as Plug found). However, I have identified juvenile and neonate buffalo at the site. Therefore I suggest, in this case, that these Bovini remains are equally, if not more, likely to be buffalo given the species profile for the sites. These Bovini elements are an aspect for future enquiry, perhaps in conjunction with both osteometry and even stable isotope studies.

Putting aside the ageing, the size of the Le6 and Le7 animals poses intriguing questions. For both species to reach such sizes points to a thriving environment with plenty of nutritious grazing available. This would further negate the suggestion that the wild species use at Le6 and Le7 was forced by poor environmental conditions.

Specifically with the cattle, castration is also another possible driver in their size. Depending on age of castration, oxen (castrated bulls) tend to be larger than their female and uncut male counterparts (e.g. Reitz & Wing 1999: 312). In terms of the southern African context, the presence of oxen at IA sites has been postulated (Plug 1989a, 2000).

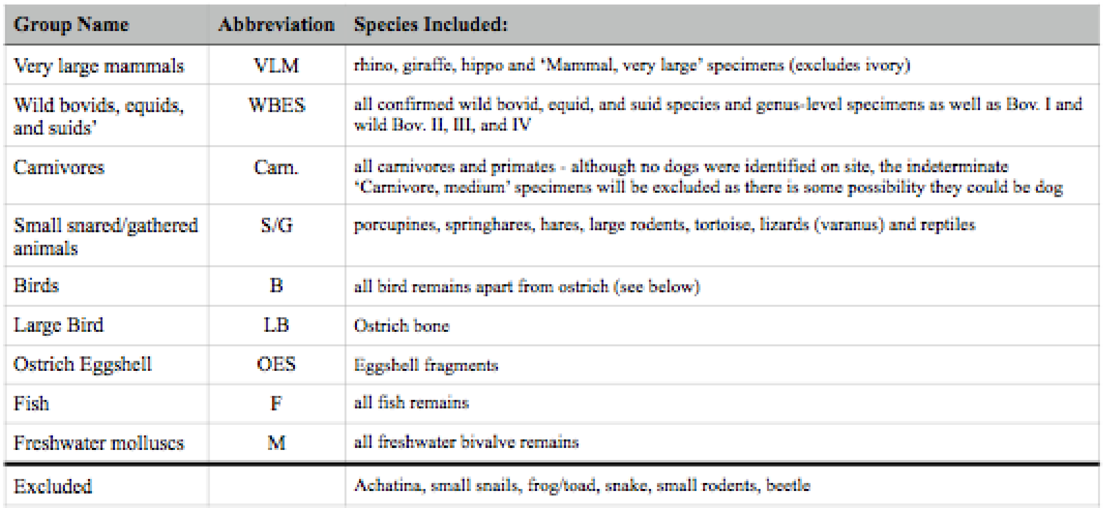
5.4 Wild Taxa

Within the wild contingent, one could look at the procurement strategies that may have led to their acquisition: hunting, snaring/gathering, and fishing. But it can be hard to definitively confirm which strategies were actually used to catch a certain species (e.g. Plug 1988: 328). For example, a duiker or medium carnivore may be hunted or snared (e.g. Lupo & Schmitt 2005; Stayt 1931: 77-78). Therefore, rather than grouping taxa solely by an assigned assumed procurement strategy, I will group them first by type, then by size and habits (section 6.5) as such factors may effect hunting tactics.

Moreover, as mentioned above, these groupings can be used to ask specific questions. One can group species by size class to see if prey size (and possible resulting meat yield) may have been a guiding factor in hunting target choices (e.g. Hill 2007: 423). It is also quite probable that EIA groups may have classified species such as zebra and wildebeest, which are very alike in both type and habits (large-bodied, gregarious grazers that occupy the same habitats), in more similar terms than their modern Linnaean taxonomic designations belie (*cf.* Hill 2007: 423). Therefore, grouping taxa by habits (e.g. migratory, gregarious, solitary) may also elucidate trends in hunting choices that are not species specific but instead derive from exploitation of certain animal types.

- *Taxa Groupings*

Table 5.7 Description of taxa groupings, adapted from Raath (2014: 180-181).



Group Name	Abbreviation	Species Included:
Very large mammals	VLM	rhino, giraffe, hippo and 'Mammal, very large' specimens (excludes ivory)
Wild bovids, equids, and suids'	WBES	all confirmed wild bovid, equid, and suid species and genus-level specimens as well as Bov. I and wild Bov. II, III, and IV
Carnivores	Carn.	all carnivores and primates - although no dogs were identified on site, the indeterminate 'Carnivore, medium' specimens will be excluded as there is some possibility they could be dog
Small snared/gathered animals	S/G	porcupines, springhares, hares, large rodents, tortoise, lizards (varanus) and reptiles
Birds	B	all bird remains apart from ostrich (see below)
Large Bird	LB	Ostrich bone
Ostrich Eggshell	OES	Eggshell fragments
Fish	F	all fish remains
Freshwater molluscs	M	all freshwater bivalve remains
Excluded		Achatina, small snails, frog/toad, snake, small rodents, beetle

I broadly follow Raath (2014: 180-181) in grouping the wild species. Table 5.7 gives a full description of the types of species included. I have also added a 'Large Bird' group to account for ostrich bones. Similar to Raath (ibid.), I exclude certain species whose roles as dietary contributors is debated, such as small rodents and snakes (e.g. Badenhorst 2015; Plug 1988: 90-95; Stayt 1931: 78), and/or which may be self-introduced, such as the terrestrial snails (*cf.* Fowler et al. 2004).

Table 5.8 Number [NISP] of grouped taxa per feature and phase (refer to Table 5.7 for taxa abbreviations).

Feature	VLM	WBES	Carn	S/G	B	LB	OES	F	M	Total grouping NISP
Le6.1		5		2						7
Le6.25	3	22		18				4	33	80
Le6.26	10	114	4	41		1		2	15	187
Le6.27	2	12		21				1	1	37
Le6.28	1	15		5						21
Le6.28.1		11		2					1	14
Le6.28.2	4	11		43						58
Le6.29	30	36		1				1	20	88
Le6.30		5	1	12						18
Le6.31	7	48	18	29	66		2	45	26	241
Le7.30	1	28	2	19	11			14	31	106
Le7.31		9	5							14
Le7.32	6	36	1	2						45
Le7.33	1	9	1	11						22
Le7/F4/	41	496	17	493	12	2	3	144	181	1389
Le6	57	279	23	174	66	1	2	53	96	751
Le7b	8	82	9	32	11			14	31	187
Le7a	41	496	17	493	12	2	3	144	181	1389

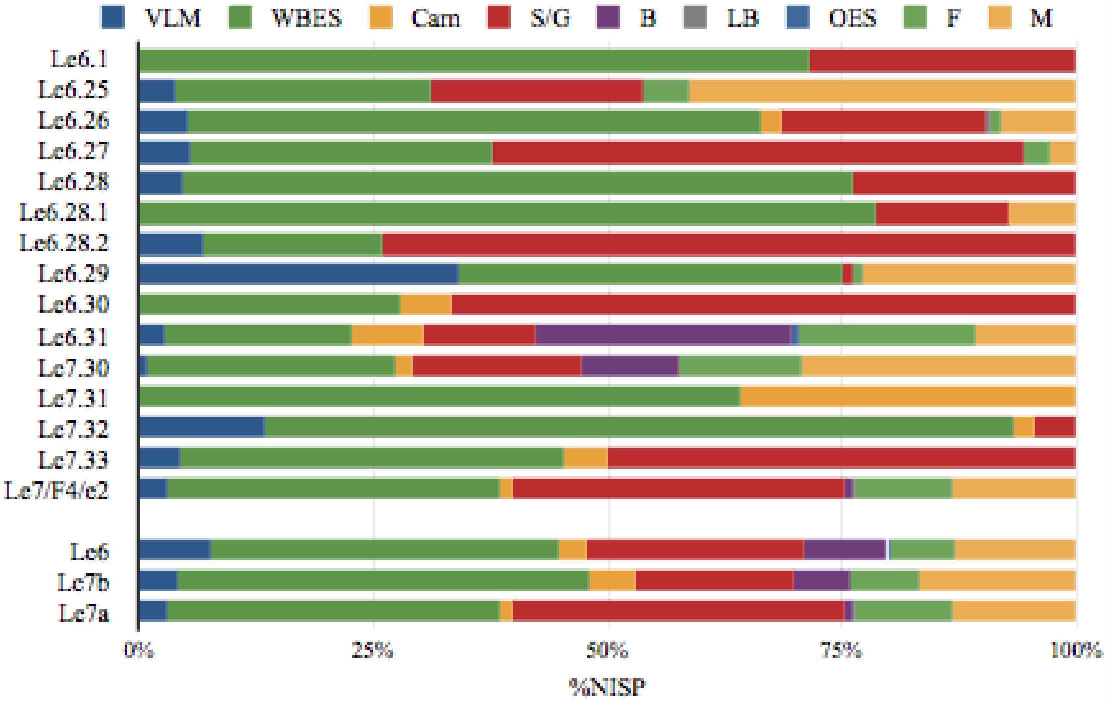


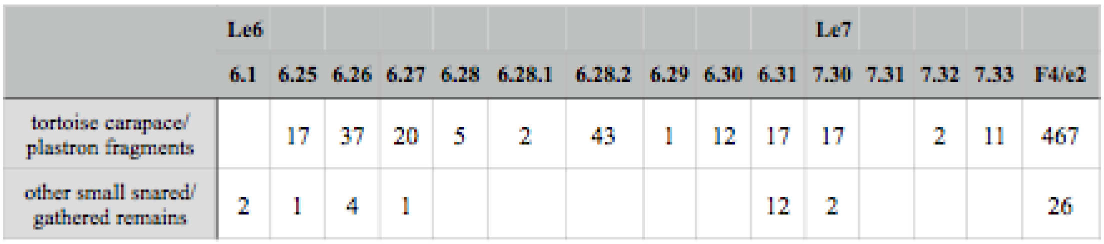
Fig. 5.2 Proportions [%NISP] of grouped taxa per feature and phase.

5.4.1 Small mammals & Non-mammals

- *Tortoise: Issue with Identifiability*

Firstly, a potentially misleading aspect of Table 5.8 and Figure 5.2 must be addressed. In this figure, it appears that small snared/gathered animals (red) make up a sizeable portion of multiple features. However, this seemingly massed presence is actually solely attributable to the presence of highly fragmented tortoise carapace/plastron pieces in the sample. Given the high level of preservation combined with the collection methods (e.g. fine-sieving and <u>all</u> faunal material retained), certain features have somewhat disproportionally large samples of tortoise carapace, especially when inspection of the pieces indicates they likely all stem from a few individuals. Table 5.9 breaks down the number of carapace fragments within each feature. In this, it is clear that carapace fragments either dominate or are the sole constituent of the 'small snared/gathered animal' category in every feature except Le6.1 and Le7.31.

Table 5.9 Number [NISP] of tortoise carapace/plastron fragments versus other small snared/gathered animal remains per feature.



	Le6										Le7				
	6.1	6.25	6.26	6.27	6.28	6.28.1	6.28.2	6.29	6.30	6.31	7.30	7.31	7.32	7.33	F4/e2
tortoise carapace/ plastron fragments		17	37	20	5	2	43	1	12	17	17		2	11	467
other small snared/ gathered remains	2	1	4	1						12	2				26

It would not be equitable to wholly remove carapace from the sample and re-calculate (although if done small snared/gathered animals only make up 1.6-5.8% of the grouped assemblage, apart from Le6.1). Indeed, tortoise (whether identified by carapace/plastron or skeletal elements) is one of the few taxa that occurs in almost every feature. This shows it was a commonly used species. However, while tortoise boasts the highest NISP for Le6 and Le7, it is safe to conclude that small snared/gathered animals (including tortoise) were a regular but not major contributor to the diets at these sites. This is also evident when looking at weight: small snared/gathered animals only make up 1.6%, 1.2%, and 2.8% of the total assemblage by weight for Le6, Le7b, and Le7a respectively.

- Small Mammals

There were very few small mammals in these assemblages. Within the small animal group, springhare, porcupine, and hares are the only mammalian representatives. In terms of features, all three species appear in Le7/F4/e2 (Le7a), a single other scrub hare bone is in Le6.27, and one porcupine and one indeterminate large rodent are in Le6.31. Even small rodents (of rat and mouse size), which tend to be common in EIA assemblages (e.g. Plug 2000), are relatively rare at Le6 and Le7. They only occur in sizeable numbers in Le6.31 and Le7/F4/e2 (Table 5.3). However, given their relative skeletal completeness and 'fresh' appearance, these small rodent remains are likely intrusive. Small rodents are slightly more common than their larger counterparts (Table 5.3).

Despite the possibility of the self-introduced small rodents and springhares (e.g. Plug 2000), there are ethnographic accounts of their use as food (e.g. Skinner & Chimimba 2005: 103; Stayt 1931: 78; Yellen 1991a). Specific species in these taxa may be diurnal (Skinner & Chimimba 2005: 117-207), but these animals are predominantly nocturnal (ibid.: 70,92,101). Given this, and their size, snaring is the most likely method with which they were acquired (ibid.). There are also local records of springhare and hares being pulled or flushed out of their burrows (Skinner & Chimimba 2005: 103; Stayt 1931: 78; Yellen 1991a; Van Warmelo 1932: 9). Large rodent gnawing was also present on some of the bones in these assemblages. As porcupines are known to gnaw on bone (Skinner & Chimimba 2005: 92), they are the likely culprits and as such may have been encountered in or around the settlement.

It should be noted that, given time restraints, the small rodent remains were only identified to size class. Given their potential to elucidate fine-scale environmental conditions (e.g. Avery 1988, 1991), further species identification could be an aspect for future work. Although such work may expand the small rodent species on the list, it is still notable that only a few of the small mammal species in the area were exploited. Plug (1988: 156) did find cane rat remains in an Le7a feature, but that was the only other large rodent/small snare-able mammal identified at these sites. Hyrax (*Procavia capensis*) were also present in the area during the IA (Plug 1989b). In general, with both the limited species list and few bones from these species, exploitation of small mammals seems to have been neither intensive nor particularly common.

- Non-mammals

Besides tortoise, monitor lizards were the only other confirmed non-mammal species in this category. There were also a few indeterminate reptile remains, which could have been monitor, a similar though smaller lizard species, and/or a smaller tortoise/terrapin. Apart from the tortoise, the other reptiles only appear in five features. Three of these are pit features at Le6, one a pit at Le7b (Le7.30) and the Le7a ash heap (Le7/F4/e2). Le7/F4/e2 is the only one in which monitors were confirmed.

As with the small mammals in this group, some of these may have been intrusive (e.g. Plug 2000), but there is some possibility that there were eaten (e.g. Junod 1962: 82; Quin 1959: 124). The tortoise in particular is a well-known food source (Plug 1989a, 2000), and the butchery marks present on the tortoise remains (both skeletal and carapace) supports a dietary designation. Similar to the small mammals, these species were likely snared, or simply picked up (gathered).

Although excluded from the ‘small snared/gathered animal’ category, snakes and frog/toads were present in the assemblage. Snakes are only found in Le7/F4/e2 (and are wholly absent from Plug’s (1988: 157,170) features). There are ethnographic examples of snakes being eaten, caught for their skins, used for ritual or medicinal purposes, or killed as pests in the settlement (e.g. Junod 1962: 82; Mönnig 1967: 176; Quin 1959: 127). Taking that into account, it would be hard to say what the few snake remains in Le7/F4/e2 signify.

Amphibians are slightly more prevalent than the snakes, appearing in two features at Le6, one in Le7b, and Le7/F4/e2. As with the small rodents, Le7/F4/e2 has the largest number of amphibian remains. Amphibians are sometimes classified as intrusive species (e.g. Plug 2000), and are known to burrow into the softer soils of archaeological deposits (Fowler et al. 2004; Voigt 1984b). Conversely, there are ethnographic examples of frogs and toads being collected and eaten (e.g. Tlou 1985 in Mbaiwa 2011). The number of different skeletal elements and general ‘fresh’ appearance makes it seem likely that amphibians (and the small rodents) from Le6 and Le7 were likely intrusive.

In spite of more than 100 reptile species in the KNP (Joubert 1986), the reptile remains at Le6 and Le7 are both sporadic and scant—beyond the ubiquitous tortoise fragments. Many may be intrusive, and the acquisition and/or use of these animals may have been opportunistic and occasional rather than systematic or consistent.

- Terrestrial Snails

While not officially included in the small animal ‘snared/gathered’ group, I briefly discuss the giant land snail (*Achatina* sp.) here as gathering was the most likely human action responsible for their presence—if they were intentionally collected. These large land snails may have been acquired for food, raw material for shell beads, or could be intrusive as the snails are known to burrow into archaeological deposits for estivation (e.g. Plug 1989a). Ethnographic examples of their use as food exist (e.g. Quin 1959), but it would be difficult to substantiate archaeologically (e.g. Plug 1989a). With the prevalence of *Achatina* shell beads on-site (section 5.6), their collection for raw material is probable. Quantifying the abundance of these snails is also problematic given their propensity for sample inflation through fragmentation. Thus, I will only briefly discuss their presence, as they are moderately common. Appearing in five Le6 features, two Le7b features and the Le7a feature, giant land snails are the second most ubiquitous non-mammal species (behind tortoise).

The many small terrestrial snails found in certain features are almost certainly self-introduced and in no way the result of human actions. However, as discussed in section 2.3.1, the presence of such diminutive specimens (often only a few millimetres in diameter, and occasionally only one to two millimetres long) is testament to and evidence of the very fine sieving and collection practiced in the excavation of these features.

The beetle remains (two legs) are almost definitely self-introduced and are likely a modern intrusion.

5.4.2 Birds

As with the tortoise carapace, the seemingly high occurrence of birds in Le6.31 is a matter of fragmentation. All 64 of the indeterminate bird remains in that feature are eggshell, as are the three indeterminate pieces in Le7/F4/e2 (Table 5.3). As these are likely from single eggs, the actual presence of birds in those features is quite small. In fact, there are few birds at Le6 and Le7 in general, as they only appear in features Le6.26, Le6.31, Le7.30, and Le7/F4/e2.

Both ground-dwelling and flying birds appear in the assemblages. In terms of the former, francolin occurs in both Le7.30 and Le7/F4/e2, while guineafowl are only identified in Le7.30. For the latter type, 'dove-sized' bird remains occur in both Le6.31 and Le7.30, while 'hornbill-sized' remains are found in Le7/F4/e2. All of these birds were likely snared, or trapped with bird lime (e.g. Stayt 1931: 78). As seen in other smaller taxa, birds seem to have been opportunistically acquired.

- Large Bird: Ostrich

Ostrich was separated from the other birds as they would have been hunted (Boeyens & Plug 2011; Plug 1988: 92; Plug & Badenhorst 2006) rather than snared like the smaller avian species. While ostrich eggshell is a common find at EIA sites, ostrich bone is notably more rare. Having ostrich bone in the assemblages of both Le6 (one in pit 6.26) and Le7a (two in ash heap Le7/F4/e2) is quite unusual. This is in addition to the ostrich sacra of two different individuals Plug (1988: 141) identified from Le7a, also in Le7.9 (Le7/F4/e2).

- Ostrich Eggshell

The presence of ostrich bones at the sites suggests ostriches were in the area (just as they are today [Chittenden 2007: 18]), meaning ostrich eggs should also have been available. Even though ostrich eggs may be collected for food (e.g. Tlou 1985 in Mbaiwa 2011) or for bead material, neither seems to have been done within these Le6 and Le7 features. There is a distinct paucity of ostrich eggshell on-site. Alternatively, it could be that the eggshell was too valuable a resource (for bead making, or other reasons) to consign it to the refuse heaps. Either way, in this study there were only five unworked ostrich eggshell fragments: two in Le6.31 and three in Le7/F4/e2. Even in Plug's (1988: 156) data, ostrich eggshell was only found on Le7a: one specimen in a pit feature and the others in Le7.9 (Le7/F4/e2). Altogether, ostrich eggshell is wholly dwarfed by the number of *Achatina* sp. shell fragments at Le6 and Le7. This will be discussed further in section 5.6.

5.4.3 Fish & Freshwater Mollusks

Freshwater mollusks are another common (although not consistent) presence, both at these and other southern African EIA sites (e.g. Plug 2000). These shells are only absent from some of the Le6 and Le7 surface and eroded pit/heap features. As with the giant land snails and tortoise carapace, the actual abundance of these mollusks is hard to quantify. However, their persistent presence, especially when coupled with the fish remains, points to regular use of the local riverine resources. There may have been slightly heavier harvesting of mollusks in Le7/F4/e2 (which included the shells of quite large individuals and some mostly complete), but this could simply be a matter of sample size (e.g. Table 5.8).

In comparison to the freshwater mollusks, the fish remains are highly unusual. Inland EIA sites of southern Africa rarely boast more than a few scattered fish bones, if they are present at all (e.g. Plug 1989a, 2000). Therefore, fish use (and riverine exploitation in general) has been categorised as “minimal” (Plug 2000: 124) for this period and region. This general archaeological absence of fish has been extended to interpretations of avoidance or even taboos regarded fish-use within the inland EIA groups (Whitelaw 2009). However, Whitelaw (2009) cautions against stereotypically applying uniformitarian ethnographic interpretations to the archaeological material. There are also numerous methodological issues (namely sieving and screen sizes) that must be taken into account when attempting to examine fish presence between sites. However, it does seem that fish were not consistently used during the EIA of southern Africa.

The hundreds of fish remains at Le6 and Le7 stand in stark contrast to this. When combined with Plug’s (1988: 157,170) findings, a total of 318 fish remains were identified at Le6 and 190 at Le7. These are some of the largest collections of fish from any inland EIA sites in southern Africa. In terms of this study, all features identified in Table 4.1 as pits or ash heaps have fish remains**.** Fish appear less frequently in Plug’s (1988: 157,170) features, occurring only in half of the Le6 pits, one Le7b ash heap, and in one pit and one ash heap (Le7.9) from Le7a. Altogether, they indicate that the sites' inhabitants habitually, if not truly frequently, fished. Sizing fish from vertebrae (the most common skeletal element recovered) is difficult (Wheeler & Jones 1989: 143), but a very preliminary and subjective comparison to the examples at DNMNH suggest that some of the remains belonged to large catfish. Both these large fish and other smaller specimens may have either been trapped or snared with catches or shot with bow and arrow (e.g. Stayt 1931: 80).

5.4.4 Carnivores & Primates

For procurement, the carnivore and primate group is not a particularly coherent one in terms of the strategies likely employed in their acquisition. This diversity is driven both by the variety of sizes and types included (e.g. lion versus vervet monkeys), as well as the potential reasons behind their procurement. The reasons put forward for primates and carnivores appearing in an assemblage are numerous.

Their presence is often attributed to hunting for "skins or magical properties" (Turner 1987a: 9), but there are a medley of reasons that could have led to the inclusion of carnivores or primates in an assemblage. Skins (e.g. Campbell 1822 [II]: 219; Plug 1989a), meat (e.g. Bunn et al. 1988), protection of home, self or livestock (e.g. Stayt 1931: 77), elite or high-status occupations or areas (e.g. Boeyens & Plug 2011; Van Warmelo 1932: 61,137), and ritual (e.g. Brunton et al. 2013; Plug 1988: 348; van Warmelo 1932: 92,151) could all account for the presence of this type of taxa. In general, carnivore and primate species are not believed to have been taken for food (e.g. Boeyens & Plug 2011), although there are ethnographic examples of such species being eaten (e.g. Bunn et al. 1988).

An important point in the discussion of carnivore procurement is that it highlights the value *beyond meat-weight* that an animal may possess. From the trade in skins (e.g. Campbell 1822 [II]: 219; Plug 1989a), species with royal links or restrictions (e.g. Stayt 1931: 77), to ethnographic examples of lion sinew and hyena blood used in ceremonies (van Warmelo 1932: 92), carnivores exemplify the fact that animals have economic, political, and even ritual value that extends far beyond mere nutritional needs.

In terms of the carnivores and primates present at Le6 and Le7, I am hesitant to suggest ‘ritual use’, as suggestions of ritual are often solely founded on the mere presence of those species (e.g. Plug 1988: 337,339,348). The unclear spatial relationships between the features boasting carnivore and primate remains in problematic, and so here I only note their presence without pronouncing a definitive interpretation of it.

- Primates

Hardly ubiquitous, primates appear in only four features at Le6 and Le7. Le6.26, Le7.30, and Le7/F4/e2 have, respectively, one, two, and three specimens apiece. The bulk of both baboon and vervet remains are in Le6.31. This is mainly attributable to the mostly complete skull with articulating mandible fragments, atlas, and axis vertebrae of a sub-adult baboon in pit Le6.31, along with other loose elements (including limb bones) of baboon and vervet monkey. In addition to the rarity of primate remains in EIA sites (e.g. Plug 2000), finding so many articulating and nearly complete elements, particularly the skull (Fig. 5.3), is highly unusual. The completeness and articulation, in conjunction with the very light weathering, indicates that these elements were buried quickly and deposited together. Plug (1988: 140,155) also found a mostly complete baboon mandible (along with other primate remains) in one of the Le7b pits. Both this mandible (ibid.) and many of the baboon remains in this study are butchered, as will be discussed future work (see chapter 10).

Fig. 5.3 Articulating baboon skull, mandible, and vertebrae from Le6.31.

- *Carnivores*

As with the primates, carnivores are not widespread in the Le6 and Le7 features. Lion remains are scattered through a few features, as are medium to large indeterminate carnivore specimens, but the bulk of the carnivores appear in Le7/F4/e2. Given the size of this feature, this could be a sampling issue, or more carnivores may have been sought during this phase. However, carnivores never appear as a significant portion of the assemblage in the features (apart from Le7.31, but its small sample size hinders its representative value). Notably, excluding the primate data, virtually all carnivores identified at these sites are at least of medium (civet) size and larger. There was only one indeterminate small/medium carnivore

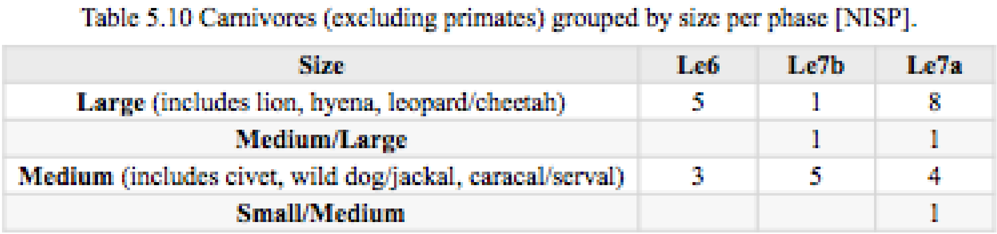


Table 5.10 Carnivores (excluding primates) grouped by size per phase [NISP].

Size	**Le6**	**Le7b**	**Le7a**
Large (includes lion, hyena, leopard/cheetah)	5	1	8
Medium/Large		1	1
Medium (includes civet, wild dog/jackal, caracal/serval)	3	5	4
Small/Medium			1

identified from Le7/F4/e2, with the rest in the medium or large categories (Table 5.10).

In both Le6 and Le7a features, large carnivore remains outnumber medium. The opposite is true in Le7b, but this should be treated with caution given the very small samples from this phase. Apart from features Le6.31 and Le7/F4/e2, the species are present only through a few scattered elements rather than a representative coverage of the skeleton. Similar to the smaller species discussed above, carnivores and primates also do not seem to have been a particularly common target at Le6 and Le7.

5.4.5 Very Large Mammals

Unlike the preceding groups, the very large mammals have a more regular presence on-site, appearing in all but four features. This is mostly due to the giraffe remains, which appear in all but five features. Giraffe are also the most populous of the very large mammals on-site, when counted either at feature (excepting Le6.29) or phase level. Only in feature Le6.29 do rhinoceros remains outnumber those of giraffe. As will be discussed in chapter 11, the rhinoceros and giraffe remains in these features are likely all from single individuals, thus the differences in NISP are not particularly significant.

Similar to the above sections, the greatest variety of very large mammal taxa appear in pit Le6.31 and heap Le7/F4/e2. Pit Le6.29 also shows the same species and pit Le6.26 has almost as much breadth in taxa. As these four features are also some of the largest in terms of specimen numbers, this may be a factor of preservation and sample size. However, giraffe also appear consistently in the surface features (Table 5.3). As these species have large skeletal elements, their remains are less likely to be dislodged by erosive forces than those of smaller taxa. The regular presence of these very large mammals signifies that they were a consistently targeted animal type at Le6 and Le7. Only in feature Le6.29 do very large mammals form a sizeable proportion (34% of grouped taxa NISP) of the assemblage. However, as Le6.29 is a relatively small sample (175 total NISP) this figure should be treated with caution. Although fewer in number than the large mammals, the size of the very large mammals means that even a single giraffe (700 to 1,400 kg in live mass) or black rhino (roughly 1,000 kg) (Skinner & Chimimba 2005: 531,617) would constitute a significant portion of the meat brought back to the site.

Unlike many other IA sites (e.g. Boeyens & Van der Ryst 2014; Plug 2000; Raath 2014: 197; Turner 1987a), rhinoceros are relatively well represented at Le6 and Le7, both in terms of feature presence and skeletal representation. Rhinoceros remains appear in four of the Le6 pits, and in one feature for each Le7b and Le7a. Plug (1988: 155) also identified rhinoceros remains in one Le7b ash heap and one Le7a ash heap (feature Le7.9).

The presence of a small number of specimens at other IA sites has been interpreted as evidence of scavenging rather than hunting (e.g. Turner 1987a). The comparatively large number of rhinoceros remains may therefore reflect procurement strategies, which will be discussed in chapter 12. The skeletal elements, which may shed light on the part of the carcass transported to site, will be discussed in chapter 11.

There are a few ethnographic records of the consumption of rhinoceros meat (e.g. Campbell 1822 [I]: 199-200). However, most ethnographic treatments on rhinoceroses focus on their political and status associations, rather than their dietary value (e.g. Boeyens & van der Ryst 2014). Rhinoceros are present in rock art (e.g. Vinnicombe 1972) and engravings (e.g. Maggs 1971; Ouzman 1996), as well as in figurines at IA sites in southern Africa (e.g. Boeyens & van der Ryst 2014; Huffman 2007: 58). This varied symbolic presence indicates rhinoceros have had some socio-cultural import in communities throughout southern Africa for a significant period of time (ibid.), and have at times been linked with the elite and royalty (e.g. Boeyens & van der Ryst 2014; Huffman 1996, 2007: 58).

The hippopotamus remains, although only confirmed in Le7/F4/e2, do indicate use of the riverine resources. Between the fish, freshwater mollusks, and the hippopotamus remains, the Letaba River was evidently exploited with some regularity.

- *Elephants*

Present in the area even today, elephants and their ivory may have been one of the many wild resources that motivated movement to Le6 and Le7 in the past. Given the size of elephants, it is possible that only the tusks and meat would have been brought back to site (e.g. van Warmelo 1932: 27). This would render them relatively invisible archaeologically, especially if the ivory was not worked at Le6 and Le7 (which would leave identifiable debitage). It is therefore possible that elephants and ivory were a regular target, however, there is no skeletal evidence of significant elephant presence on-site.

While the Le6 and Le7 ivory has been provisionally identified as elephant (section 5.6), it has left out of this group as it may have been scavenged or gathered (e.g. Plug 2000). These ivory bangle fragments will be discussed in section 5.6.

5.4.6 Wild Bovids, Equids & Suids

Wild bovids, equids and suids are the largest, most well-represented, and most ubiquitous taxa group in the assemblages. The only features in which these animals are not the most numerous are those in which there is a substantial portion of tortoise carapace (Le6.27, Le6.28.2, Le6.30, Le7.33) or indeterminate bird eggshell (Le6.31) artificially inflating the presence of non-mammal and small animal groups. Even with the carapace and eggshell included, wild bovids, equids and suids still predominate at the phase level, both in NISP and by weight. Indeed, by weight wild bovids, equids, and suids account for 66% of the total assemblage studied, with very large mammals accounting for a further 30%.

The different major taxa types within this group will be discussed below.

- *Suids*

There are few suids in the Le6 and Le7 assemblages. They only appear in any numbers in ash heap Le7/F4/e2 (Le7a), with a few more scattered suid remains in three Le6 feature as well. It is possible that further fragmented suid remains are present in the ‘Mammal, medium

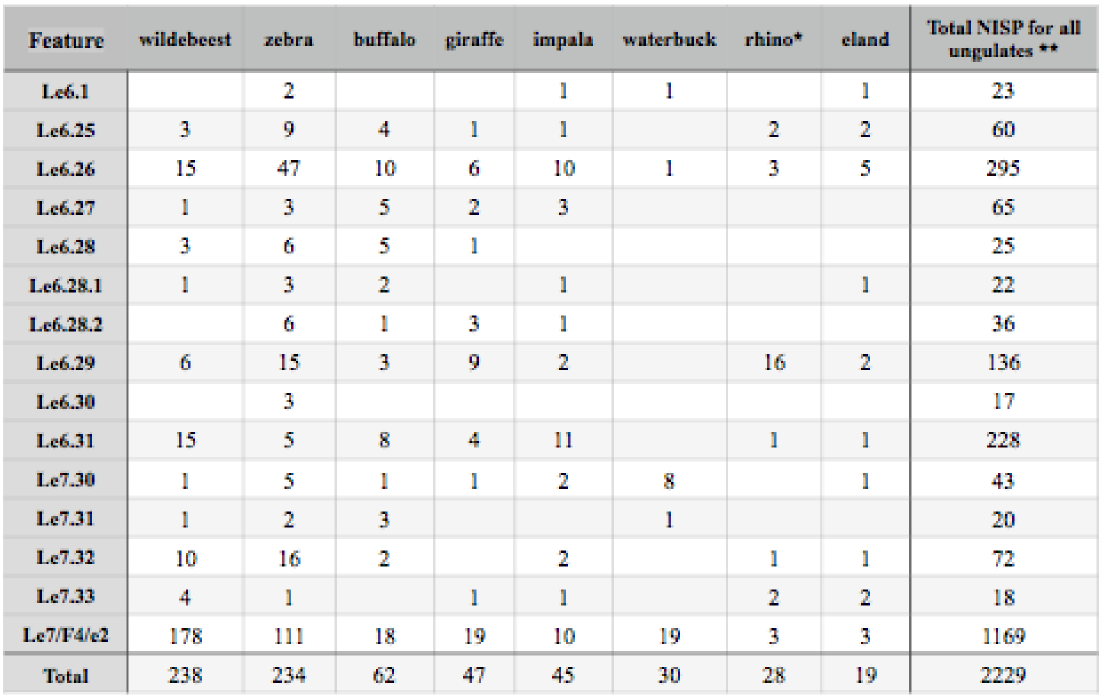
- bovid/suid' category, but if so it would only expand their presence by a single feature. Plug (1989a: 64) also found warthog and bushpig at Le6 and Le7. However, as with this study, they were only identified in a few scattered features and suids only appeared in slightly larger quantities in the large ash heap Le7.9 (Le7/F4/e2) (Plug 1988: 155,169).

Warthogs are still present in the vicinity of Le6 and Le7 today. On the other hand, bushpigs are not, nor are there records of them being historically present in the area (Plug 1989b: 111-112). This does potentially point to some environmental change, as bush pigs prefer denser vegetation than that currently present at these sites (ibid., see also section 2.4.2).

- *Equids, Wildebeest & Buffalo*

Plains zebra is one of the most prevalent and ubiquitous species in these assemblages. Zebra has been confirmed in every feature at Le6 and Le7 in this study, and in all but five from Plug's analysis (1988: 155,169). In terms of simple fragment count, only blue wildebeest outranks it, and then only by a few pieces (Table 5.11). It should be noted that only plains zebra (*Equus quagga*) and blue wildebeest (*Connochaetes taurinus*) were identified at Le6 and Le7. Thus 'zebra' should be taken to mean plains zebra and 'wildebeest' as blue wildebeest hereafter.

Table 5.11 Most common [NISP] ungulate species per feature (*includes black rhino and indeterminate rhino sp., ** total includes domesticates and indeterminate ungulates).



Feature	wildebeest	zebra	buffalo	giraffe	impala	waterbuck	rhino*	eland	Total NISP for all ungulates **
Le6.1		2			1	1		1	23
Le6.25	3	9	4	1	1		2	2	60
Le6.26	15	47	10	6	10	1	3	5	295
Le6.27	1	3	5	2	3				65
Le6.28	3	6	5	1					25
Le6.28.1	1	3	2		1			1	22
Le6.28.2		6	1	3	1				36
Le6.29	6	15	3	9	2		16	2	136
Le6.30		3							17
Le6.31	15	5	8	4	11		1	1	228
Le7.30	1	5	1	1	2	8		1	43
Le7.31	1	2	3			1			20
Le7.32	10	16	2		2		1	1	72
Le7.33	4	1		1	1		2	2	18
Le7/F4/e2	178	111	18	19	10	19	3	3	1169
Total	238	234	62	47	45	30	28	19	2229

In total, wildebeest and zebra each make up over 10% of all large-bodied ungulate remains studied here. If buffalo, the third-most prevalent, is included, these three species represent a quarter of all the remains identified to ungulates. Le6.1, Le6.28.2 and Le7.33, all of which were identified as either surface concentrations or [partly] eroded pits (Table 4.1) are the only features that do not have all three of these taxa. Le6.1 is the sole feature that has only one of the three. These three species are also not only similar in their presences at Le6 and Le7 but in other habits and characteristics that will be discussed below in section 5.5.

- *Remaining Bovids*

Overall, bovids are the most proliferous taxa type present at Le6 and Le7, with the greatest complement of species being in Le7/F4/e2. Unlike the other taxa groups, Le6.31 is relatively sparse in terms of bovid diversity. Indeed, many features only have a few (three to six) different species, generally including the ever-present zebra, wildebeest and buffalo. Features Le6.26, Le6.29 and Le7.30, in addition to Le7/F4/e2, have a greater variety of bovid species.

This ‘wild bovids, equids and suids’ category is an ungainly grouping. This is partly due to the vast diversity in sizes, ranging from the roughly 7 kg Sharpe’s grysbok to the 500-600 kg buffalo (Skinner & Chimimba 2005: 622,702). The variety of species in this group represents a diverse range of characteristics that would have significantly influenced procurement choices. These will be discussed in the following section (5.5).

For this next section, the data from the very large mammals will also be included, creating an 'ungulate’ group for the analyses below. This group includes all the identified species in the ‘wild bovids, equids and suids’ and ‘very large mammal’ classes, along with certain of the more indeterminate classes (e.g. bovid size classes) in specified areas. This dataset allows for the identification of any habits or aspects (e.g. size) that may have guided the targeting and acquisition of ungulates at Le6 and Le7.

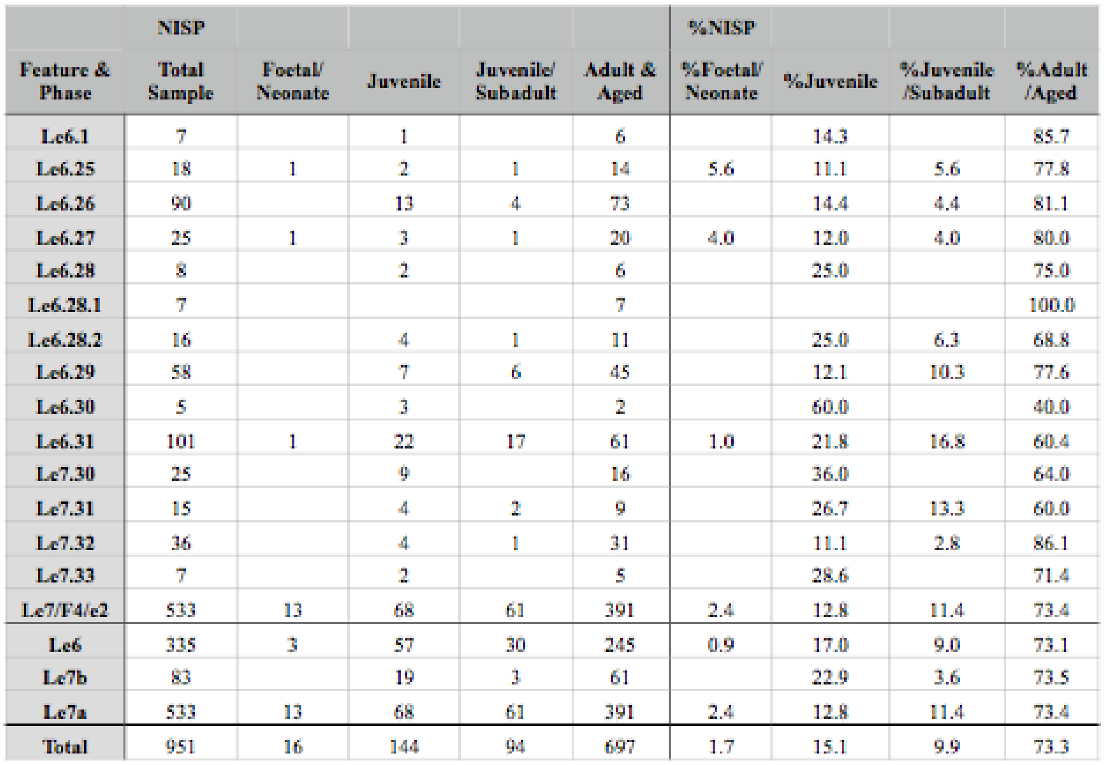
5.5 Ungulate Trends: Size and Habits

As mentioned above, certain characteristics of the animals themselves (such as size, habits, or habitat) also shape procurement strategies and tactics (e.g. hunting versus snaring, or seasonal movements following migratory species), target selection (big, adult animals offer the most meat), as well as aspects such as carcass transport, processing, preservation, and sharing choices. These will be further discussed in chapters 11 and 12, but the data trends within these characteristics are presented here.

Within the Le6 and Le7 features, the ungulate taxa present display a variety of habits. In each feature there are mix of migratory and territorial species, small and large grazers and browsers, and those gregarious or solitary by nature. However, this does not necessarily imply that the inhabitants were simply hunting by “driftnet” (D. Orton 2008: 101), acquiring whatever presented itself in the environment. There are a few clear patterns within the ungulate types present.

Gregarious species are the most common within the ungulate ranks. These include not only the three most populous taxa (zebra, wildebeest, and buffalo) but also other frequent species such as impala, eland, and giraffe (Skinner & Chimimba 2005). The potential implications of this will be discussed below.

Table 5.12 Overall frequency [NISP] of mammal remains per age class by feature and phase.



	NISP					%NISP			
Feature & Phase	**Total Sample**	**Foetal/ Neonate**	**Juvenile**	**Juvenile/ Subadult**	**Adult & Aged**	**%Foetal/ Neonate**	**%Juvenile**	**%Juvenile /Subadult**	**%Adult /Aged**
Le6.1	7		1		6		14.3		85.7
Le6.25	18	1	2	1	14	5.6	11.1	5.6	77.8
Le6.26	90		13	4	73		14.4	4.4	81.1
Le6.27	25	1	3	1	20	4.0	12.0	4.0	80.0
Le6.28	8		2		6		25.0		75.0
Le6.28.1	7				7				100.0
Le6.28.2	16		4	1	11		25.0	6.3	68.8
Le6.29	58		7	6	45		12.1	10.3	77.6
Le6.30	5		3		2		60.0		40.0
Le6.31	101	1	22	17	61	1.0	21.8	16.8	60.4
Le7.30	25		9		16		36.0		64.0
Le7.31	15		4	2	9		26.7	13.3	60.0
Le7.32	36		4	1	31		11.1	2.8	86.1
Le7.33	7		2		5		28.6		71.4
Le7/F4/e2	533	13	68	61	391	2.4	12.8	11.4	73.4
Le6	335	3	57	30	245	0.9	17.0	9.0	73.1
Le7b	83		19	3	61		22.9	3.6	73.5
Le7a	533	13	68	61	391	2.4	12.8	11.4	73.4
Total	951	16	144	94	697	1.7	15.1	9.9	73.3

Table 5.12 presents another clear pattern, in the ages of these animals. There are a few young specimens from various bovid species, as well as juvenile rhino, giraffe, zebra, a porcupine, and an indeterminate medium carnivore. There was also a subadult and at least two juvenile baboons. However, fully grown animals are significantly more numerous.

It should be noted that the age data in Table 5.12 is only from those elements with definitive age characteristics, such as teeth or long bones with fused or unfused epiphyses. It does not includes specimens such as long bone shaft fragments, bones without epiphyses (e.g. carpals and tarsals), or whose epiphyses may never fuse, such as sacra (Silver 1970). However, the vast majority of these other elements also displayed all the hallmarks of adult animals, such as joint definition and robust muscle attachments (e.g. *cf.* Plug 1993). Therefore, while juvenile remains appear to make up between 11% and 36% of the assemblage, this proportion is much smaller if the remaining specimens were to be considered.

Therefore, adults are substantially more prevalent at these sites. This is true throughout both the features and phases, but also within the different taxa, as all consistently display greater numbers of adult remains.

Table 5.13 Frequency [NISP, %NISP] of grouped ungulate size classes per feature.

	NISP							%NISP					
Feature	**Total**	**very large**	**large/very large**	**large**	**medium /large**	**medium**	**small/ medium**	**very large**	**large/very large**	**large**	**medium /large**	**medium**	**small/ medium**
Le6.1	23			20		3				87.0		13.0	
Le6.25	60	3	1	50		5	1	5.0	1.7	83.3		8.3	1.7
Le6.26	295	10	10	235	2	37	1	3.4	3.4	79.7	0.7	12.5	0.3
Le6.27	65	2	1	55	2	4	1	3.1	1.5	84.6	3.1	6.2	1.5
Le6.28	25	1		22	1	1		4.0		88.0	4.0	4.0	
Le6.28.1	22			21		1				95.5		4.5	
Le6.28.2	36	4	1	26	1	3	1	11.1	2.8	72.2	2.8	8.3	2.8
Le6.29	136	30	1	101	1	3		22.1	0.7	74.3	0.7	2.2	
Le6.30	17		1	12		4			5.9	70.6		23.5	
Le6.31	226	7	4	144	8	62	1	3.1	1.8	63.7	3.5	27.5	0.4
Le7.30	43	1	2	34	1	3	2	2.3	4.7	79.0	2.3	7.0	4.7
Le7.31	22			18		3	1			81.8		13.6	4.6
Le7.32	72	6	2	57	3	4		8.3	2.8	79.2	4.1	5.6	
Le7.33	18	1		16		1		5.6		88.9		5.5	
Le7/F4/e2	1169	41	30	923	27	87	61	3.5	2.6	79.0	2.3	7.4	5.2

- Size Classes

The frequency of the various ungulate size classes from Le6 and Le7 (Table 5.13) indicates that large ungulates dominate all features. There is a greater presence of smaller species in Le6.30 and Le6.31. In Le6.31 this is due to a marked increase in impala remains, along with indeterminate Bov. II and 'Bov. II - wild' remains (also likely from impala). With Le6.30, it seems to be a matter of sample size rather than a true pattern (Table 5.13). Apart from those two features, small/medium, medium, and medium/large ungulates together never make up more than 20% of the ungulate remains in a feature.

The large and larger ungulate types appear to be the main focus at these sites. This pattern holds through ubiquity, abundance in NISP, and even by weight in the assemblage. It is also true when looking at species level, bovid size classes, and even with the entire mammal assemblage (Fig. 5.4).

The other prevalent ungulates characteristics discussed above also reinforce this evident focus on large animals. For example, rather than targeting younger and thus smaller individuals, adults dominate these taxa classes, thereby maximising the size of the animals acquired. A size preference is also evident in the physical measurements of the taxa present. While osteometrics will be part of a forthcoming project, a cursory examination of the buffalo, wildebeest, and other species in these assemblages indicates many were very large individuals (in comparison to a range of museum specimens at the DNMNH). Even the ubiquity of gregarious ungulates may align with this focus. For gregariousness allows for the acquisition of multiple, in this case large, animals at once, thereby further increasing the already sizeable meat yields. There may also be a seasonal component in the faunal use at

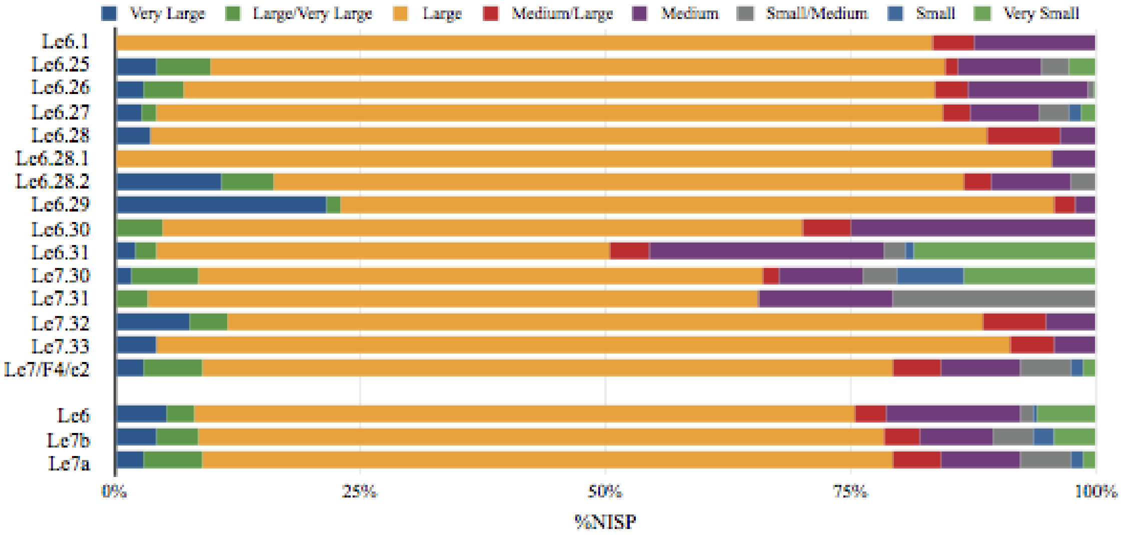


Fig. 5.4 Frequency [%NISP] of size classes per feature and phase, all mammals included.

Le6 and Le7, but that will be discussed more fully in chapter 12.

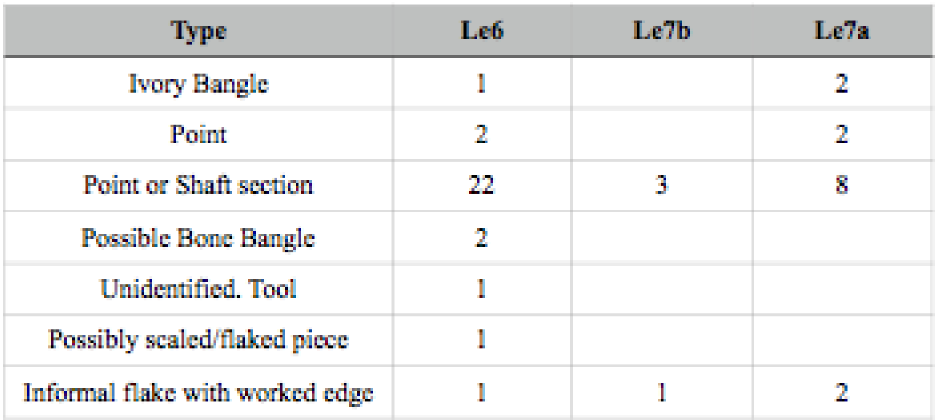
5.6 Worked Fauna

Here I present only a brief outline of the types of worked fauna found at Le6 and Le7.

- *Worked Bone*

Both formal and informal bone tools were found in the collections. Most of these were bone points or indeterminate tool shaft sections (Table 5.14). Plug (1988: 141,143,345-346) described the majority of Le6 and Le7 bone tools as “projectile sections”. Although these broken mid-shaft sections may represent a number of different tools, it is possible that they were arrow components (e.g. Voigt 1983: 102).

Table 5.14 Types of worked bone identified on Le6 and Le7.



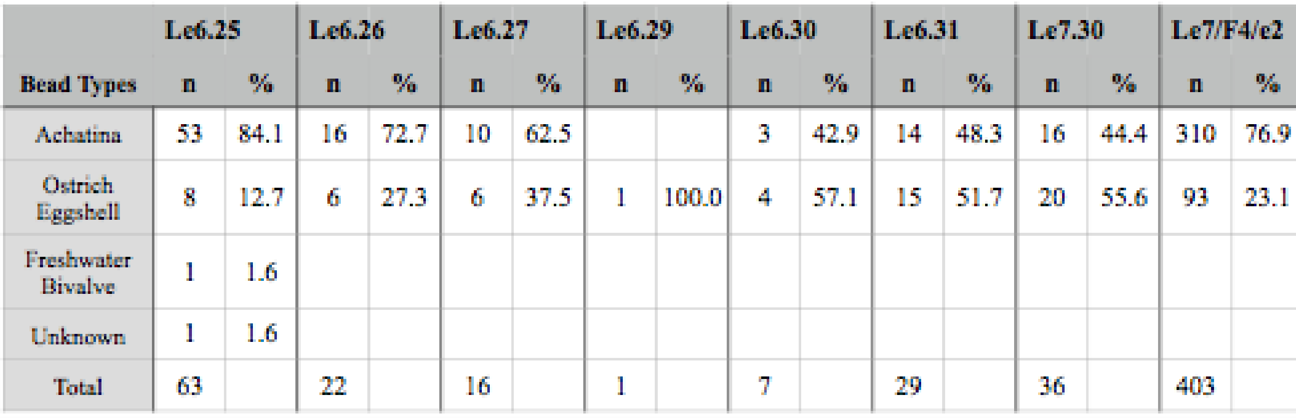
Type	Le6	Le7b	Le7a
Ivory Bangle	1		2
Point	2		2
Point or Shaft section	22	3	8
Possible Bone Bangle	2		
Unidentified. Tool	1		
Possibly scaled/flaked piece	1		
Informal flake with worked edge	1	1	2

A number of the points and shafts are completely smoothed, rounded, and polished, although others are still distinctly faceted. Two incomplete point tips from Le6 are burnt (solidly black), as are three other shaft segments, and the potential bone bangle fragments. One of the point/shaft sections on Le6 is decorated, with a pair of etched parallel lines spiralling around the shaft. There is one small flaked bone piece that may be somewhat similar to the scaled pieces or flaked bone tools Plug (1982a, 2012) described at Bushman Rock Shelter. There were a few bone flakes with one or more edge worked and smoothed. These were likely expedient tools.

- *Shell and Eggshell: Beads*

There were 577 shell beads found in just the Le6 and Le7 features used in this study (Table 5.15). The Le7/F4/e2 beads here are only from the upper two layers (section 4.1). There were another 257 shell beads (172 *Achatina*, and 85 ostrich eggshell) in the lower two layers of this feature, but they are not included here.

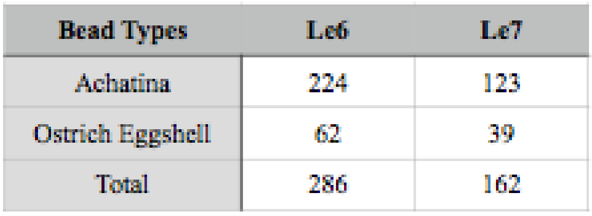
Table 5.15 Frequency [NISP,%NISP] of bead type per feature.



	Le6.25		Le6.26		Le6.27		Le6.29		Le6.30		Le6.31		Le7.30		Le7/F4/e2	
Bead Types	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Achatina	53	84.1	16	72.7	10	62.5			3	42.9	14	48.3	16	44.4	310	76.9
Ostrich Eggshell	8	12.7	6	27.3	6	37.5	1	100.0	4	57.1	15	51.7	20	55.6	93	23.1
Freshwater Bivalve	1	1.6														
Unknown	1	1.6														
Total	63		22		16		1		7		29		36		403	

Achatina shell beads outnumber ostrich eggshell (OES) in almost every feature. Only in the smallest samples (Le6.29, Le6.31,Le7.30) do OES beads outnumber the *Achatina*. Plug (1988: 341,351-352—Table 5.16) found similar trends in her analysis of Le6 and Le7 as well as at other EIA sites in the KNP as a whole.

Table 5.16 Number [NISP] of beads from Le6 and Le7
(Plug 1988: 351-352).



Bead Types	Le6	Le7
Achatina	224	123
Ostrich Eggshell	62	39
Total	286	162

Similar to Plug's findings (1988: 351-352), the majority beads from this study were complete (Appendix Table B.1). Most of them were at least partly, if not wholly, rounded (Appendix Table B.1). In terms of the OES specimens, as section 5.4.2 describes, only five OES fragments were identified in this study, which may have been bead blanks or unworked fragments. The rest of the OES specimens on-site are clearly worked, if not finished, beads. Appendix Tables B.2-3 provide basic bead measurement, and additional data will be presented as part of a forthcoming project.

In addition to the beads, two pieces of freshwater bivalve shell from Le6 appear to have worked, smoothed edges. There were also two mostly complete freshwater *Melanoides* sp. snail shells in Le7/F4/e2 with rough perforations near their bases, and a third unidentified shell that had been ground into a cylinder shape with a perforation through its centre.

- Ivory

Three ivory bangle fragments (one consisting of five re-fit pieces) were found amongst the Le6.26 and Le7/F4/e2 material. As discussed in section 5.2, this a rare find for the KNP. The larger bangle section from Le6.26 appears to be elephant (A. Coutu pers. comm). The ivory in the thinner bangle fragments from Le7 could not be identified macroscopically to species, although it may be discernible through other methods (ibid.).

- Other

There were a few other worked faunal specimens. A fragment of tortoise carapace from Le6 with a clearly shaped and rounded edge. A loose large carnivore canine (either lion or hyena) from Le7a was split longitudinally and had distinct polishing and/or wear on one interior edge. The nature or purpose of this polishing is unclear.

5.7 Summary

This chapter presented the faunal data from this study of new, previously unanalysed material from Le6 and Le7. In Chapter 12 I will return to these results in conjunction with the taphonomic data to discuss the overall patterns in both procurement and processing evident at these sites.

In general, these assemblages were marked by relatively high identification rates, which aided in the identification of a diverse variety of species. The taxa in table 5.3 marked the use of a variety of habitats that surrounded Le6 and Le7. There was much similarity to the past work done at these sites, but there were a few differences in the domesticates and the newly identified ivory.

Within the wide variety of species present, there appear to be patterns in the presence of the various taxa groups. There are representatives from all groups, indicating snaring, gathering, fishing, and herding were all part of the food activities at Le6 and Le7. However, hunting of large wild taxa was definitively the most substantial procurement activity.

In the domestic sample, cattle and ovicaprines appear in roughly similar numbers in Le7a, although only cattle appeared at Le6. Both taxa were generally adult at the time of death.

How this differs from Plug's (1988) original findings is discussed in sections 5.2.1 and 5.3.2, as are the difficulties posed by the similarity between cattle and buffalo.

Section 5.4 presented the results from the various taxa groupings of the wild fauna. Certain taxa of the smaller animal groups are present, such as the nearly ubiquitous tortoise, but in general they are only present in smaller numbers and/or in scattered features. Within these more sparsely represented species there are a few that are particularly noteworthy for an EIA site. Ostrich eggshell may be a relatively common presence on EIA sites, yet it is scarce on Le6 and Le7. Conversely, ostrich bones are a very rare find yet appear at both Le6 and Le7a. The rarity factors of these taxa types are intriguing, but the fish present at Le6 and Le7 is perhaps the most anomalous. The hundreds of fish remains from these sites stand out sharply against their general absence at other inland EIA sites. However, whether the perceived scarcity at other sites is due to fish avoidance or methodological issues remains to be seen. This raises an important methodological point concerning these, generally smaller, taxa.

Given the methodological standards practiced at Le6 and Le7 (see Chapter 2), it is very unlikely that the relative absence of certain species or elements discussed above is because they were missed or lost during excavation and collection. Therefore, the generally scant proportions of the smallest mammal and non-mammal taxa do seem to indicate that the utilisation of these animals at Le6 and Le7 were sporadic and opportunistic at best.

Although carnivores are somewhat more common than fish and ostrich bones in EIA assemblages, Le6 and Le7 present a contingent of carnivores and primates that raise questions. These arise through the potential uses their presence may indicate, their completeness (in the case of the baboon skull and associated articulating elements), and in their notably heavy butchery (see Chapter 10).

Sections 5.4.5 and 5.4.6 both discussed the most common type of taxa found on Le6 and Le7 and in all features: the wild ungulates. Certain taxa (zebra, wildebeest and buffalo) are more abundant, but a variety of other species also appear with regularity. Section 5.5 identified trends within this most populous group. Small and medium-sized ungulates are present, but large and very large species are the most numerous. Additionally, these large species are predominantly fully grown and often gregarious. Identifying potential seasonality in the Le6 and Le7 assemblages requires future work and will be discussed in Chapter 12.

While some taxa do consistently appear in the greatest numbers, there does seem to be specific, if not intense, focus on large and larger ungulates as a whole. Particularly in comparison with the infrequent presence of other taxa groupings, large wild ungulates appear to have been of particular and insistent interest at Le6 and Le7.

These topics will be returned to in Chapter 12 but they bear remembering as I proceed to the next step in the sequence of animal use: processing post-procurement. In this chapter I have catalogued the species selected for use and procured through a variety of activities. This presents the foundation on which to build the taphonomic study, essentially identifying the raw material (animals and their respective carcasses) for the processing strategies employed at Le6 and Le7. Thus, the remaining chapters in Part II (6 through 11) address the following steps in the process: transport, butchery and dismemberment, as well as cooking and/or preservation.

Results: Taphonomy

Chapters 6 through 11 explore what was actually done with the animals once they had been procured. Whatever their use or purpose, the way the remains from an animal were treated may leave distinctive taphonomic traces that shed light on how, and even why, they were utilised.

However, this taphonomy is not solely a record of human activity. It includes everything from what was done just after killing the animal through cooking and disposing of the unused elements or refuse. In addition, post-depositional events may not only effect the other taphonomic marks, such as cut marks obscured by weathering (e.g. Phoca-Cosmetatou 2005), but factors such as density-mediated attrition have the ability to mask or obliterate human-driven patterns (e.g. Marean 1991). Therefore the subsequent chapters address those many facets of a taphonomic study. Following the species chapter, the goal of these chapters is to explore patterns of use: to distinguish any differentiated habits of processing or disposal, be they based on taxa, size, or feature differences.

In these chapters I include data from the non-identifiable material, specifically labelled when it is included. In terms of skeletal elements, I will generally separate the teeth (identifiable and enamel fragments) from the bones. This will be discussed in the relevant chapters, starting with 7. Following Chapter 5, all data with "cf." have been included with their confirmed counterparts.

As stated in section 4.4, I will only use mammalian remains in this chapter. Small rodents (e.g. rats and mice) will also be excluded from these sections. These rodents, like the small birds (Laroulandie 2005: 25) and amphibians (Sampson 1999), may have been self- and or differently-introduced (i.e by raptors or other non-human predators) (e.g. G. Avery 1984; Fowler et al. 2004). Additionally, they may respond differently to taphonomic factors than the larger species (*cf.* Behrensmeyer 1978). Therefore, their taphonomy may be incomparable to the main, larger-bodied, human-produced assemblage, especially if these small taxa are recent, modern intrusions.

Following Orton (2012), Chapters 6 through 11 will present the results of the taphonomic analysis according to the five stages discussed in Chapter 4. Potential excavation or curation biases that may have affected the taphonomic analysis were discussed in sections 2.3.1 and 4.1 and will not be repeated here.

Chapter 6: Density-Mediated Attrition

The first stage to be assessed is density-mediated attrition. Although there are a variety of ways in which density assessments may be carried out (e.g. Grayson 1989; Lam et al. 1989; Orton 2012; Symmons 2005), only one simple, basic assessment is presented in this study. Given the time limitations of the project, I elected to examine the completeness of skeletal elements such as sesamoids, carpals and tarsals to address density-mediated attrition. A strong correlation between density and completeness (or lack thereof) may indicate attrition based more on intrinsic properties of these elements rather than human choices (e.g. Orton 2012). Therefore, the completeness of these varyingly dense elements (and particularly of the notably porous sesamoids) may shed light on the general presence and severity of density-mediated attrition within this assemblage.

The smaller elements could be more reliably assessed because of the thorough recovery strategies at Le6 and Le7. This stands in contrast to sites whose material was less rigorously retrieved, where a lack of carpals and tarsals (especially incomplete ones) may be due to excavation and collection procedures rather than actual absence (*cf.* Orton 2012).

6.1 Carpals & Tarsals

Carpals and tarsals are assessed following Orton (2012) and Marean (1991). These elements are relatively dense and quite compact. Moreover, they are less ‘valuable’ in terms of food, as there is little meat around these joints nor do they contain much marrow. Thus they have scant bone grease to offer, in comparison with other elements such as long bone epiphyses (e.g. Karr et al. 2014; Marean 1991). Given this, these elements are less likely to have been broken or processed by humans or by scavenging carnivores (Marean 1991). Marean (1991) suggested excluding the calcanea and astragali from this group, given differences in in-bone fats and responses to experimental processing, and so both are excluded here.

Table 6.1 presents the percentage of complete carpals and tarsals, grouped by phase.

Table 6.1 Number [NISP] of carpals and tarsals per phase and percent complete (*complete specimens, **types from no taxa).

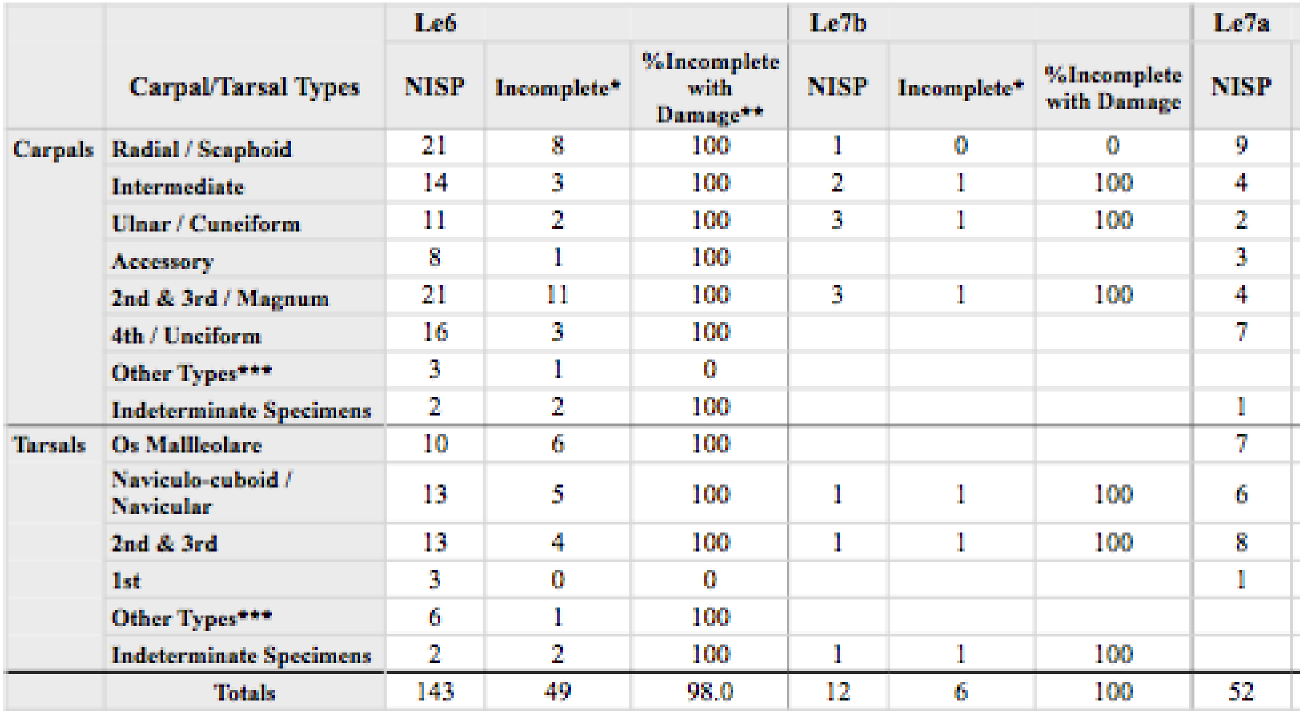
	Carpal/Tarsal Types	Le6			Le7b			Le7a	
		NISP	Complete*	%Complete	NISP	Complete*	%Complete	NISP	Complete
Carpals	Radial / Scaphoid	21	13	61.9	1	1	100	9	5
	Intermediate	14	11	78.6	2	1	50.0	4	2
	Ulnar / Cuneiform	11	9	81.8	3	2	66.7	2	1
	Accessory	8	7	87.5				3	3
	2nd & 3rd / Magnum	21	10	47.6	3	2	66.7	4	3
	4th / Unciform	16	13	81.3				7	6
	Other Types**	3	2	66.7					
	Indeterminate Specimens	2	0	0				1	0
Tarsals	Os Malleolare	10	4	40.0				7	6
	Naviculo-cuboid / Navicular	13	8	61.5	1	0	0	6	3
	2nd & 3rd	13	9	69.2	1	0	0	8	4
	1st	3	3	100				1	1
	Other Types**	6	5	75.0					
	Indeterminate Specimens	2	0	0	1	0	0		
	Totals	143	94	65.7	12	6	50.0	52	34

Generally, there is only a moderately high level of completeness within these elements. The smaller elements are usually among the most complete, with accessory carpals and first tarsals exhibiting the highest rates of completeness. Unsurprisingly, the carpals and tarsals too degraded to distinguish type (i.e. the indeterminate specimens) had the lowest levels of completeness.

Table 6.1 includes all of the Le6 and Le7 carpals and tarsals identified. However, Marean (1991) advises that elements that have obvious human or carnivore damage should not be included in the density analysis. He further states that "all weathered bones should be excluded from [density assessment] if the goal is to measure just post-depositional destruction" (Marean 1991: 685). For the purposes of this section, I do only focus on this post-depositional aspect as the other taphonomic forces are addressed in subsequent sections. Thus, elements that have been severely (rating of 3) weathered, gnawed by carnivores, digested, and/or that have been clearly chopped through are assessed in Table 6.2.

I have also added 'recent' breakage (i.e. occurred during or since excavation) to the list of exclusion criteria. The excavation and storage history of this material caused a substantial degree of fresh damage or breakage. This recent breakage may have influenced, at the very least, fragmentation rates and identifiability. Only a small portion of this breakage was extensive (i.e. all surfaces and/or edges exhibiting fresh breakage). The efforts made to re-fit material (section 4.1.2) would have partially attenuated this, but elements whose breakage was wholly fresh or were extensively freshly broken were excluded in this density assessment.

Table 6.2 Number [NISP] and percent of incomplete carpals and tarsals that have been freshly broken, severely weathere
digested and/or chopped through by phase (*incomplete specimens, **as defined in Table title, ***types from no



		Le6			Le7b			Le7a
	Carpal/Tarsal Types	NISP	Incomplete*	%Incomplete with Damage**	NISP	Incomplete*	%Incomplete with Damage	NISP
Carpals	**Radial / Scaphoid**	21	8	100	1	0	0	9
	Intermediate	14	3	100	2	1	100	4
	Ulnar / Cuneiform	11	2	100	3	1	100	2
	Accessory	8	1	100				3
	2nd & 3rd / Magnum	21	11	100	3	1	100	4
	4th / Unciform	16	3	100				7
	Other Types* **	3	1	0				
	Indeterminate Specimens	2	2	100				1
Tarsals	**Os Mallleolare**	10	6	100				7
	Naviculo-cuboid / Navicular	13	5	100	1	1	100	6
	2nd & 3rd	13	4	100	1	1	100	8
	1st	3	0	0				1
	Other Types* **	6	1	100				
	Indeterminate Specimens	2	2	100	1	1	100	
	Totals	143	49	98.0	12	6	100	52

Barring a single incomplete carpal in Le6, all of the carpal and tarsal incompleteness aligns with one of the other (processing, peri-depositional, or excavation/curation) breakage factors, leaving little evidence of purely density-mediated, post-depositional breakage. Therefore, in terms of purely post-depositional attrition, the overall survival of these bones is very high.

To briefly assess the differences between the phases seen in Table 6.1, Table 6.3 presents the completeness of carpals and tarsals by feature. These tallies incorporate all the carpals and tarsals, including those butchered and with other taphonomic modifications. Overall, the results for the features are similar to those of the phases, with generally high frequencies of completeness. The exceptions are usually the features with the smallest samples (e.g. Le7.30) or those identified as eroded pit type features (e.g. Le6.1).

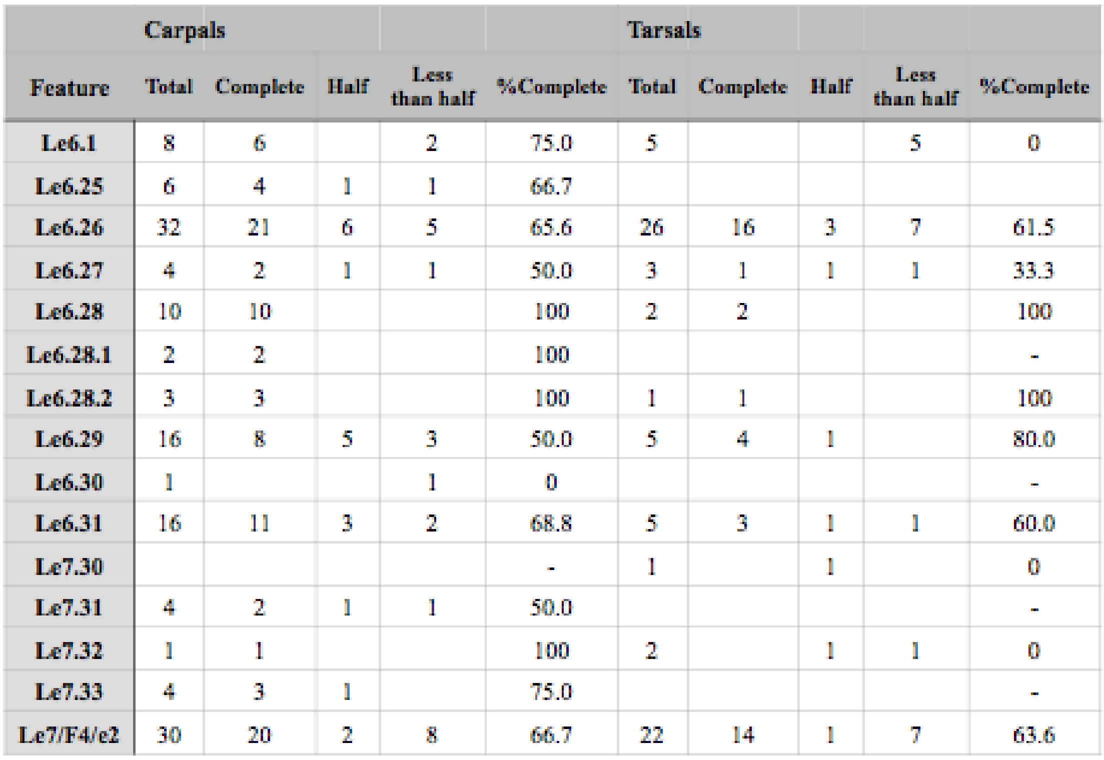
Carpal and tarsal completeness was also assessed by taxa, but no differences were seen across taxa and taxa groups. In fact, even higher completeness levels where attained when looked at by taxa. As complete bones were more likely to be identified to taxa than less complete specimens, the overall percent complete increased.

While carpals and tarsals offer a viable route for assessing density-linked attrition (e.g. Marean 1991), they are quite dense skeletal elements and so may not well represent the survival of more delicate remains. The high numbers of sesamoids recovered at Le6 and Le7 present the chance to address density-mediated attrition within a notably less robust element.

6.2 Sesamoids

Sesamoids fit all the criteria required for a suitable skeletal element in terms of density assessment: "bones to be used for measuring post-depositional destruction should be those *that are never or very rarely fragmented by people or animals attempting to extract nutrition*" (Marean 1991: 681, emphasis his). Carpals and tarsals may be damaged in processing the more marrow rich metapodia or during bone grease extraction (e.g. ibid.). Sesamoids, on the other hand, are cushioned and concealed in the tendons and ligaments of the feet (Plug 2014: 25) and possess negligible grease value. This means they are even less likely to suffer butchery and processing damage. Conversely, as they are less dense than carpals and tarsals, sesamoids are more likely to suffer either mechanical or chemical attrition post-deposition.

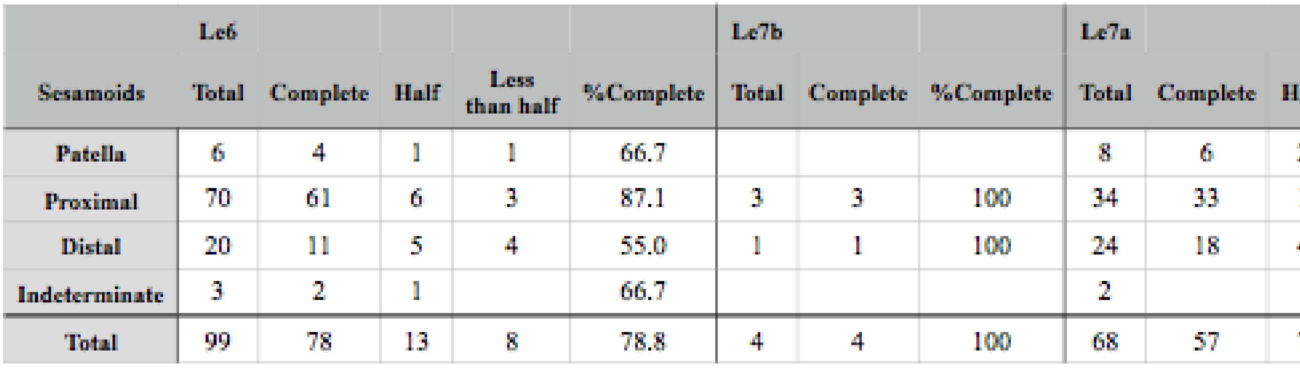
Table 6.3 Completeness [NISP] of carpals and tarsals per feature.



	Carpals					Tarsals				
Feature	Total	Complete	Half	Less than half	%Complete	Total	Complete	Half	Less than half	%Complete
Le6.1	8	6		2	75.0	5			5	0
Le6.25	6	4	1	1	66.7					
Le6.26	32	21	6	5	65.6	26	16	3	7	61.5
Le6.27	4	2	1	1	50.0	3	1	1	1	33.3
Le6.28	10	10			100	2	2			100
Le6.28.1	2	2			100					-
Le6.28.2	3	3			100	1	1			100
Le6.29	16	8	5	3	50.0	5	4	1		80.0
Le6.30	1			1	0					-
Le6.31	16	11	3	2	68.8	5	3	1	1	60.0
Le7.30					-	1		1		0
Le7.31	4	2	1	1	50.0					-
Le7.32	1	1			100	2		1	1	0
Le7.33	4	3	1		75.0					-
Le7/F4/e2	30	20	2	8	66.7	22	14	1	7	63.6

Accepting sesamoids as another element with which to assess this attrition, Table 6.4 presents completeness of these elements. The patellae are included here: although notably larger than the other sesamoid types, they are still technically sesamoids (Plug 2014: 23).

Table 6.4 Sesamoid [NISP] completeness per phase.



	Le6					Le7b			Le7a	
Sesamoids	Total	Complete	Half	Less than half	%Complete	Total	Complete	%Complete	Total	Complete
Patella	6	4	1	1	66.7				8	6
Proximal	70	61	6	3	87.1	3	3	100	34	33
Distal	20	11	5	4	55.0	1	1	100	24	18
Indeterminate	3	2	1		66.7				2	
Total	99	78	13	8	78.8	4	4	100	68	57

As with the carpals and tarsals, specimens that were generally too degraded to assign to type (i.e. indeterminate) display lower completeness. The Le6 distal sesamoids also seem to have suffered higher attrition. Their shape—being a relatively thin rectangular cuboid—may make them more prone to breakage than the bean-shaped proximal sesamoids. The patellae also have a lower frequency of completeness. This is likely due to their size as well as a greater chance of being damaged during the disarticulation or processing of the distal femur and proximal tibia.

In terms of incomplete sesamoids with other damage, we see the exact same pattern as with the carpals and tarsals (Table 6.2). All incomplete sesamoids also displayed some other type of taphonomic damage. Therefore, if these other-wise altered incomplete elements were to be removed from the totals, all categories would rise to 100% complete.

As with the carpals and tarsals, there are great similarities when all sesamoids (including those with other damage) are compared by feature: features generally followed the phase-level results excepting small or ‘eroded’ features. Although fewer specimens were identified to taxa type, the sesamoids also displayed very high levels of completeness across the various taxa.

6.3 Summary

There are possibly some signs of density effects evident in the carpals, tarsals, and sesamoids of Le6 and Le7. However, all of the broken specimens in these groups are also associated with other taphonomic damage, and it is difficult to separate the various impacts of those different factors. Nevertheless, the overall completeness rates are quite high for both the carpals and tarsals and the less dense sesamoids. This points to low density-mediated attrition at these sites. This is also evident in the fact that so many types of delicate remains, such as fish bones, sternae, dew claws, neonate remains, and even rib cartilage, were recovered from Le6 and Le7.

There are certain features that show higher levels of incompleteness within the carpals, tarsals and sesamoids, such as Le6.1, Le6.30 and Le7.32. As material in these features may have been slightly more effected by density-mediated factors, these results will be kept in mind during the following chapters. Additionally, as was presented in Table 6.2, peri-depositional and other taphonomic agents may have played a role in this slightly higher incompleteness (density-mediated or otherwise) and thus will be the focus of the following sections.

As mentioned at the start of this section, there are many other techniques for examining density-linked impacts within an assemblage (e.g. Grayson 1989; Lam et al. 1989; Orton 2012; Symmons 2005). In future work, it could be valuable to re-assess the Le6 and Le7 material with such methods to gain a more thorough and holistic view of density-mediated attrition within the various other elements in these assemblages.

Chapter 7: Peri-Depositional Factors - Weathering & Gnawing

The main goal of this section is to identify depositional clues that may point to potential assemblage formation processes (Orton 2012). To assess the effects of peri-depositional processes, the frequency and severity of both gnawing and weathering (section 4.4) will be assessed (see Orton 2012). In this stage, I treat the teeth and bones separately. Beyond the fact that gnawing rarely appears on teeth, tooth structures (particularly the enamel) weather differently to bone (*cf*. Hillson 2005: 158-159). Given this, and as the sample sizes are generally large enough, these two skeletal groups will be discussed separately.

I explore the evidence of peri-depositional damage by feature and phase, then by taxa type, size, and skeletal region in order to identify differences in treatment based on one of those categories. I begin with weathering (section 7.1) before moving on to rodent (7.2) and carnivore (7.3) gnawing. The results from each of these sections will be summarised in section 7.4.

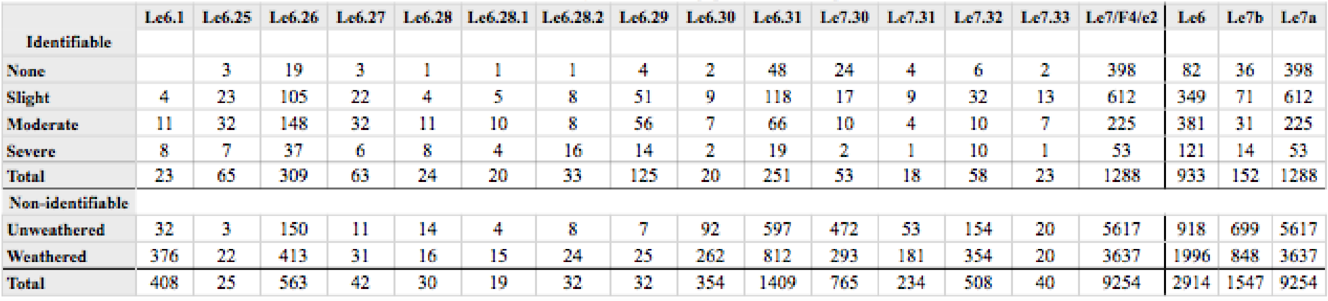
7.1 Weathering

This section begins by looking at the entire assemblage of bones and teeth (section 7.1.1), before assessing weathering trends between taxa and size classes (section 7.1.2) as well as skeletal regions (section 7.1.3).

7.1.1 Overall Weathering

- *Bone*

Table 7.1 Number [NISP] of bones weathered, and severity of weathering, per feature and phase, identifiable and non-identifiable bones.



	Le6.1	Le6.25	Le6.26	Le6.27	Le6.28	Le6.28.1	Le6.28.2	Le6.29	Le6.30	Le6.31	Le7.30	Le7.31	Le7.32	Le7.33	Le7/F4/e2	Le6	Le7b	Le7a
Identifiable																		
None		3	19	3	1	1	1	4	2	48	24	4	6	2	398	82	36	398
Slight	4	23	105	22	4	5	8	51	9	118	17	9	32	13	612	349	71	612
Moderate	11	32	148	32	11	10	8	56	7	66	10	4	10	7	225	381	31	225
Severe	8	7	37	6	8	4	16	14	2	19	2	1	10	1	53	121	14	53
Total	23	65	309	63	24	20	33	125	20	251	53	18	58	23	1288	933	152	1288
Non-identifiable																		
Unweathered	32	3	150	11	14	4	8	7	92	597	472	53	154	20	5617	918	699	5617
Weathered	376	22	413	31	16	15	24	25	262	812	293	181	354	20	3637	1996	848	3637
Total	408	25	563	42	30	19	32	32	354	1409	765	234	508	40	9254	2914	1547	9254

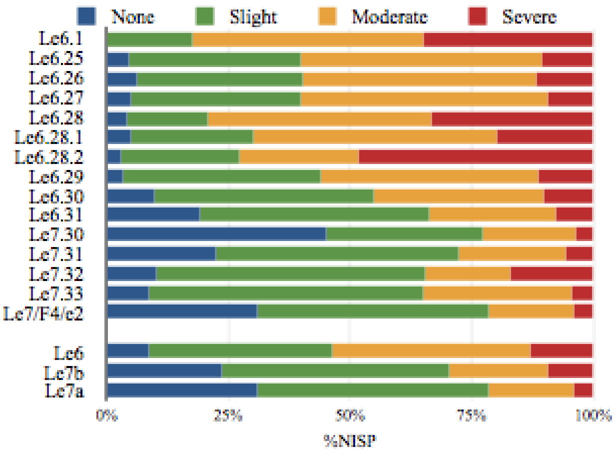


Fig. 7.1 Frequency [%NISP] of weathering severity on identifiable bones per feature and phase.

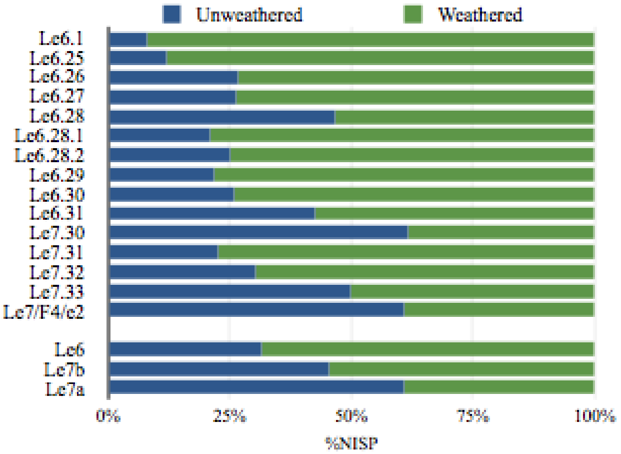


Fig. 7.2 Frequency [%NISP] of weathering on non-identifiable bones per feature and phase.

At first glance, weathering (see pages 58-59 for descriptions) is very common (Table 7.1, Figs. 7.1-2). However, it is only the severe weathering that marks real damage to bones and jeopardises both bone structure and possible cut marks (e.g. Phoca-Cosmetatou 2005). Beyond a few specific features, severe weathering is relatively rare. ‘Slight’ is the most common severity category (accounting for 56% of all the weathering present), and it refers to elements barely damaged. This slight damage often manifested as scattered patches of very light fine-line fractures or root etching. Even within the ‘moderately’ weathered specimens (34% of the weathering), this category was characterised by more wide spread fine-line fracturing rather than truly substantial damage. In the non-identifiable material, where severity was not recorded, the vast majority of the weathering in most features was virtually the same as that in the identifiable material (i.e. very light). It was also noted that weathering often occurred on only one face of an element or in patches. Thus, while a relatively large proportion of the bones were weathered, the impact on bone condition and other taphonomic features was minimal.

Differences exist between the features, although features consistently more (or less) weathered in the identifiable material display the same patterns within the non-identifiable categories (Figs. 7.1-2). Features with the biggest samples tend to have lighter weathering overall (e.g. Le7/F4/e2) (Table 7.1), but there are a few exceptions (notably Le7.30, which is a small sample yet is relatively unweathered). It is highly likely that sample size and severity of weathering are both strongly linked to feature type (e.g. surface concentration versus pit or heap).

- Teeth

Table 7.2 Number [NISP] of teeth and enamel fragments weathered, and severity of weathering, per feature and phas

	Le6.1	Le6.25	Le6.26	Le6.27	Le6.28	Le6.28.1	Le6.28.2	Le6.29	Le6.30	Le6.31	Le7.30	Le7.31	Le7
Identifiable													
None		1	4	3			2	1		29		5	2
Slight	1		14	6		2	2	9		17		2	1
Moderate		2	6	2			1	4		1		1	1
Severe		1										3	
Total	1	4	24	11	0	2	5	14	0	47	0	11	2
Non-identifiable													
Unweathered	3	10	44	16	8	10	5	38	3	37	15	18	5
Weathered	26	15	25	3	5	2	2	13	1	11	8	9	6
Total	29	25	69	19	13	12	7	51	4	48	23	27	1

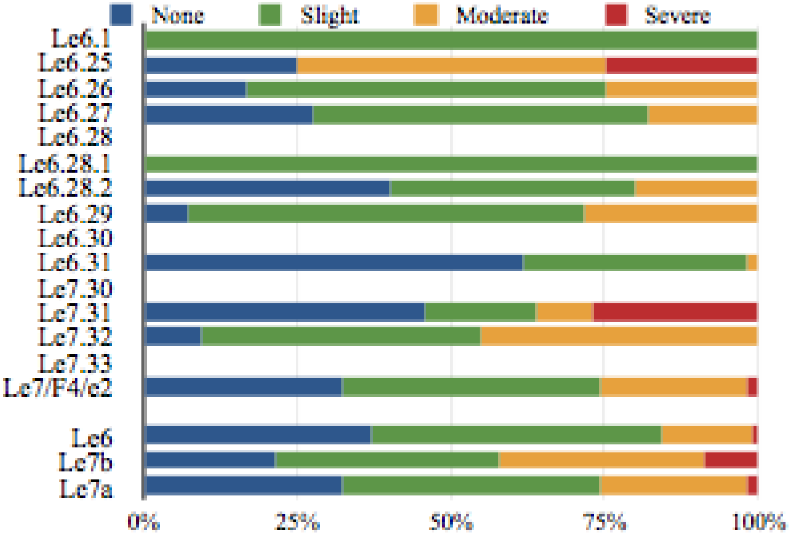


Fig. 7.3 Frequency [%NISP] of weathering severity on identifiable teeth per feature and phase.

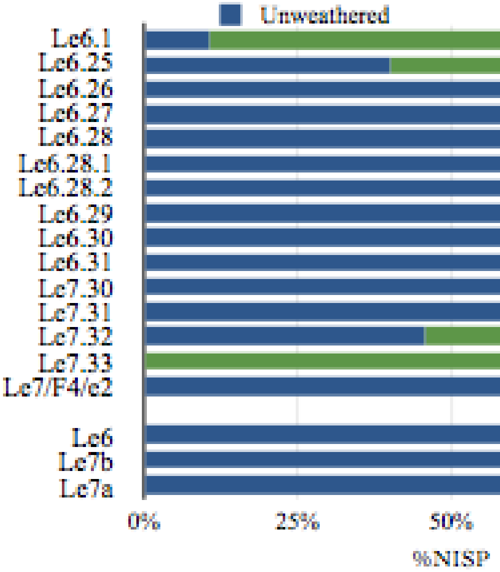


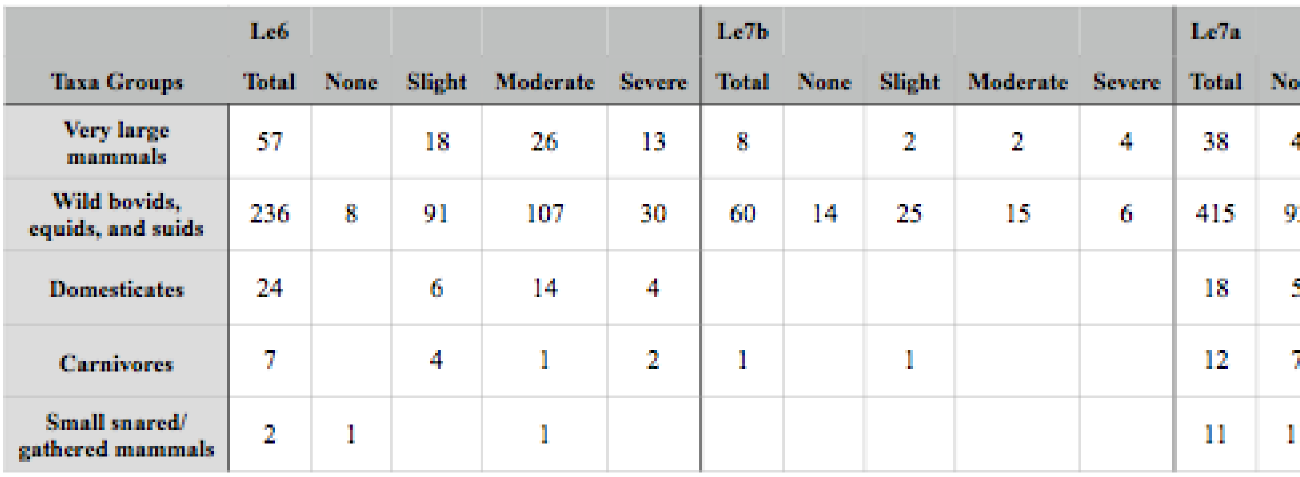
Fig. 7.4 Frequency [%NISP] of weat
enamel fragments per fea

The identifiable teeth are also commonly weathered (Table 7.2, Fig. 7.3). Conversely, the non-identifiable enamel fragments show markedly lower weathering rates (Fig. 7.4), presenting essential inverted results to those of the non-identifiable bones (Fig. 7.2). Complete and fragmented teeth (Figs. 7.3-4) show less weathering and less severe weathering than the bones. As tooth enamel tends to be more robust than bone (*cf.* Hillson 2005: 1,4,6), this pattern is not unexpected.

7.1.2 Weathering: Taxa & Size Groupings

When taxa groups and size classes are presented by feature, the samples are small, rendering interpretation difficult. Therefore, data will only be presented at the phase level for this section. Additionally, only bones are used in the following subsections of 7.2, and as weathering severity was not recorded for non-identifiable material, only identifiable bones are used.

Table 7.3 Weathering severity [NISP] by taxa grouping per phase, identifiable bones only



	Le6					Le7b					Le7a	
Taxa Groups	Total	None	Slight	Moderate	Severe	Total	None	Slight	Moderate	Severe	Total	No
Very large mammals	57		18	26	13	8		2	2	4	38	4
Wild bovids, equids, and suids	236	8	91	107	30	60	14	25	15	6	415	9
Domesticates	24		6	14	4						18	5
Carnivores	7		4	1	2	1		1			12	7
Small snared/ gathered mammals	2	1		1							11	1

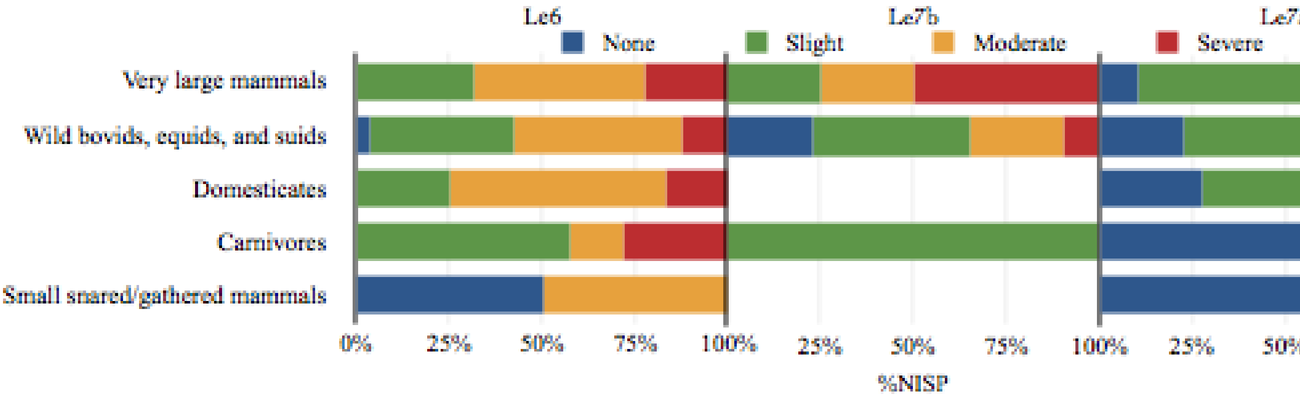


Fig. 7.5 Weathering severity [%NISP] by taxa grouping by phase, identifiable bo

Table 7.3 and Figure 7.5 display the weathering severity within the different taxa groupings. In contrast to the plentiful wild ungulates, the carnivores, small snared or gathered mammals, and domesticates are relatively few in number. This makes comparing patterns between the taxa types questionable. However, despite being smaller in number, the domesticates display largely similar weathering rates to the other ungulates in Le6 and Le7a. The carnivores in Le6 also show somewhat comparable weathering to the ungulates.

Alternatively, in Le7a the carnivores are significantly less weathered. The small mammals display virtually no weathering. Their small sample is problematic. However, this usually lighter (or non-existent) weathering may be factor of discard practices or manner of introduction and will be discussed in 7.3.

The weathering patterns of the more populous taxa (very large mammals and wild bovids, equids, and suids) mimic those seen at the broader feature and phase level (Fig. 7.1). As these two groups account for the majority of these assemblages, this similarity is to be expected. Thus, amongst these two taxa types, weathering is common but rarely severe. The only instance of notably more severe weathering occurs within the smallest sample: the very large mammals of Le7b. The very large mammals may still display more severe weathering than the other ungulates (see below).

- *Size*

When grouped by size, the results present a clearer pattern: the larger the mammal, the greater the weathering (Table 7.4, Fig. 7.6). This also stands in contrast to the overall trend seen between the features, where the larger the sample the lesser the weathering (see Table 7.1, specifically features such as Le6.31 and Le7/F4/e2). Although the ‘Large’ sample is more numerous than the sample size of smaller mammals, is displays higher weathering in every phase. There appears to be a relationship between weathering severity and animal size, where both frequency and severity decrease with size.

Table 7.4 Weathering severity [NISP] by mammal size classes per phase, identifiable bones o

	Le6					Le7b					Le7a	
Mammal Size Classes	Total	None	Slight	Moderate	Severe	Total	None	Slight	Moderate	Severe	Total	Non
Very Large	57		18	26	13	8		2	2	4	38	4
Large / Very Large	30	2	12	14	2	8	1	6	1		85	31
Large	656	37	233	289	97	105	24	48	24	9	896	229
Medium / Large	33	4	16	10	3	8	4	4			66	25
Medium	136	30	63	39	4	14	2	8	4		111	53
Small / Medium	13	3	6	3	1	2	1	1		1	68	34
Small	4	3	1			4	2	2			19	17

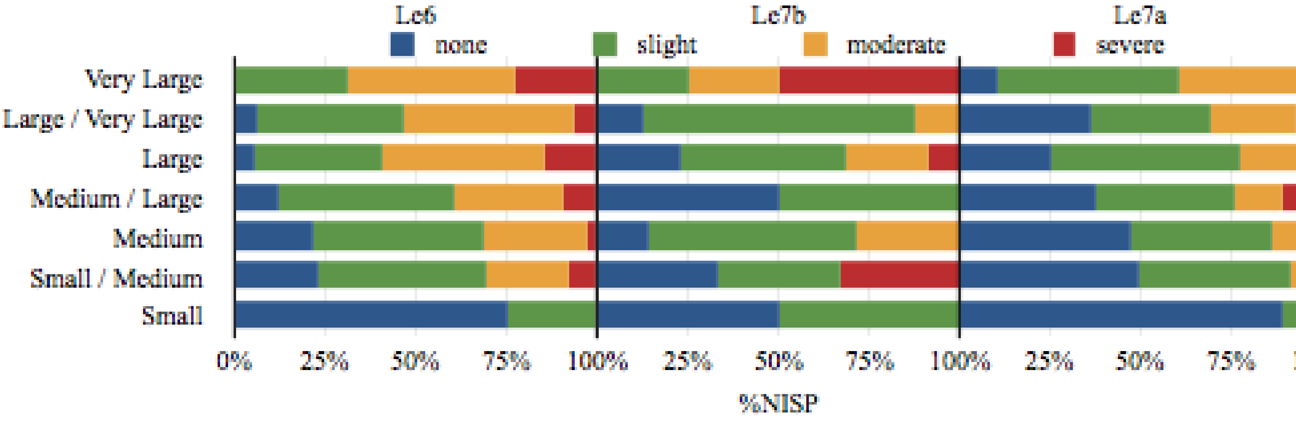


Fig. 7.6 Weathering severity [%NISP] by mammal size classes per phase, identifiable bones only.

7.1.3 Weathering: Skeletal Regions

To identify any differentiated discarding or burial of certain skeletal parts or types, Table 7.5 and Figure 7.7 present the incidence of weathering within the different skeletal regions (as defined in Table 4.3).

Table 7.5 Weathering severity [NISP] by skeletal region per phase, identifiable bones

	Le6					Le7b					Le7
Skeletal Region	Total	None	Slight	Moderate	Severe	Total	None	Slight	Moderate	Severe	Tota
Head	49	5	33	9	2	11	2	7	1	1	174
Vertebra + Pelvis	83	9	28	39	7	22	7	11	3	1	208
Rib	15		12	3							62
Scapula	10	2	3	3	2	6		4	2		31
Upper Limb	141	24	61	41	15	23	5	15	2	1	194
Mid. Limb	109	11	51	39	8	22	7	13	2		208
Joint	187	9	42	92	44	19		4	6	9	88
Lower Limb	81	8	38	27	8	24	8	7	7	2	95
Feet	259	11	84	129	35	30	6	12	9	3	223

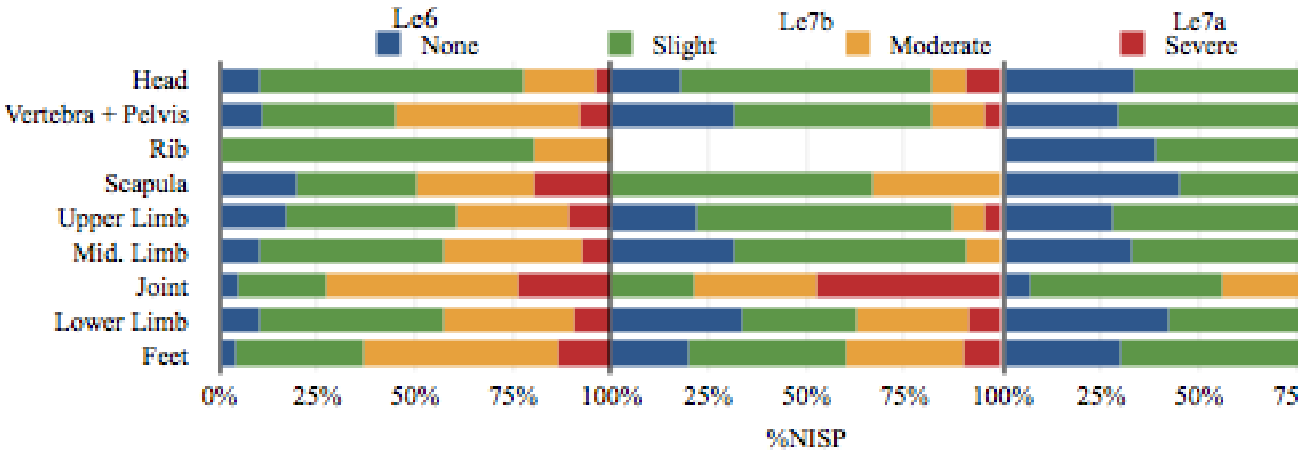


Fig. 7.7 Weathering severity [%NISP] by skeletal region per phase, identifiable bone only.

The regions appear to show some variability. In terms of identifiable remains, head, vertebra and pelvis, upper, mid, and lower limbs all consistently show lower weathering rates across the phases. Beyond the ribs in Le6, the highest incidence of weathering and most moderate and severe weathering occurs in the joint elements. This is particularly true in Le7b; however, it is a small sample. Apart from those Le7b joint elements, weathering is prevalent but rarely severe in any category. Indeed, within each phase, there appear to be similar patterns and proportions of weathering severity across the regions (particularly notable in Le6 and Le7a), apart from the joint elements. Le7a consistently displays the least weathering.

As aspects of exposure time (i.e. when weathering occurs) also relate to potential assemblage access for scavengers (be they rodent or carnivore), gnawing will be assessed before the implications of these weathering patterns are discussed.

7.2 Gnawing: Rodent & Carnivore

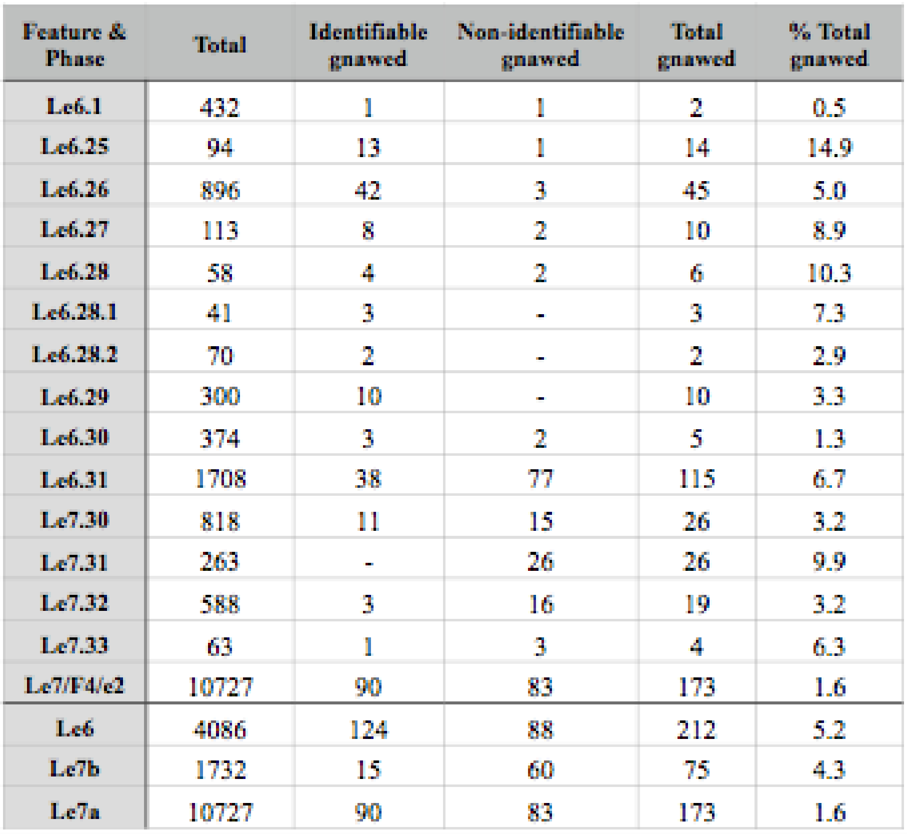
Rodents and carnivores may play a significant role in shaping an assemblage (e.g. Cleghorn & Marean 2007; Marean 1991; Marean & Spencer 1991). While rodent activity at Le6 and Le7 was scarce, carnivore gnawing had a greater effect on the assemblage, particularly in terms of breakage and fragmentation (see below).

Although three levels of severity were recorded for both rodent and carnivore gnawing (section 4.4), ‘slight’ (of which there was little) and ‘moderate’ have been combined into a single category (‘present’) as they both described marks that were present but superficial.

This stands in contrast to the ‘severe’ gnawing which marked significant damage to the bones, including edges or portions destroyed.

7.2.1 Rodent Gnawing

Table 7.6 Number of elements [NISP] with rodent gnawing per feature and phase, identifiable and non-identifiable bones.



Feature & Phase	Total	Identifiable gnawed	Non-identifiable gnawed	Total gnawed	% Total gnawed
Le6.1	432	1	1	2	0.5
Le6.25	94	13	1	14	14.9
Le6.26	896	42	3	45	5.0
Le6.27	113	8	2	10	8.9
Le6.28	58	4	2	6	10.3
Le6.28.1	41	3	-	3	7.3
Le6.28.2	70	2	-	2	2.9
Le6.29	300	10	-	10	3.3
Le6.30	374	3	2	5	1.3
Le6.31	1708	38	77	115	6.7
Le7.30	818	11	15	26	3.2
Le7.31	263	-	26	26	9.9
Le7.32	588	3	16	19	3.2
Le7.33	63	1	3	4	6.3
Le7/F4/e2	10727	90	83	173	1.6
Le6	4086	124	88	212	5.2
Le7b	1732	15	60	75	4.3
Le7a	10727	90	83	173	1.6

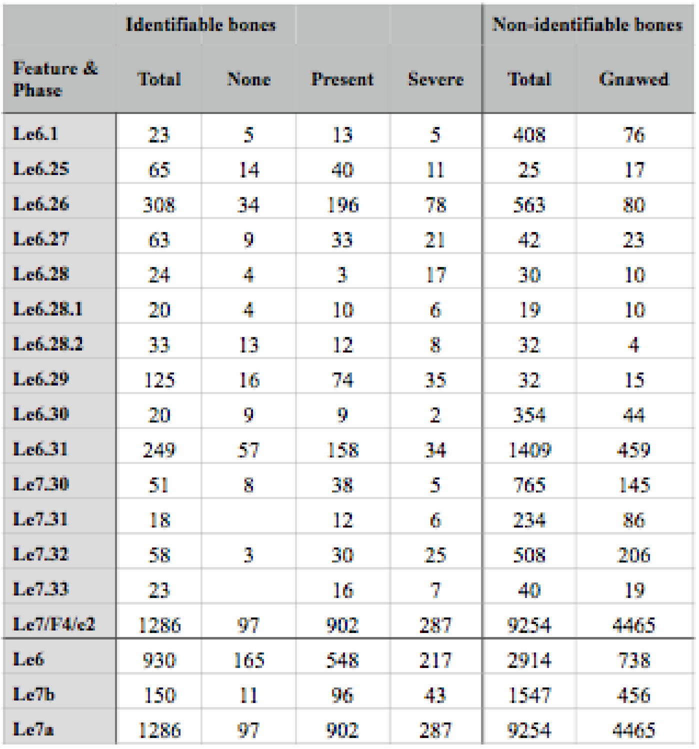
On the whole, rodent gnawing was scarce at Le6 and Le7 (Table 7.6). At the feature level, severe gnawing never makes up more than five percent of the rodent gnawing, while at the phase level it never breaches two percent. Where there was severe gnawing, the size of the tooth marks suggest it was porcupine. A few of these severely gnawed specimens also appeared to have been recently gnawed, judging by the colour of the damaged bone.

While there was little rodent gnawing in general, certain features display slightly more frequent gnawing (e.g. Le6.25, Le6.28, and Le7.31). However, this is not a major factor in terms of damage to bones and attrition. It speaks more to the potential presence of rodent burrows and thus bioturbation and layer mixing (*cf.* Fowler et al. 2004). However, as the Le6 and Le7 features had little in the way of separate layers (section 4.1), potential mixing presents less of a threat than it might with more stratigraphically divided features or sites.

7.2.2 Carnivore Gnawing

As is immediately evident at both feature and phase level, carnivore gnawing is substantially more prevalent than rodent gnawing (Table 7.7, Figs. 7.8-9).

Table 7.7 Carnivore gnawing [NISP] and severity per feature and phase, identifiable and non-identifiable bones.



	Identifiable bones				Non-identifiable bones	
Feature & Phase	**Total**	**None**	**Present**	**Severe**	**Total**	**Gnawed**
Le6.1	23	5	13	5	408	76
Le6.25	65	14	40	11	25	17
Le6.26	308	34	196	78	563	80
Le6.27	63	9	33	21	42	23
Le6.28	24	4	3	17	30	10
Le6.28.1	20	4	10	6	19	10
Le6.28.2	33	13	12	8	32	4
Le6.29	125	16	74	35	32	15
Le6.30	20	9	9	2	354	44
Le6.31	249	57	158	34	1409	459
Le7.30	51	8	38	5	765	145
Le7.31	18		12	6	234	86
Le7.32	58	3	30	25	508	206
Le7.33	23		16	7	40	19
Le7/F4/e2	1286	97	902	287	9254	4465
Le6	930	165	548	217	2914	738
Le7b	150	11	96	43	1547	456
Le7a	1286	97	902	287	9254	4465

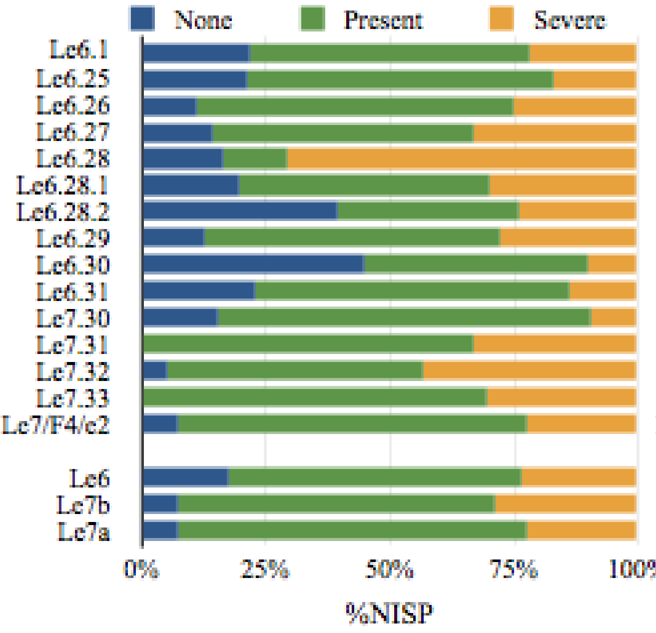


Fig. 7.8 Severity of carnivore gnawing [%NISP] on identifiable bones by features and phase.

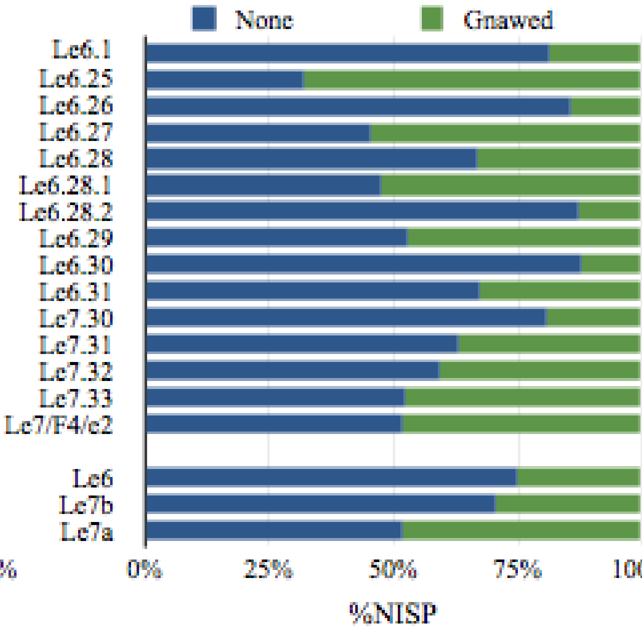


Fig. 7.9 Carnivore gnawing [%NISP] on non-identifiable bones by feature and phase.

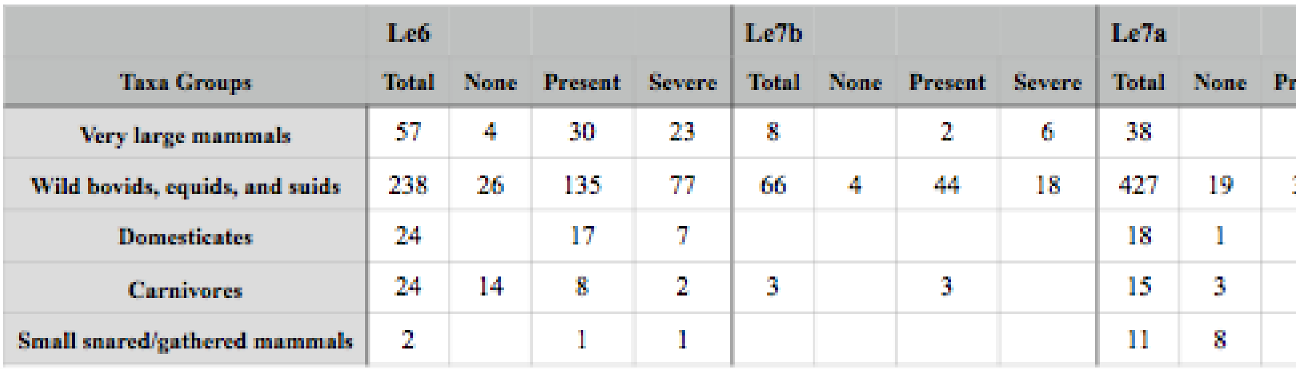
Similar to the weathering, the features with the highest severity also tend to be those with the smallest samples (e.g. Le6.28) (Table 7.7). While there is some variation between features, the gnawing proportions are largely steady between the phases in the identifiable material. Unlike weathering, where feature type seems to have played a greater role, here scavenger habits may have been the greater driver in this apparent similitude. For example, Le6.28 and Le6.28.2 vastly differ in gnawing severity (Fig. 7.8). They are both probably surface features, so the differentiation likely stems from carnivore activities rather than feature type-based patterns. Interestingly, the non-identifiable bones display lower levels of gnawing (Fig. 7.9).

As with the weathering, the following sections present the carnivore gnawing results per various taxa and skeletal groupings.

- *Taxa Types*

As sample sizes again plague comparisons, the data in these groups is presented at phase level (Table 7.8, Figure 7.10).

Table 7.8 Carnivore gnawing severity [NISP] by taxa grouping per phase, identifiable bones only.



	Le6				Le7b				Le7a	
Taxa Groups	Total	None	Present	Severe	Total	None	Present	Severe	Total	None
Very large mammals	57	4	30	23	8		2	6	38	
Wild bovids, equids, and suids	238	26	135	77	66	4	44	18	427	19
Domesticates	24		17	7					18	1
Carnivores	24	14	8	2	3		3		15	3
Small snared/gathered mammals	2		1	1					11	8

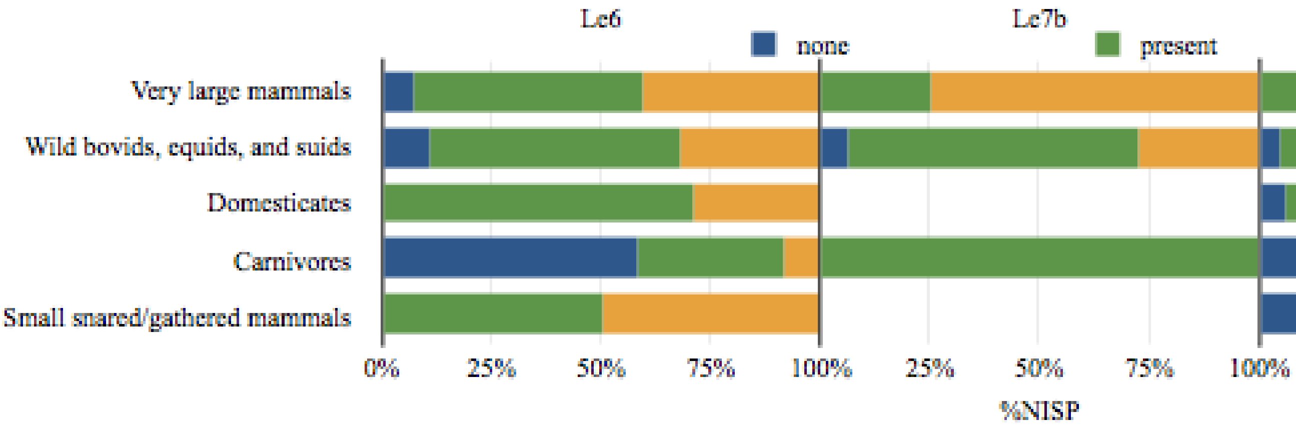


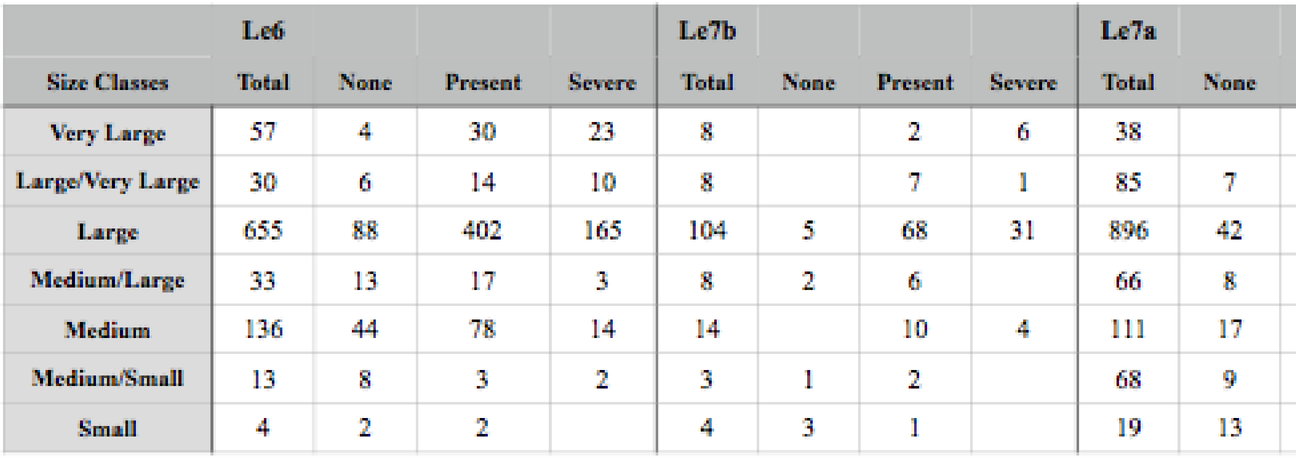
Fig. 7.10 Severity of carnivore gnawing [%NISP] by grouped taxa per pha

Despite the disparity in numbers (Table 7.8), carnivore gnawing (of variable severity) is present in all of these groups. Therefore, no taxa appears to have been wholly protected from scavengers (e.g. Brown & Emery 2008), or otherwise shielded from gnawing. There may have been lower rates of gnawing amongst the carnivore and small mammal remains, but sample sizes preclude confident interpretation. The ungulate groups show similar gnawing proportions to one another, although the very large mammals display more severe gnawing in all three phases.

Altogether, it appears no particular group was either wholly exempt or exclusively targeted by scavenging carnivores. Moreover, the individual features with greater gnawing within a particular taxa grouping tend to have consistently higher gnawing across all groups, indicating again that feature type may be a significant factor. However, there was some similarity between the features and phases, for the only times the feature level taxa data deviated from the phase level was when samples were very small. This also held true for the species within these taxa groupings, as migratory, territorial, and otherwise grouped or specific species essentially reflected the assemblage-wide phase level results.

- Size Classes

Table 7.9 Carnivore gnawing [NISP] on mammal size classes per phase, identifiable bones only.



	Le6				Le7b				Le7a	
Size Classes	Total	None	Present	Severe	Total	None	Present	Severe	Total	None
Very Large	57	4	30	23	8		2	6	38	
Large/Very Large	30	6	14	10	8		7	1	85	7
Large	655	88	402	165	104	5	68	31	896	42
Medium/Large	33	13	17	3	8	2	6		66	8
Medium	136	44	78	14	14		10	4	111	17
Medium/Small	13	8	3	2	3	1	2		68	9
Small	4	2	2		4	3	1		19	13

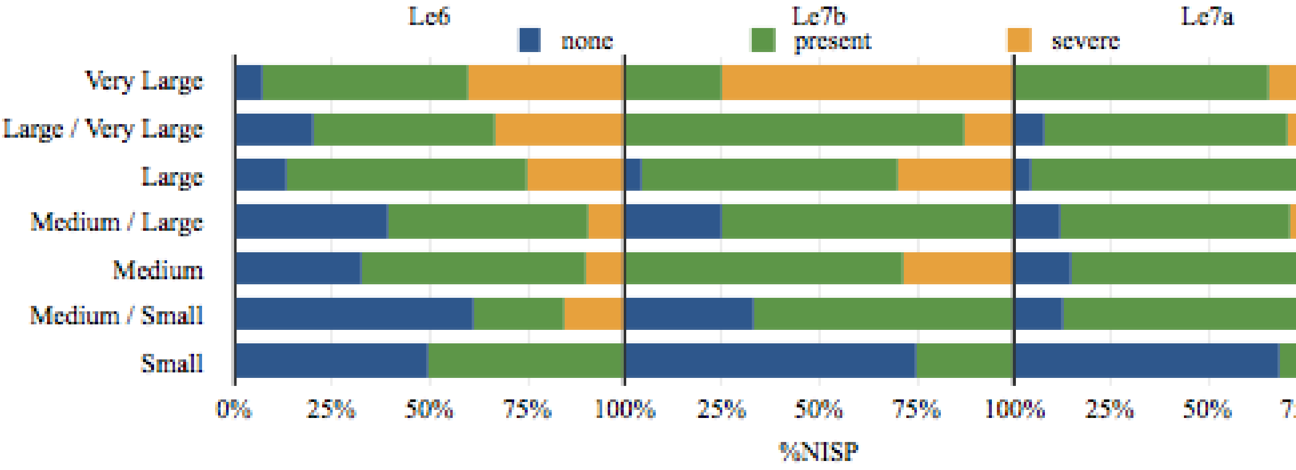


Fig. 7.11 Severity [%NISP] of carnivore gnawing by mammal size classes per phase, identifiable b

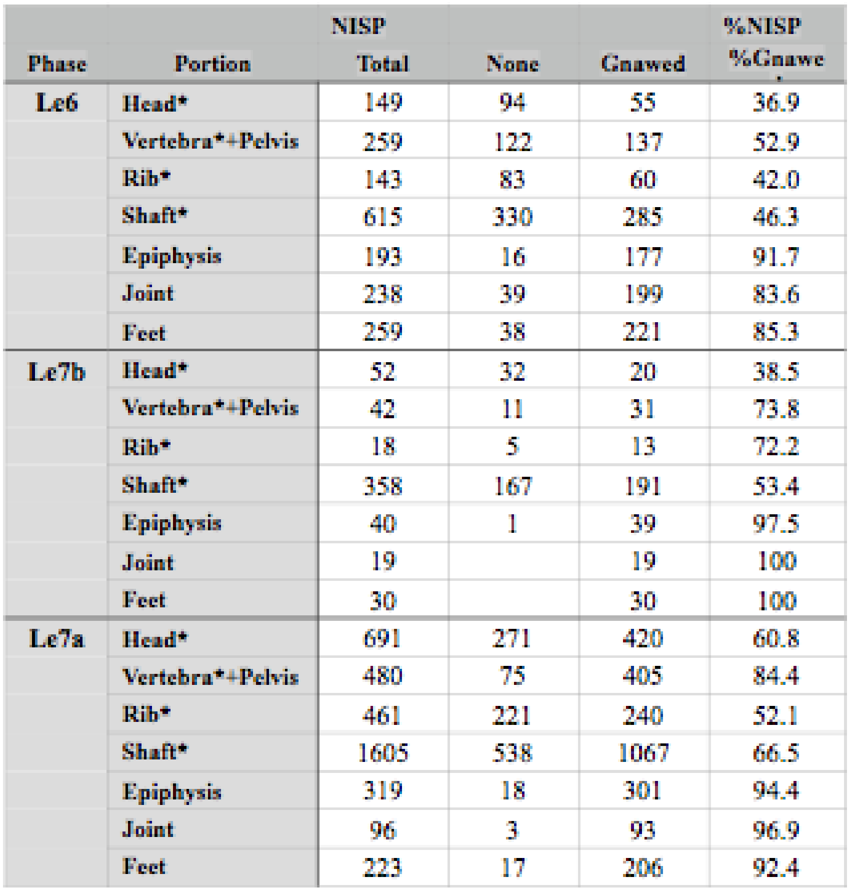
At both feature and phase level, it seems the larger mammals may have more frequent and severe gnawing than the smaller taxa (Table 7.9, Fig. 7.11). The potential causes of this relationship between size and gnawing will be discussed in Chapter 12. However, seemingly size-linked frequency is not as pronounced as it was with weathering. Indeed, in Le7a only the small mammals are notably un-gnawed, while all other size classes are largely similar. Severe gnawing does still exhibit something of a size gradient in Le7a.

- *Skeletal Region*

I also assessed gnawing data by skeletal and intra-element regions as carnivores are known to preferentially chew on certain portions of the skeleton (e.g. Marean & Spencer 1991). For the skeletal regions, the patterns largely resembled those seen at the phase level.

However, when assessed at an intra-element level (with some non-identifiable material), a trend appears (Table 7.10).

Table 7.10 Frequency [NISP] of carnivore gnawing on regions and limb portions per phase, combined identifiable and non-identifiable bones (*includes the applicable non-identifiable material).



Phase	Portion	NISP			%NISP
		Total	None	Gnawed	%Gnawe
Le6	**Head***	149	94	55	36.9
	Vertebra*+Pelvis	259	122	137	52.9
	Rib*	143	83	60	42.0
	Shaft*	615	330	285	46.3
	Epiphysis	193	16	177	91.7
	Joint	238	39	199	83.6
	Feet	259	38	221	85.3
Le7b	**Head***	52	32	20	38.5
	Vertebra*+Pelvis	42	11	31	73.8
	Rib*	18	5	13	72.2
	Shaft*	358	167	191	53.4
	Epiphysis	40	1	39	97.5
	Joint	19		19	100
	Feet	30		30	100
Le7a	**Head***	691	271	420	60.8
	Vertebra*+Pelvis	480	75	405	84.4
	Rib*	461	221	240	52.1
	Shaft*	1605	538	1067	66.5
	Epiphysis	319	18	301	94.4
	Joint	96	3	93	96.9
	Feet	223	17	206	92.4

Long bone epiphyses, joints, and feet show the most consistent and frequent carnivore damage at Le6 and Le7—a pattern that appears when compared between size classes as well. This aligns with the expectations from studies of carnivore gnawing behaviour (e.g. Marean 1991; Marean & Spencer 1991). It may stem from the meat and fat content of these element, a subject addressed in section 7.3, but it does suggest that the bone type and scavenger preference, rather than size, taxa, feature, or treatment practices, was the main differential factor in carnivore gnawing at Le6 and Le7.

7.3 Summary

Overall, weathering and carnivore gnawing are both very common but rarely severe, while rodent gnawing is significantly less frequent. Weathering varies between the features, but carnivore gnawing is largely similar at both the feature and phase level. In terms of taxa, there is a great deal of similarity in the weathering and carnivore gnawing present between the ungulates, a pattern that holds when individual species are also assessed. The non-ungulate taxa (carnivores and small mammals) may display different gnawing and weathering patterns, but the sample sizes complicate interpretation.

The general dearth of peri-depositional damage on the small snared or gathered mammals may be due to a variety of factors. For instance, these small mammal species could have been buried rapidly or incidentally shielded and protected by the bones of other, larger taxa. These smaller animals also simply have smaller bones which means less surface area upon which to see weathering and gnawing. Additionally, according to Behrensmeyer (1978) the bones of small mammals (e.g. 5 kg or less, such as those in the small snared/gathered category and certain carnivores) weather differently from those of the larger taxa. Given this, the notably lighter weathering of the smallest taxa may be due to intrinsic characteristics of the bones themselves, rather than any differential treatment or conditions.

It is also possible that the lighter damage relates back to the issue of self-introduction. The springhare and lagomorph bones in Le7/F4/e2 (Le7a) may have been introduced by those animals burrowing into the feature and subsequently dying, hence a lack of weathering and carnivore access. However, had that been the case, one might expect to find more complete skeletons (similar to the mostly complete small rodents found) rather than the scattered foot and limb bones that are present. Thus, manner of introduction for these taxa remains unclear.

There does appear to be relationship between size and weathering, and possibly in gnawing severity. This may be a factor of element size: large species have larger bones with greater surface area upon which to identify taphonomy (*cf.* D. Orton 2008: 242). There are also simply more large species' remains on-site (chapter 5), so the differences in weathering rates may also be due to sample size disparity. However, it is notable that, in terms of the weathering, this size trend stands counter to Behrensmeyer’s (1978) findings. She noted that the remains of animals less than 100 kg in size tended to weather more rapidly than those of larger animals (Behrensmeyer 1978). Thus, the Le6 and Le7 assemblages show an inverse trend to the “size-biasing” Behrensmeyer (1978: 160) noted. In contrast, Orton (2008: 246) described a similar decrease between both weathering, gnawing, and body size. As a possible product of various factors, including collection strategies and specific scavenger choices, he concluded that this size-based pattern “would be hard to interpret in terms of human behaviour” (D. Orton 2008: 246). Therefore, linking this pattern to any particularly processing or disposal tactic is difficult.

Certain regions of the skeleton may be more highly weathered (e.g. joints), but many skeletal regions also show similarity within their respective phases. This is despite physical differences (e.g. density differences between vertebrae and long bones). On the whole, the greatest variation in skeletal region weathering appears to be linked to feature type rather than differential region treatment. Carnivore gnawing, on the other hand, occurs much more frequently on specific skeletal parts (e.g. long bone epiphyses, joints, and feet). But these patterns can probably be attributed simply to selective carnivore gnawing habits.

Although these results may indicate a few human choices, discussed in Chapter 12, overall it seems that diagenetic factors (i.e. relating to feature context type and carnivore preferences) rather than anthropogenic choices have had the greatest influence in the weathering and gnawing patterns at Le6 and Le7. I would further address this by comparing, for example, the weathering of taxa or skeletal element by context type (e.g. wild bovids in surface features versus those in pit features). As I used weathering severity to help assign potential context types in section 4.1, grouping the features by those assigned types would make that argument rather circular. Nonetheless, it does appear that feature type may have been a more significant determinant of weathering than differential treatment. And yet, whatever the driver, neither gnawing nor weathering have likely made a significant impact on the assemblage.

The often light or superficial nature of the weathering and gnawing present at these sites may indicate that these peri-depositional factors had little effect on the breakage within these assemblages. The lower proportions of gnawing and weathering in the non-identifiable material may corroborate this, as it seems there were not major drivers of the fragmentation that forced material into the 'non-identifiable' categories. Carnivore gnawing certainly played a role in breakage, but it may not have been a significant agent of attrition.

Some scholars have attempted to assess the correlation between weathering or gnawing severity and fragment length, in order to more directly quantify the effect of these factors on fragmentation (e.g. D. Orton 2008: 243-244). However, in doing so, Orton (ibid.) found no appreciable relationship between severity and fragment length and did not view it as a usable tool for discerning the actual impact of weathering and gnawing on breakage. For Le6 and Le7, gnawing and weathering likely had no great effect on overall identifiability or skeletal element presence, nor are they likely to have obscured or damaged the other taphonomy present on the remains.

The next chapter, 8, proceeds with a more in-depth examination of the breakage characteristics within this material, which may provide more information about the agents involved.

Chapter 8: Fragmentation and Breakage

As in the previous sections, this stage speaks to diagenetic events but also begins to address direct human action. In this, it covers both the incidental breakage that occurred peri- or post-depositionally but also the fracturing that took place during processing.

I assess fragmentation to explore degree and time of breakage: was the bone fresh or long since discarded and desiccated when broken? The next step involves identifying potential fracturing agents, be they human or otherwise. Within potentially human-induced breakage, I also seek to identify any specific processing strategies as well as the intent behind such fracturing at Le6 and Le7. Within all that, any ostensible differences in the treatment or destruction of different taxa groups or skeletal elements that point to differential disposal or simple inter-feature differences will be noted.

Fragmentation has also been used by some to identify intensity in the of utilisation a carcass (e.g. Halstead 2007; D. Orton 2008: 250-252, 2012), particularly in terms of fat exploitation (e.g. Karr 2015; Outram 2001). Merely equating high fragmentation to ‘intensity’ of use would be problematic in lieu of the assessment of other potential taphonomic factors (e.g. Karr 2015; Karr et al. 2014; Orton 2012). As those factors were the subjects of the previous section, here I proceed with a discussion of the fragmentation and breakage present at Le6 and Le7.

I broadly follow Orton’s (2008: 250-256, 2012) framework within this section. He assessed fragmentation through a few main analyses including element completeness, the identification of ‘fresh’ fracture types, and overall percent of identifiable material. As the overall identification rates were discussed in the previous chapter (section 5.1), here I expand upon those coarse values by looking at completeness within specific elements (8.1). This is done to assess overall trends in the fragmentation of elements, no matter the causal agent. The next section (8.2) assesses the frequency of fresh (e.g. green bone) fractures present. Both analyses may provide clues about specific human actions and the potential drivers therein, which will be summarised in section (8.3). Only identifiable bones are discussed in this section.

8.1 Completeness

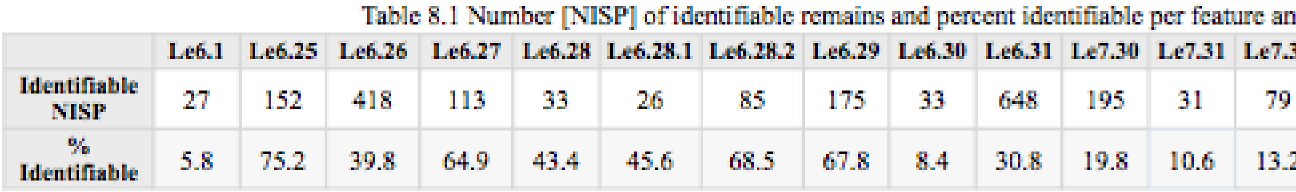


Table 8.1 Number [NISP] of identifiable remains and percent identifiable per feature an

	Le6.1	Le6.25	Le6.26	Le6.27	Le6.28	Le6.28.1	Le6.28.2	Le6.29	Le6.30	Le6.31	Le7.30	Le7.31	Le7.3
Identifiable NISP	27	152	418	113	33	26	85	175	33	648	195	31	79
% Identifiable	5.8	75.2	39.8	64.9	43.4	45.6	68.5	67.8	8.4	30.8	19.8	10.6	13.2

As was presented in section 5.1, the Le6 and Le7 assemblages may be marked by a relatively high identification rate (Table 8.1). The possible reasons for this were discussed in that section. Those values say little about the actual state of the material, particularly as a bone need not be complete to be identifiable. In this way, the identification rate may be a weak indicator of intensity. The nature of the assemblage could greatly influence what ‘percent identifiable’ actually means. For instance, if a hypothetical assemblage were wholly composed of minuscule pieces of tortoise carapace and mollusk shell it would rate a 100% identification rate despite being wholly fragmented. Alternatively, given the high degree of skeletal similarity within the family, an assemblage of bovids requires little damage before it becomes impossible to confidently identify the material beyond size class. Therefore, to explore the nature of the assemblage itself, I assess completeness by following Orton (2012) in using Morlan’s (1994: 805) formula, as described in section 4.3.2.

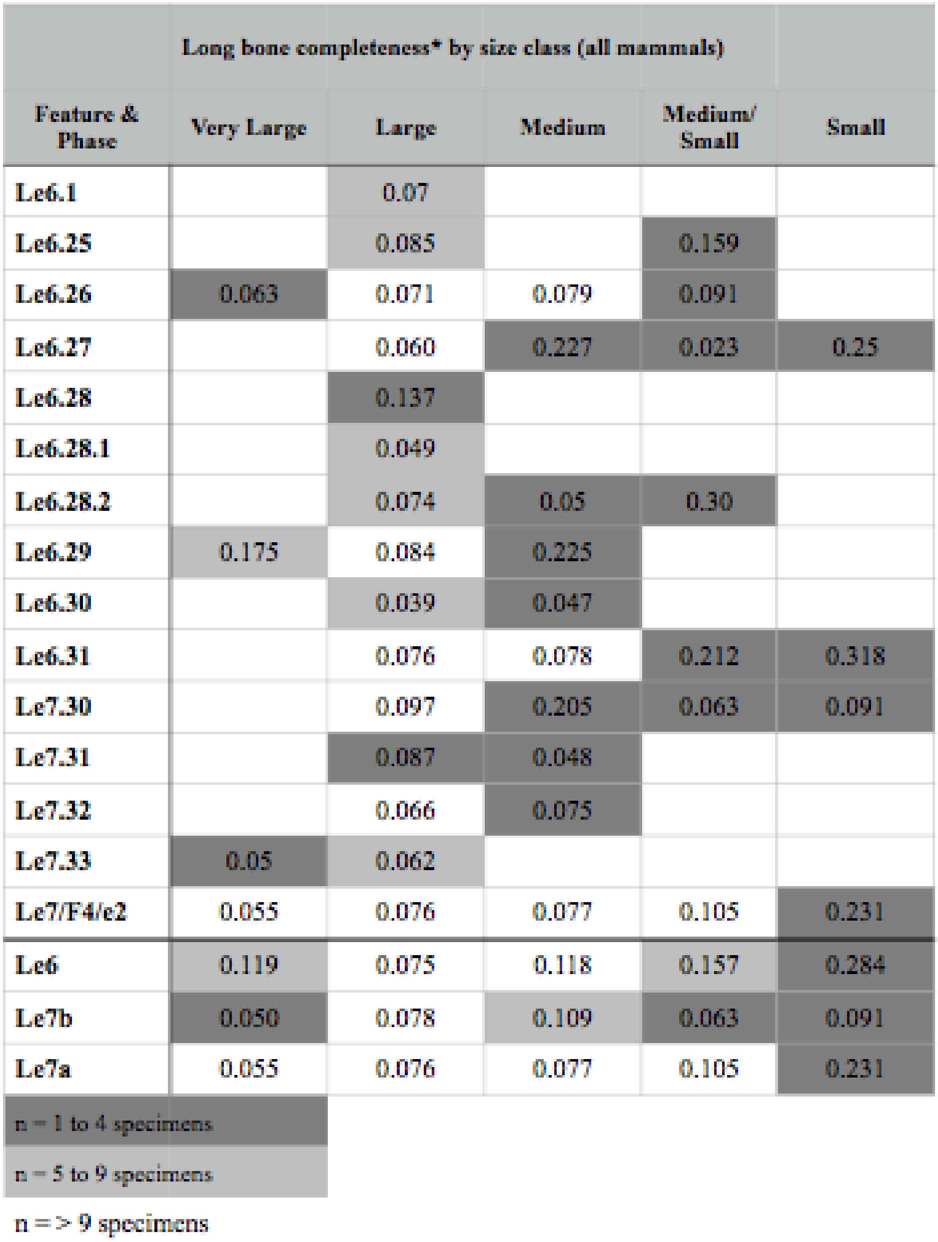
I first discuss long bone completeness at Le6 and Le7 before addressing the other skeletal element types. Although I will explore inter-taxa results in certain areas, the main aggregation unit is mammal size classes. This is both to explore the potential size-based trends indicated in Chapter 7 as well as in recognition that size is likely a highly influential factor in terms of breakage patterns (e.g. Johnson 1985; Karr 2015).

8.1.1 Long Bones

Following Orton (2008: 251), Table 8.2 presents the mean long bone scores by feature. Sample sizes were very small at the feature level (see shading). Thus, I will only use phase level data for the rest of this chapter. For the same reason, the least populous intermediate sizes classes (large/very large and medium/large) have also been excluded. Despite sample size issues, however, most of these scores rarely rise above 10% complete. Overall, long bone completeness seems to be quite low. At first, this may seem to mark rather drastic fragmentation and reduction of the assemblages. Yet, looking at the long bone as a whole may be obscuring important intra-element differences.

One of the more likely reasons for a human or carnivore to break up an element is for access to the in-bone fats (e.g. Johnson 1985; Marean 1991; Outram 2001). In such activities, viewing the long bone as one homogenous entity is problematic (e.g. ibid.). To explore fat use, it may be best to assess the long bone shafts separately from the long bone epiphyses

Table 8.2 Long bone completeness scores per feature and phase (* = mean value).

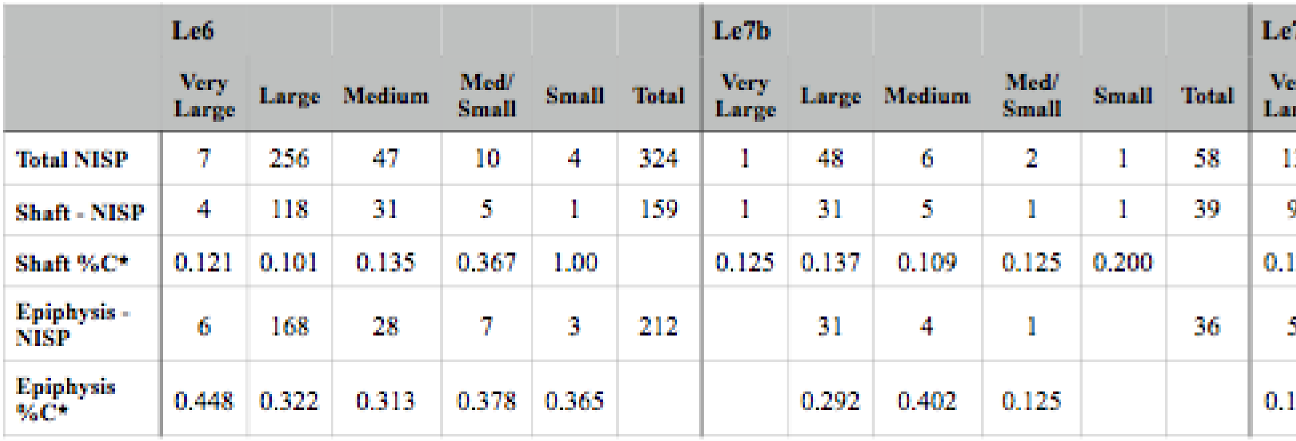


	Long bone completeness* by size class (all mammals)				
Feature & Phase	**Very Large**	**Large**	**Medium**	**Medium/ Small**	**Small**
Le6.1		0.07			
Le6.25		0.085		0.159	
Le6.26	0.063	0.071	0.079	0.091	
Le6.27		0.060	0.227	0.023	0.25
Le6.28		0.137			
Le6.28.1		0.049			
Le6.28.2		0.074	0.05	0.30	
Le6.29	0.175	0.084	0.225		
Le6.30		0.039	0.047		
Le6.31		0.076	0.078	0.212	0.318
Le7.30		0.097	0.205	0.063	0.091
Le7.31		0.087	0.048		
Le7.32		0.066	0.075		
Le7.33	0.05	0.062			
Le7/F4/e2	0.055	0.076	0.077	0.105	0.231
Le6	0.119	0.075	0.118	0.157	0.284
Le7b	0.050	0.078	0.109	0.063	0.091
Le7a	0.055	0.076	0.077	0.105	0.231

n = 1 to 4 specimens
n = 5 to 9 specimens
n => 9 specimens

(e.g. Karr 2015; Outram 2001). This is because of the variable fats found in each region: the shafts house easily accessed and rich bone marrow, while the epiphyses contain high quality bone grease that requires more extraction effort (e.g. Janzen et al. 2014). The long bone results were thus divided into shaft and epiphyseal categories (see section 4.2.6), and the completeness calculated within those separate groups.

Table 8.3 Long bone shaft and epiphysis sample sizes [NISP] and completeness scores [%C*] by size class per phase, in
class).



	Le6						Le7b						Le
	Very Large	Large	Medium	Med/ Small	Small	Total	Very Large	Large	Medium	Med/ Small	Small	Total	Ve La
Total NISP	7	256	47	10	4	324	1	48	6	2	1	58	1
Shaft - NISP	4	118	31	5	1	159	1	31	5	1	1	39	9
Shaft %C*	0.121	0.101	0.135	0.367	1.00		0.125	0.137	0.109	0.125	0.200		0.1
Epiphysis - NISP	6	168	28	7	3	212		31	4	1		36	5
Epiphysis %C*	0.448	0.322	0.313	0.378	0.365			0.292	0.402	0.125			0.1

Table 8.3 generally shows greater average completeness within the epiphyses. The smallest taxa deviate from this somewhat, but they also have the smallest sample sizes. Apart from them, the shaft values are commonly around 10%, while the epiphyses usually show at least 25% completeness or higher. Le7b proves the exception, but as the remains from this phase have consistently shown the most taphonomic damage (see section 7.2), this decreased completeness is likely linked to peri- and post-depositional aspects. While the epiphyseal sections generally express higher completeness scores than the shafts, the epiphyses are rarely wholly complete (Fig. 8.1). This moderate breakage likely ties in with the methods used to access the marrow in the shafts, which will be discussed below (sections 8.2-3).

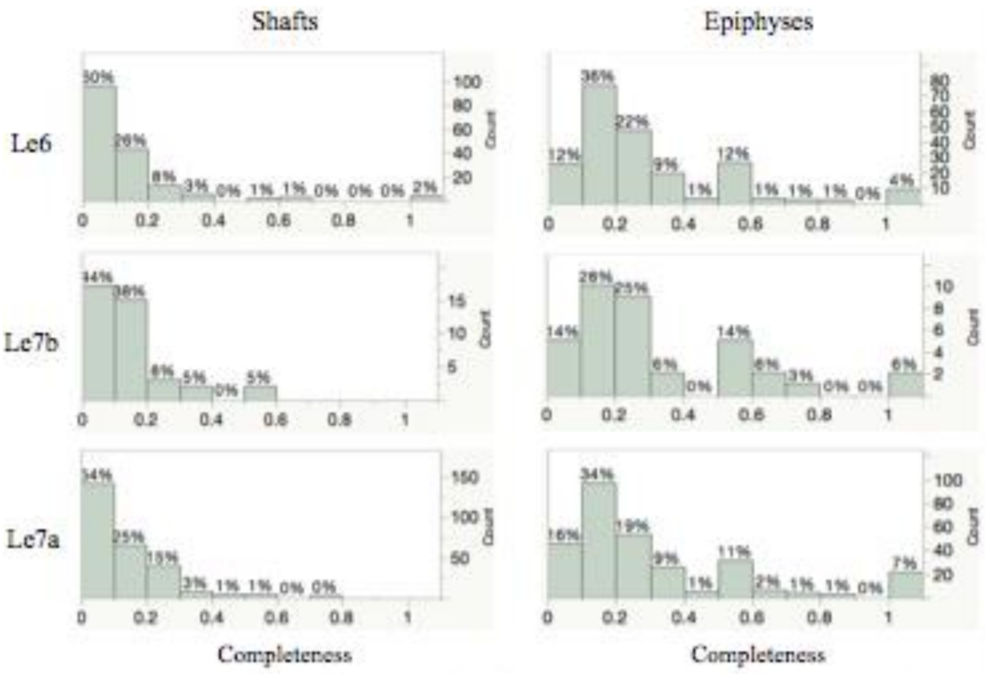


Fig. 8.1 Distribution of long bone shaft versus epiphyseal completeness by phase.

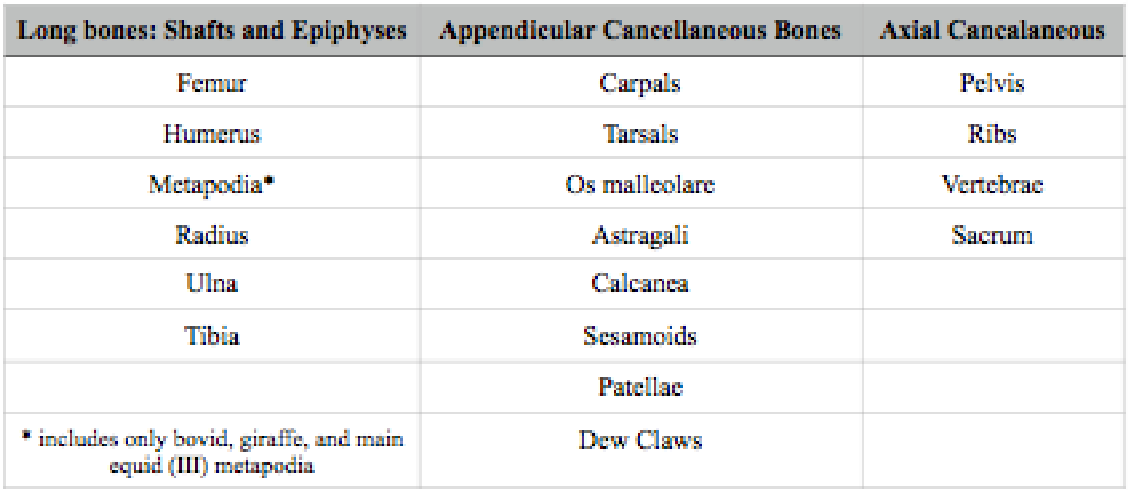
The difference in comminution between the marrow-bearing shafts and the grease-containing epiphyses highlights an important point. It does seem that different elements or section types, with their various associated fats, should be assessed separately. Moreover, to address intensity in fat use, other potential fat sources within the skeleton should also be included.

8.1.2 Various Skeletal Marrow & Grease Sources

Both Karr (2015) and Outram (2001, 2002) discuss the variable fats available in skeletal elements. While the long bones provide rich marrow that is easily accessed, the long bone epiphyses and other appendicular cancellous bones (such as carpals and tarsals) also offer high quality bone grease (ibid.). These require more processing (in the form of breakage and boiling) to extract the grease, which can result in notably higher fragmentation (e.g. Janzen et al. 2014; Karr 2015). The cancellous axial bones (such as the ribs and vertebrae) also contain bone grease, although it is lower quality than that in the appendicular elements (ibid.).

To distinguish signs of fat use and extraction at Le6 and Le7, I compare the completeness of four main bone fat sources: long bone shafts, long bone epiphyses, appendicular cancellous bones, and axial elements (Table 8.4).

Table 8.4 Skeletal elements assigned to their fat source groups.



Long bones: Shafts and Epiphyses	Appendicular Cancellaneous Bones	Axial Cancalaneous
Femur	Carpals	Pelvis
Humerus	Tarsals	Ribs
Metapodia*	Os malleolare	Vertebrae
Radius	Astragali	Sacrum
Ulna	Calcanea	
Tibia	Sesamoids	
	Patellae	
* includes only bovid, giraffe, and main equid (III) metapodia	Dew Claws	

It is also possible that not all species present at these sites were prepared or utilised the same in terms of meat and fat. Physical size, element structural differences, and socio-cultural dictates around the use of specific products may all influence the species and bones selected for fat-use (e.g. Johnson 1985; Karr 2015; Yellen 1991a).

As the previous chapters (6-7) showed little difference in terms of disposal between the different types of taxa, this is the first point at which to assess differences in active use. It is possible that the ungulates would have been utilised differently (in terms of fat and meat) from the other species, thus I assessed the average completeness scores and their distributions (across histograms, e.g. Fig. 8.1) with all mammals included, with ungulates only, and with non-ungulate species.

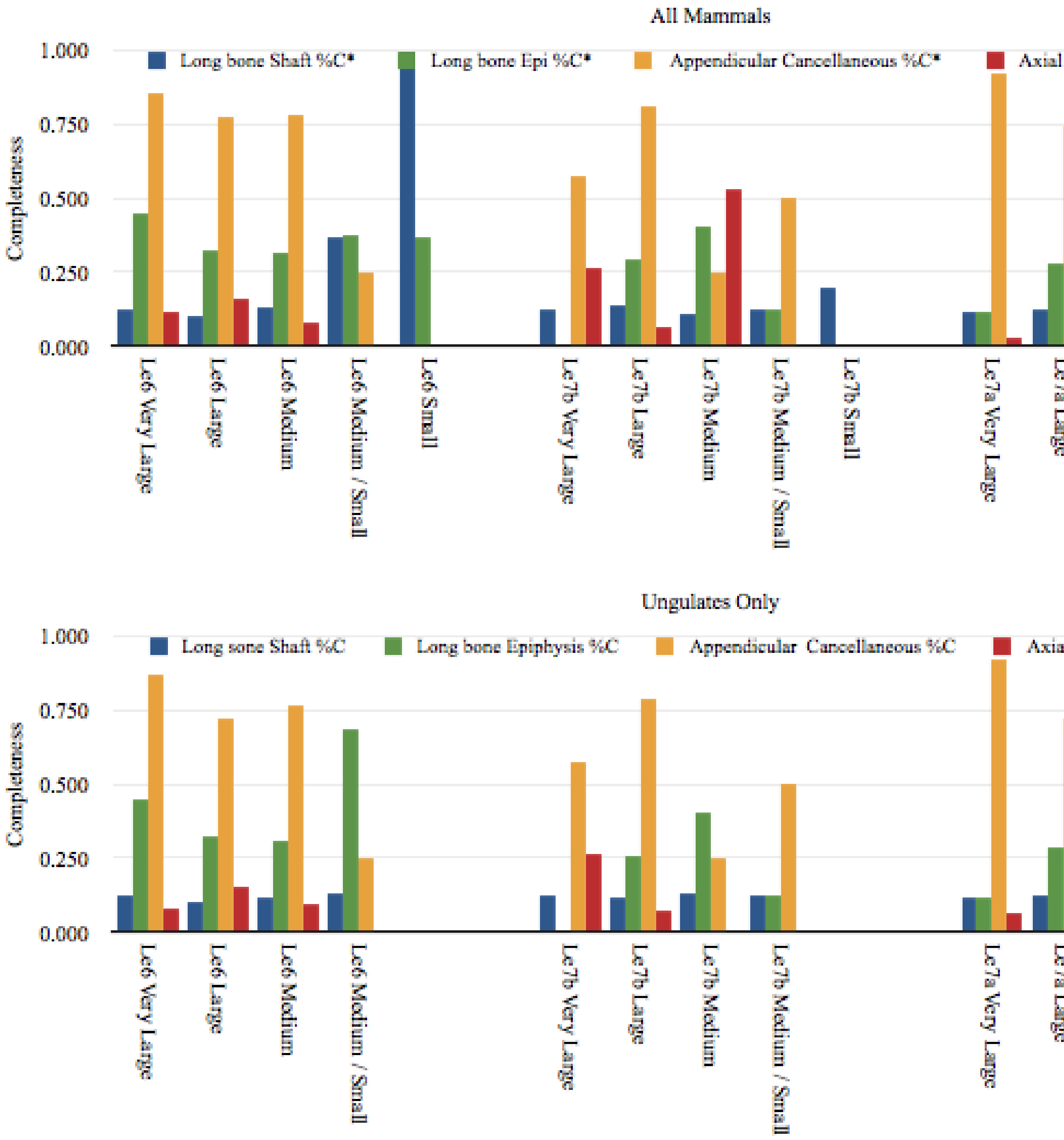
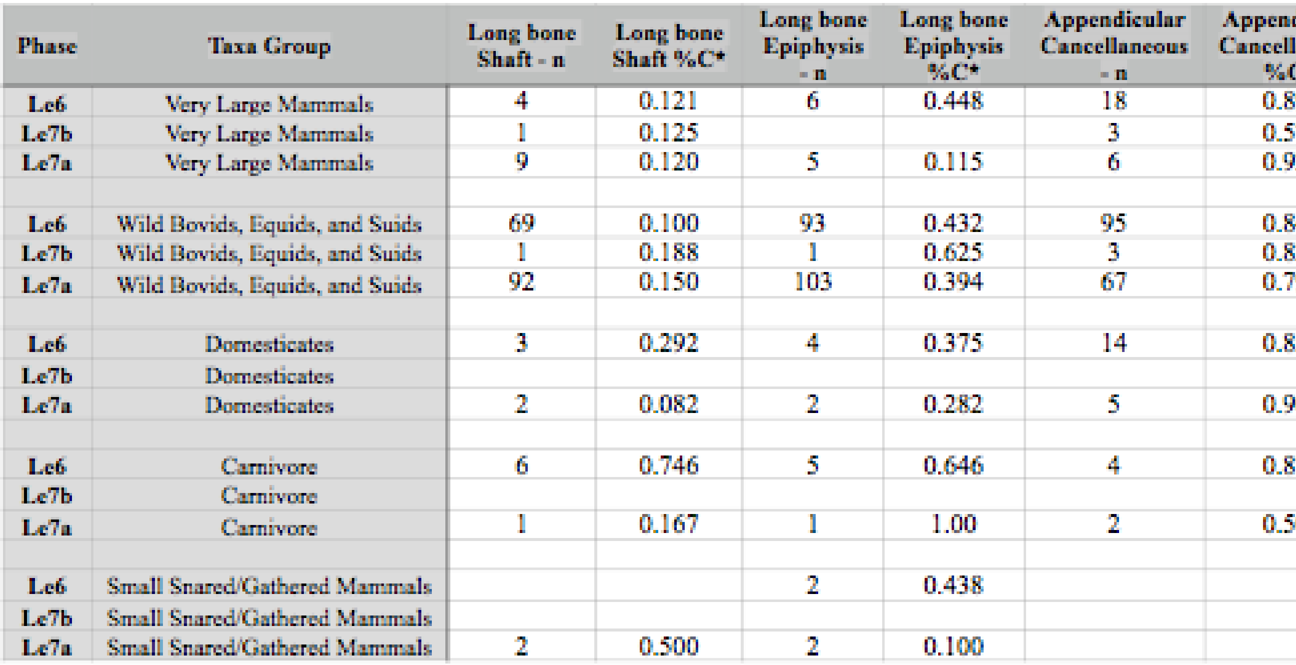


Fig. 8.2 Completeness (averages) by fat type grouping per size class and phase for all mammals ver

In both the histograms and in the averages (Fig. 8.2), there were very few notable differences between the ungulates and the entire mammal group. The main exception is the ‘small’ category, which does not exist within the ungulates. This overall similarity makes sense as ungulates make up the vast majority of the mammals present (chapter 5).

Comparing ungulates to the non-ungulates (e.g. carnivores and small snared or gathered mammals) is more complicated, given the extreme sample size differences. Often, the non-ungulate sample for a given fat source (e.g. type of element) and size class is a single specimen, if present at all. Even collating the size classes into one group, with element type and phase the only divisors, produces very small samples (Table 8.5). When looking at the averages, any attempt at comparison must be approached cautiously.

Table 8.5 Sample sizes [NISP] and completeness [%C*] by fat type grouping per taxa type and p



Phase	Taxa Group	Long bone Shaft - n	Long bone Shaft %C*	Long bone Epiphysis - n	Long bone Epiphysis %C*	Appendicular Cancellaneous - n	Appen Cancell %C
Le6	Very Large Mammals	4	0.121	6	0.448	18	0.8
Le7b	Very Large Mammals	1	0.125			3	0.5
Le7a	Very Large Mammals	9	0.120	5	0.115	6	0.9
Le6	Wild Bovids, Equids, and Suids	69	0.100	93	0.432	95	0.8
Le7b	Wild Bovids, Equids, and Suids	1	0.188	1	0.625	3	0.8
Le7a	Wild Bovids, Equids, and Suids	92	0.150	103	0.394	67	0.7
Le6	Domesticates	3	0.292	4	0.375	14	0.8
Le7b	Domesticates						
Le7a	Domesticates	2	0.082	2	0.282	5	0.9
Le6	Carnivore	6	0.746	5	0.646	4	0.8
Le7b	Carnivore						
Le7a	Carnivore	1	0.167	1	1.00	2	0.5
Le6	Small Snared/Gathered Mammals			2	0.438		
Le7b	Small Snared/Gathered Mammals						
Le7a	Small Snared/Gathered Mammals	2	0.500	2	0.100		

In the phase level comparison, it is evident that the ungulate taxa groupings (very large mammals, domesticates, and wild bovids, equids, and suids) have very similar patterning. But the carnivores and small mammals are just very few in number. On the whole, various elements of these non-ungulate species seem to express higher completeness than the other (generally larger) taxa. These smaller taxa also displayed lesser weathering and gnawing damage (section 7.2). Fragmentation and peri-depositional damage are thus very likely linked.

Given the sample size issues with the results at the taxa level and for the non-ungulate groups, only ungulate size class data is presented in this section. Other mammal taxa may have been treated differently to the ungulate species. However, as ungulate data dominates the mammal sample, those other patterns would be overshadowed by the ungulate trends. This could give a false impression that <u>all</u> mammals were processed in the same manner. To clarify that only <u>ungulate</u> processing is under discussion below, only ungulate data is used here.

- *Ungulates only*

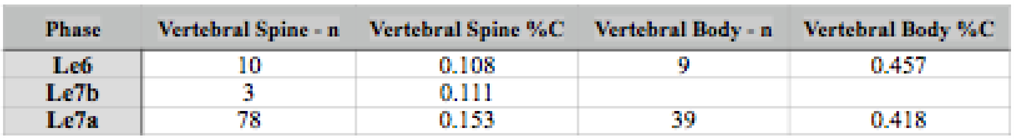
Table 8.6 Sample sizes [NISP] and completeness [%C*] by fat type grouping per size class and phase, ungulates

Phase	Ungulate Size Class	Long bone Shafts - n	Long bone Shaft %C*	Long bone Epiphyses - n	Long bone Epiphyses %C*	Appendicular Cancellaneous - n	Appendicular Cancellaneous %C*	Axi Cancell - n
Le6	Very Large	4	0.121	6	0.448	18	0.869	9
Le6	Large	115	0.101	152	0.323	231	0.722	4
Le6	Medium	28	0.117	27	0.309	27	0.767	7
Le6	Small / Medium	2	0.134	3	0.688	1	0.250	
Le7b	Very Large	1	0.125			2	0.575	2
Le7b	Large	28	0.116	28	0.257	17	0.785	1
Le7b	Medium	4	0.132	4	0.402	1	0.250	
Le7b	Small / Medium	1	0.125	1	0.125	1	0.500	
Le7a	Very Large	9	0.120	5	0.115	6	0.917	11
Le7a	Large	190	0.128	212	0.287	128	0.718	14
Le7a	Medium	28	0.176	18	0.410	14	0.839	8
Le7a	Small / Medium	15	0.104	21	0.422	5	0.750	7

Table 8.6 presents an almost inverse relationship between quality of fat and completeness: the higher the quality of the fat and the easier to extract, the lower the completeness of the elements. Shafts have the richest fats yet the lowest completeness scores. Alternately, the appendicular elements, with their quality grease but dense cancellous housing, are more complete. The axial elements are the only outliers. The breakage of the axial elements is likely related to structure, rather than fragmentation incurred from grease extraction (Karr 2015). One way to address structural weakness versus use breakage is by looking at, for example, the vertebrae themselves; comparing the completeness of vertebral spines versus bodies.

With the vertebrae, one might expect that the less dense and protuberant spines would likely be broken whether the vertebrae had been processed or not: a simple by-product of their shape and various taphonomic forces (e.g. Karr 2015). However, if the vertebrae had been categorically exploited for their grease, there would be more comparable breakage in the bodies. With the vertebrae, I also include all the mammals here as many of the vertebrae were only identified to mammal size class.

Table 8.7 Sample size [NISP] and completeness [%C*] for vertebral spines versus vertebral bodies per phase, ungulates only (* averages).



Phase	Vertebral Spine - n	Vertebral Spine %C	Vertebral Body - n	Vertebral Body %C
Le6	10	0.108	9	0.457
Le7b	3	0.111		
Le7a	78	0.153	39	0.418

The Le6 and Le7 vertebral bodies are generally more complete than the spines (Table 8.7). The bodies are generally around 50% complete. Moreover, much of this breakage is very clean: the bodies are neatly halved and often display remnants of the chops that split them. This type of breakage (and butchery) points more to dismemberment (e.g. Seetah 2006a: 204-205, 207-208) than to fat extraction and will be discussed further in Chapter 10.

If the results from the vertebrae are taken as indicative of the broader axial class (where much of the fragmentation is likely due to structural weakness and/or portioning breakage rather than exploitation), then the axial results fall back in line with findings above. In other words, there was selective use of fats, but not intensive (i.e. diversified) exploitation of all sources possible.

8.2 Fractures

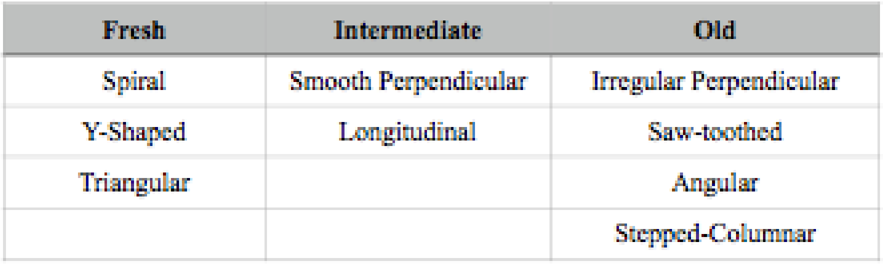
There is an unavoidable overlap between fragmentation or fracturing and butchery, as the latter not only involves breakage (Seetah 2006a: 98,165) but may have been the causal agent of it. For example, chops may be used to start longitudinal breakage (e.g. Rixson 1989). This section will therefore present the start of this processing discussion, which will be continued in Chapter 10.

Although fracturing may be the direct result of human processing, it can also stem from other taphonomic processes (e.g. Johnson 1985; Seetah 2006a: 23). This section will discuss the types of fractures present and distinguish, if possible, those that are more likely to have stemmed from human processing versus those incurred later in the taphonomic history of the bone. In hindsight, using Outram’s (2001) or Orton’s (2012) recording method for breakage would have been useful. However, such assessment remains for a future project as there is much potential for a more in-depth study of breakage at Le6 and Le7. Here a coarse exploration of breakage at these sites is presented.

Terminologically, I follow Johnson (1985) in using ‘fresh’ to describe breakage that occurred when a “bone [was] in the living condition, or from a just-killed animal”. In other words, it describes a bone that was freshly removed from an animal killed shortly before, when the bone still contained “a high moisture content and fresh marrow” (Johnson 1985: 160). This is significant, as it greatly effects how a bone breaks and the shape of resultant fractures (e.g. Johnson 1985; Karr & Outram 2012b; Outram 2001).

Additionally, ‘intermediate’ breaks describes those bones that exhibit the types of fractures Outram (e.g. 2001: 60) identified primarily in bones that had undergone some temperature stress but were far from fully desiccated or otherwise structurally compromised. ‘Old’ describes bone that has been mineralised, desiccated, and/or exposed to extreme temperature damage (*cf.* Johnson 1985; Karr & Outram 2012b; Outram 2002). Table 8.8 presents a classification of fracture outlines, following Johnson’s (1985) and Outram’s (2002) breakage characteristics and types. It must also be noted that in the discussion of breakage here, the mere presence of spiral fractures it not taken to mean incontrovertible human activity. It is well established that a variety of other processes, including trampling and carnivore gnawing, can also produce spiral breakage (e.g. Haynes 1983; Johnson 1985).

Table 8.8 Fracture categories and their associated outline types.

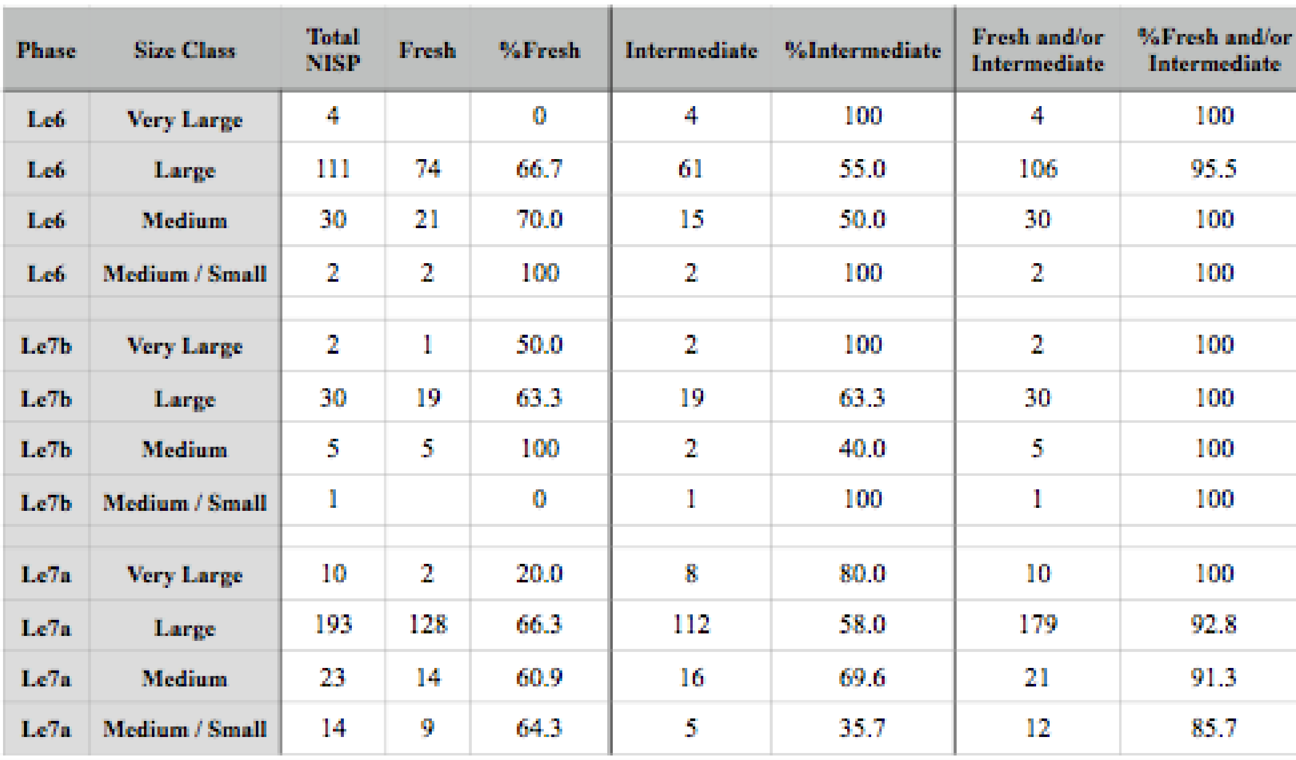


Fresh	Intermediate	Old
Spiral	Smooth Perpendicular	Irregular Perpendicular
Y-Shaped	Longitudinal	Saw-toothed
Triangular		Angular
		Stepped-Columnar

The remainder of section 8.2 will predominantly only use ungulate remains, as both size and structural differences are know to make bones fracture differently (e.g. Johnson 1985). The focus will also be on the long bones, as the greatest body of research treats on the fracturing of these skeletal elements (e.g. Johnson 1985; Outram 2001, 2002).

8.2.1 Fractures Types

Table 8.9 Long bone sample size [NISP], number of specimens with fresh, intermediate, and combined fresh and intermediate breakage, and frequency of these types by size class and phase, ungulates only.



Phase	Size Class	Total NISP	Fresh	%Fresh	Intermediate	%Intermediate	Fresh and/or Intermediate	%Fresh and/or Intermediate
Le6	Very Large	4		0	4	100	4	100
Le6	Large	111	74	66.7	61	55.0	106	95.5
Le6	Medium	30	21	70.0	15	50.0	30	100
Le6	Medium / Small	2	2	100	2	100	2	100
Le7b	Very Large	2	1	50.0	2	100	2	100
Le7b	Large	30	19	63.3	19	63.3	30	100
Le7b	Medium	5	5	100	2	40.0	5	100
Le7b	Medium / Small	1		0	1	100	1	100
Le7a	Very Large	10	2	20.0	8	80.0	10	100
Le7a	Large	193	128	66.3	112	58.0	179	92.8
Le7a	Medium	23	14	60.9	16	69.6	21	91.3
Le7a	Medium / Small	14	9	64.3	5	35.7	12	85.7

- Fresh Fractures

Despite large difference in sample size (Table 8.9), generally there are some similar frequencies of fresh breakage within the different size classes per phase. The largest deviations in fresh breakage generally occur amongst the smallest samples, such as the very large ungulates of Le6 and Le7a as well as the medium and medium/small species of Le6 and Le7b. These divergent values may then be a factor of sample size rather than a true pattern. The smaller size classes also displayed less weathering and carnivore gnawing. Therefore, it is also possible that these pieces from smaller species have simply experienced less taphonomic damage than the other categories. This could mean that their original breakage features remain in more pristine conditions (e.g. the first fractures remain unmodified by later fragmentation) and so they appear with more fresh fractures.

Overall, the frequency of fresh breakage is quite similar between most size classes and is quite high. In other words, the majority of long bone specimens in the assemblages display fresh fracture types. This assertion also holds true when look at the entire mammal sample (Table 8.10).

Table 8.10 Long bone sample size [NISP], number with fresh breakage, and frequency of fresh breakage per phase for all mammals versus only ungulates.

	All Mammals			Ungulates only		
	Le6	Le7b	Le7a	Le6	Le7b	Le7a
Total NISP	173	46	313	147	38	240
Number with Fresh breakage	98	28	160	97	25	153
% with Fresh Breakage	56.6	60.9	51.1	66.0	65.8	63.8

According to figure 8.3, feature type rather than size class has a greater influence on the taphonomy. This complements the idea that features with higher degrees of weathering and gnawing, for instance, are more likely to have skeletal elements that were either broken post-depositionally and/or in conditions in which later breakage was more likely (e.g. structurally weakened through weathering).

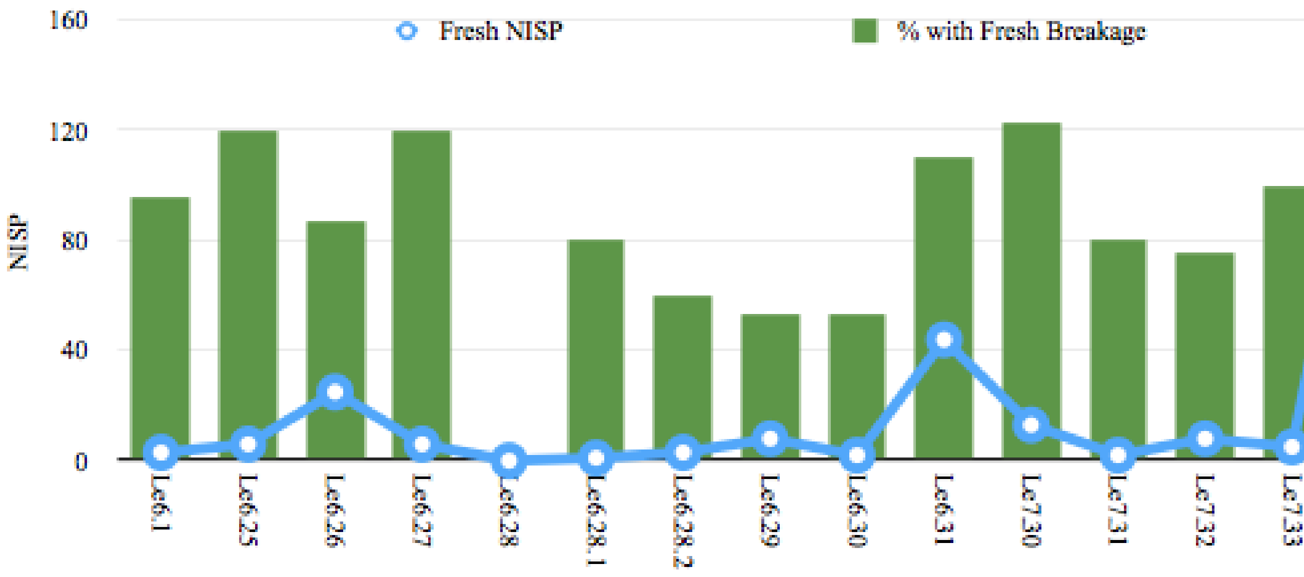


Fig. 8.3 Number [NISP] of long bones with fresh breakage and percent [%NISP] of total long bones with fresh by feature, all mammals.

But where the features are similar (e.g. the un-eroded pits and ash heaps) there are also very similar fracturing results, with most of the sample exhibiting fresh fracture types. This also fits in with the findings of the previous section: although peri-depositional damage was present, it was generally light. This means that these specimens are more likely to display their original fracturing (e.g. that which occurred before or during deposition) than to have been modified subsequently.

- Old Fractures

Yet ‘old’ fracture types are relatively rare, particularly the ’stepped/columnar’ fracturing that is the classic breakage of truly desiccated and mineralised bone (Johnson 1985; Outram 2002). Stepped/columnar features were only identified on nine ungulate specimens in total. The sawtoothed and angular types were slightly more common (Table 8.11). However, these two jagged ‘old’ types may be linked to heating. Outram (2001) reported a similar jaggedness on long bone specimens that had been baked in an oven for five hours or boiled for an hour. While these represent rather extreme treatments, they do show the type of fracturing one may expect with heat. This point will be returned to in the next chapter (9) in the discussion of burning.

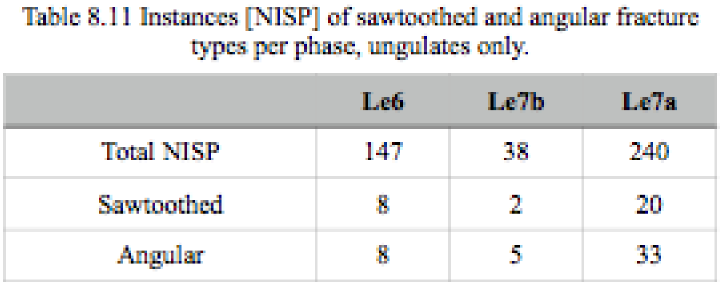


Table 8.11 Instances [NISP] of sawtoothed and angular fracture types per phase, ungulates only.

	Le6	Le7b	Le7a
Total NISP	147	38	240
Sawtoothed	8	2	20
Angular	8	5	33

Therefore, although there are instances of older fracture types, they only account for a small portion of the overall breakage seen on Le6 and Le7 material.

- Intermediate Fractures: Processing Strategies?

Outram (2002) found that even minor amounts of heat damage on fresh bones results in their expressing in more ‘unfresh’ fracture types. Karr and Outram (2012b) also demonstrated that in hot, dry environments (similar to summers in the KNP) bones rapidly lose their fresh fracture characteristics when broken. Even after a single day, they noticed significant changes in the fracture morphology (ibid.). Gifford-González (1993; see also Outram 2002; Stiner et al. 1995) also postulated that cooking will likely affect a ‘fresh’ bone’s fracture response. Specifically, bones with some heat damage display more fractures with longitudinal and transverse outlines (Outram 2002). My fracture categories of smooth perpendicular, longitudinal, and longitudinally split could well fit into these breakage types.

Therefore, if these three types of intermediate fractures (as types of breakage that may have occurred while the bone was still fresh but with some heat damage) are combined with the classically fresh helical outlines, together they account for the vast majority of the breakage seen at Le6 and Le7 (Table 8.9). This pattern is even stronger when viewed with all mammal long bones (Table 8.12).

Table 8.12 Long bone sample size [NISP], number of specimens with fresh, intermediate and combi
intermediate breakage, and frequency of these types by phase in all mammals versus ungulate

		All Mammals			Ungulates only	
	Breakage Types	**Le6**	**Le7b**	**Le7a**	**Le6**	**Le7b**
NISP	**Total Sample**	173	46	313	147	38
	Fresh Breakage	98	28	160	97	25
	Intermediate Breakage	82	24	141	86	25
	Fresh and/or Intermediate	142	38	222	147	40
%NISP	**%Fresh**	56.6	60.9	51.1	66.0	65.8
	%Intermediate	55.8	63.2	58.8	49.7	54.3
	% Fresh and/or Intermediate	96.6	100	92.5	85.0	87.0

Of these types, longitudinal splitting is the most common fracture characteristic recorded in all material from both Le6 and Le7. Triangular breakage is second, and it shares many similarities with longitudinally splitting.

Fig. 8.4 A longitudinally-split metatarsal from Le6.

Splitting a long bone longitudinally, especially when manifest as cleanly as in the majority of Le6 and Le7 long bones (Fig. 8.4), was likely a very common and expedient method for accessing marrow. Both Rixson (1989) and Seetah (2006a: 103) note that cortical bone of long bone shafts is easier to split longitudinally than at a transverse angle. They also add that this is (relatively) easily accomplished by chopping down through an epiphysis, it being cancellous and therefore less dense. If such chopping was indeed in practice at Le6 and Le7, it would certainly account for the great number of longitudinally split elements, not to mention the immense number of epiphysis that have been cleanly and clearly sheared through (e.g. chopped through). This method then ties into the completeness seen above. The longitudinally split shafts do suffer higher incompleteness, but the more complete values of the epiphyses may well be driven by this axial splitting. This may also account for the lower numbers of helical fractures, in addition to a greater number of longitudinal types, as the fractures resulting from a longitudinal chop are likely to be different from those incurred by percussive forces (*cf.* Johnson 1985).

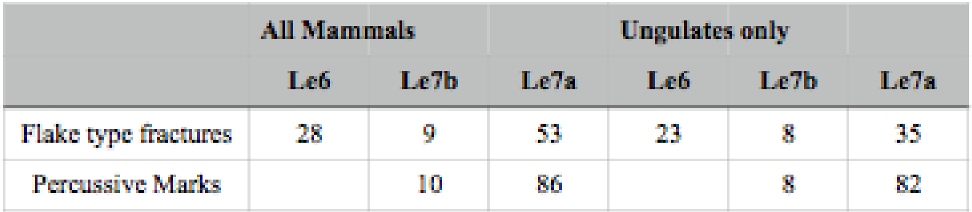
Longitudinal splitting therefore speaks to a very different method of marrow extraction than that which is predominantly discussed in fracturing studies. Often these experimental studies are based on the premise of a hammerstone being used to percussively fracture the shafts (e.g. Johnston 1985; Outram 2001, 2002). This longitudinal chopping for marrow access may thus create an assemblage that partially contradict’s Outram (2001) expectations for in which only marrow was exploited. He predicted that in such an assemblage one would find the following:

- bones left complete or nearly complete
- long bone shaft fragments bearing evidence of percussive damage
- epiphyses deposited whole
- axial elements left complete.

These expectations hold partly true for Le6 and Le7. Where not subject to structural weakness (i.e. vertebral spines and processes), the axial elements and the non-marrow bearing elements (e.g. carpals, tarsals) do show higher completeness (Table 8.6). The deviation comes in two parts: one is in the percussion damage factor and the other is the epiphyses.

In terms of percussive damage, longitudinal chopping would simply not result in such marks as the classic impact scars and percussion flakes. There are some signs of percussive damage nonetheless. This is difficult to quantify as I only began to notice it, and therefore record it, when working on the Le7 material. It is possible that there are missed percussive marks within the Le6 assemblage. However, in spite of this, it seems that only Le7a showed notable percussive damage (Table 8.13). Again, samples sizes are an issues here, so comparing the results between Le7b and Le7a is difficult. Even though Le7a may display more signs of percussive damage than the other two phases, such damage is rare. Sheared-through epiphyses, which account for nearly half of all epiphyses identified (Chapter 10), are substantially more prevalent.

Table 8.13 Number [NISP] of long bones with percussive type damage by phase, for all mammals and ungulates only.



	All Mammals			Ungulates only		
	Le6	Le7b	Le7a	Le6	Le7b	Le7a
Flake type fractures	28	9	53	23	8	35
Percussive Marks		10	86		8	82

Although epiphyses often show signs of having been split or sheared through (Fig. 8.5), they show no great comminution beyond that. Hence, they may not be Outram's (2002) expected wholes, but nor do they truly mark the fragmentation one might have expected with grease processing (e.g. Janzen et al. 2014).

Fig. 8.5 Sheared through humeral epiphyses from Le6 and Le7.

If Outram's (ibid.) predictions are combined with Seetah (2006a: 103) and Rixson's (1989) views of efficient marrow processing, as well as with the completeness and fracture patterns seen at Le6 and Le7, it does seem marrow may have been the main focus at these sites. While some in-bone fat was exploited, it cannot be said that fat use was 'intensive' in the sense of all possible fats being used (i.e. diversified fat exploitation). The 'easy' marrow sources (e.g. long bones) were utilised, but there are no signs of a more concerted nor systemic effort to extract skeletal fats.

8.3 Summary

At Le6 and Le7, it appears that the majority of the fracturing likely derives from human actions, specifically fat extraction. Rather than wholesale fat utilisation, only marrow seems to have been a particular target, as is seen both within the completeness and fracture results.

In terms of completeness, there may be slightly higher completeness within the smaller taxa and non-ungulates, but small samples prevent more confident interpretation. Within the other size classes, and particularly the ungulates, there is a great deal of similarity (e.g. Fig. 8.2). The biggest differences in fragmentation do not seem bound by size or type of animal. This may serve to further bolster the findings of Chapter 6: if density-mediated attrition had been a significant force one may have expected notably higher attrition within the smaller species at Le6 and Le7. Instead, the type of skeletal element (and possibly their associated bone fats) seems to have a markedly stronger relationship with breakage.

For the fracturing, although classic fresh fracture types are relatively common, aspects such as clean longitudinal splitting characterise the bulk of the breakage at Le6 and Le7. These fracturing patterns again point to marrow extraction as well as the specific methods used (i.e. longitudinal splitting, likely chop-assisted). These methods, and their associated breakage, also do not seem bound by species type, feature, or phase. Indeed, similarities within completeness and fracturing of element types across size classes (excepting perhaps the smallest taxa) may point to somewhat standardised practices in terms of fat extraction.

Adding to this are the oft-repeated breakage patterns, which also point to a certain repetition in practice. Standardised, repetitive methods begin to speak to elements of skill, practice, and possible speed and efficiency, which will be discussed in the subsequent sections and Chapter 12.

Altogether, I believe that these breakage patterns are indicative of selective fat use, with specific elements and types of in-bone fat regularly targeted and other sources left un-exploited. Fragmentation and fracturing are one part of the processing pathway. The next stage, incorporating both burning (Chapter 9) and butchery (10), will continue to explore these same questions through different taphonomic signals.

Chapters 9 and 10: Stage 4 - Burning & Butchery

Although this stage will be split into two chapters, burning and butchery remain in the same stage as they both may record parts of the processing and preparation of food. They may also be greatly influenced by specific preparation choices: is the meat to be filleted from the bone then roasted or are the still meat-laden bones to be broken up and boiled together? Is the animal being eaten now or must at least parts of it be preserved for future consumption? What are the tools at hand for butchery and the cooking itself?

How an animal is to be cooked can greatly influence processing strategies (e.g. Gifford-González 1993; Yellen 1991a). This in turn will then effect the resultant butchery, breakage, and burning damage left on the skeletal remains. Of course, the size of the animal, intent behind its usage (e.g. for its meat, skin, or so forth), the potential need to preserve and/or transport it, and the tools at hand for processing (e.g. type of knives, size of ceramic vessels) can also greatly affect the methods used in processing (e.g. Friesen & Stewart 2013; González 1993; Henrikson 2003; Kent 1993; Seetah 2006a: 10,91, 2008; Yellen 1991a). All this will explored and discussed in the following chapters, first with burning (9), then butchery (10).

Chapter 9: Burning

Similar to the previous chapter (8), burning in the assemblage may not have wholly stemmed from human actions. Burning can occur during cooking (e.g. Gifford-González 1989), but bones may also be burnt through disposal practices or if used as fuel (e.g. Bennett 1999; Castel et al. 2006; Clark & Ligouis 2010; Costamagno et al. 2005). Burning may also be incidental. It has been shown experimentally that even subsurface (e.g. wholly buried) bones can be burnt if fires are built on top of them (e.g. Asmussen 2009; Bennett 1999; Lyman 1994: 384; Stiner et al. 1995).

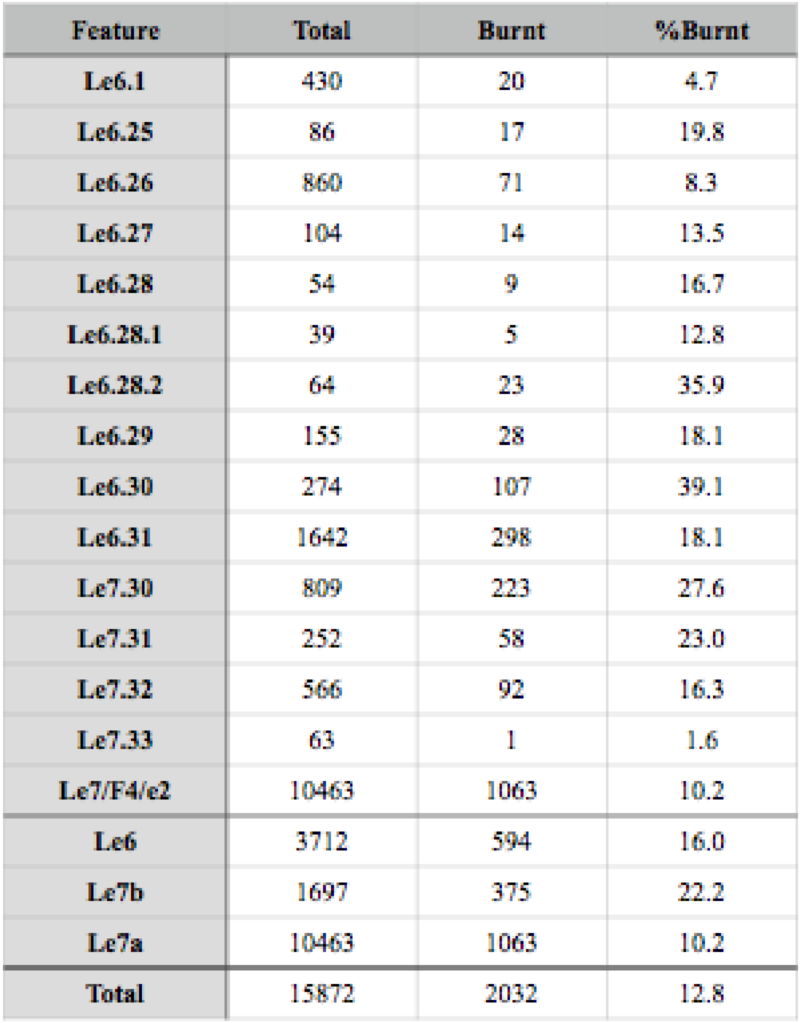
In fact, some studies suggest that charring is so rare during either boiling or roasting, that the burning seen on skeletal material is a poor indicator of cooking (Kent 1993). In general, it appears that peri- or post-depositional processes are more likely to account for the macroscopic burning visible on bones (e.g. Asmussen 2009; Bennett 1999; Kent 1993). It may be possible to distinguish certain cooking methods (e.g. Koon et al. 2010) and more precise details on temperature through high powered microscopic techniques (e.g. Nicholson 1993; Shipman et al. 1984).

However, here I am relying on macroscopic colour changes only. In this subsection I will discuss the types and severity of burning present at Le6 and Le7 and the possible interpretations thereof. Firstly, this will be carried out on a layer and feature-level basis to discuss possible disposal methods, other potential causes of incidental burning, and overall trends in burning (9.1). A few potential cooking methods, such as joint roasting, will then be discussed between phase, taxa, and skeletal regions to explore specific processing patterns (9.2). The potential taphonomic impact of burning on the overall assemblage will be discussed in the summary of this section (9.3).

Both identifiable and non-identifiable material will be used to discuss burning. Although bones and teeth are somewhat similar in their response to heat (Shipman et al. 1984), I only use bones below.

9.1 Overall Burning

Table 9.1 Bones burnt [NISP] per feature and phase, combined identifiable and non-identifiable material.



Feature	Total	Burnt	%Burnt
Le6.1	430	20	4.7
Le6.25	86	17	19.8
Le6.26	860	71	8.3
Le6.27	104	14	13.5
Le6.28	54	9	16.7
Le6.28.1	39	5	12.8
Le6.28.2	64	23	35.9
Le6.29	155	28	18.1
Le6.30	274	107	39.1
Le6.31	1642	298	18.1
Le7.30	809	223	27.6
Le7.31	252	58	23.0
Le7.32	566	92	16.3
Le7.33	63	1	1.6
Le7/F4/e2	10463	1063	10.2
Le6	3712	594	16.0
Le7b	1697	375	22.2
Le7a	10463	1063	10.2
Total	15872	2032	12.8

At the broadest grouping (burnt and unburnt), the majority of Le6 and Le7 bones are unburnt (Table 9.1). Certain features show higher levels of burning, but these are the smaller samples from these sites (e.g. Le6.28.2 and Le6.30). Given their size, these more highly burnt features have little impact on the phase-level results, which remain quite low.

In multi-layer features, the layers labelled “surface” display burning rates that are not notably higher than the others in the feature (Fig. 9.1). Indeed, the various layers within a feature are very similar to one another. This again supports the idea that features are single deposition events, with very similar material throughout the deposit (sections 2.3.1 and 4.1).

The inter-layer similarity also suggests that the burning present is unlikely to only stem from surface events, be they veld fires (e.g. Lyman 1994: 388) or hot ash poured over the pits and heaps. Even if there had been intentional burning of the pit fill, possibly as part of site maintenance or cleaning (*cf.* D. Orton 2008: 259-260), one might expect higher levels of burning. Instead, the relatively few burnt specimens are evidently spread throughout the features. It is therefore possible that this represents material that was burnt elsewhere before being mixed in with the rest of deposit. To truly address such aspects, having access to excavation notes, stratigraphic information, and greater context detail in general would have been ideal. Notes about concentrations of burnt material, lenses of notable charcoal deposits, or that the material was indeed recovered in such a mixed state would have been helpful. However, with the lack of such information, the nature of the material does seem to point to secondary deposits of burnt material. The features that are likely surface concentrations (e.g. Le6.28.2) may have incurred additional burning post-deposition, but on the whole the rates of burning are low.

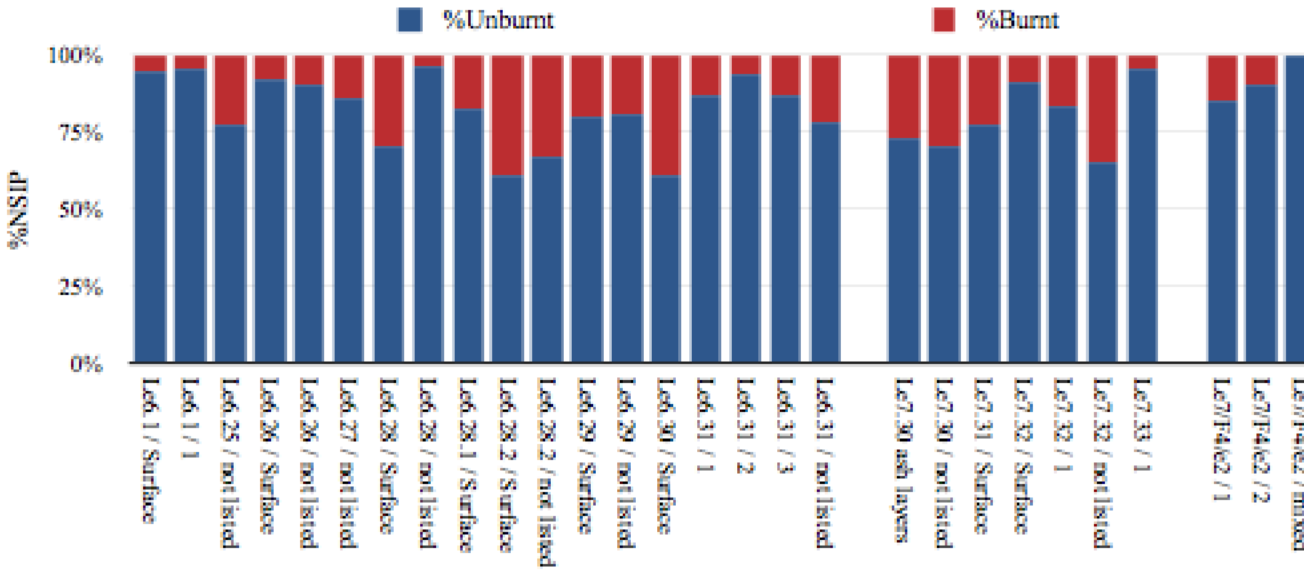


Fig. 9.1 Burning [%NISP] per layer and feature, combined identifiable and non-identifiable bones.

9.1.1 Overall Severity

Burning colour was recorded to track the temperatures to which these bones had been exposed and mark the severity of damage upon them. The colour of a burnt bone has long been known to relate to the temperature at which it was burned. Brown and black mark the lowest temperatures, while grey, white, and blue progressively denote higher temperatures (e.g. Lyman 1994: 385**,** Nicholson 1993; Shipman et al. 1984).

In terms of the varying features and layers, there are no obvious patterns within the colours (Fig. 9.2)[8]. The lower temperature colours are more common than those associated with higher temperatures (blue is the rarest), but none are particularly common. Apart from some of the smallest features, such as Le6.28.2 (Table 9.1), none of the burning categories are common. At the phase-level, the separate colours rarely appear on more than five percent of all bones present.

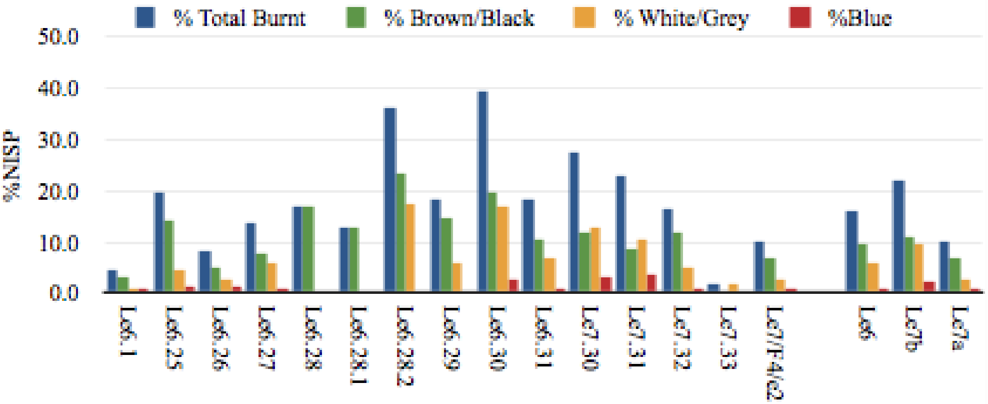


Fig. 9.2 Percent [%NISP] of total bones burnt and per burn colour class by feature and phase, combined identifiable and non-identifiable material.

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[8] As specimens may have more than one burning colour present (i.e. a long bone with one epiphysis burnt blue but with only patches of brown and black burning at the other end of the shaft) at 'Total Burnt' category was included to avoid portraying an inflated impression of the number of specimens actually affected. This only applies for this figure, in all others the separate categories are fully discrete.

Indeed, when considering the identifiable material alone and grouping the burnt material by overall severity[9], there is also usually very little burning and little severe burning (Fig. 9.3).

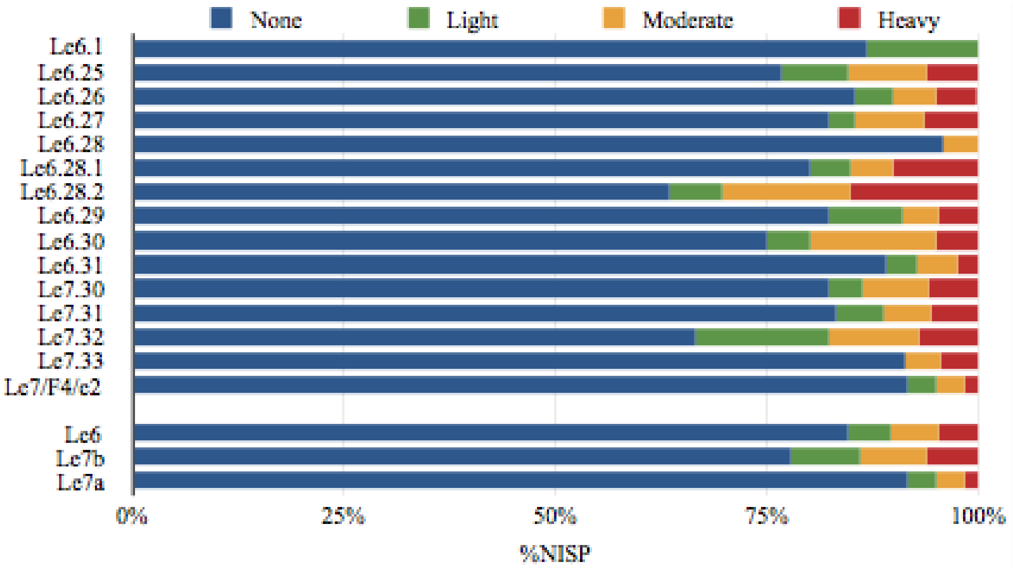

Fig. 9.3 Burning severity [%NISP] on identifiable bones per feature and phase.

Thus, while there is some evidence of both low and high temperature burning in the identifiable and non-identifiable material, neither are common. In terms of disposal practices, this may indicate that bones were occasionally thrown in to the fire, covered in hot ashes, or otherwise affected, but such activities do not appear to be consistent. This sporadic burning instead seems indicative of more incidental or occasional burning of skeletal material.

9.1.2 Differential Burning: Taxa & Size Groupings

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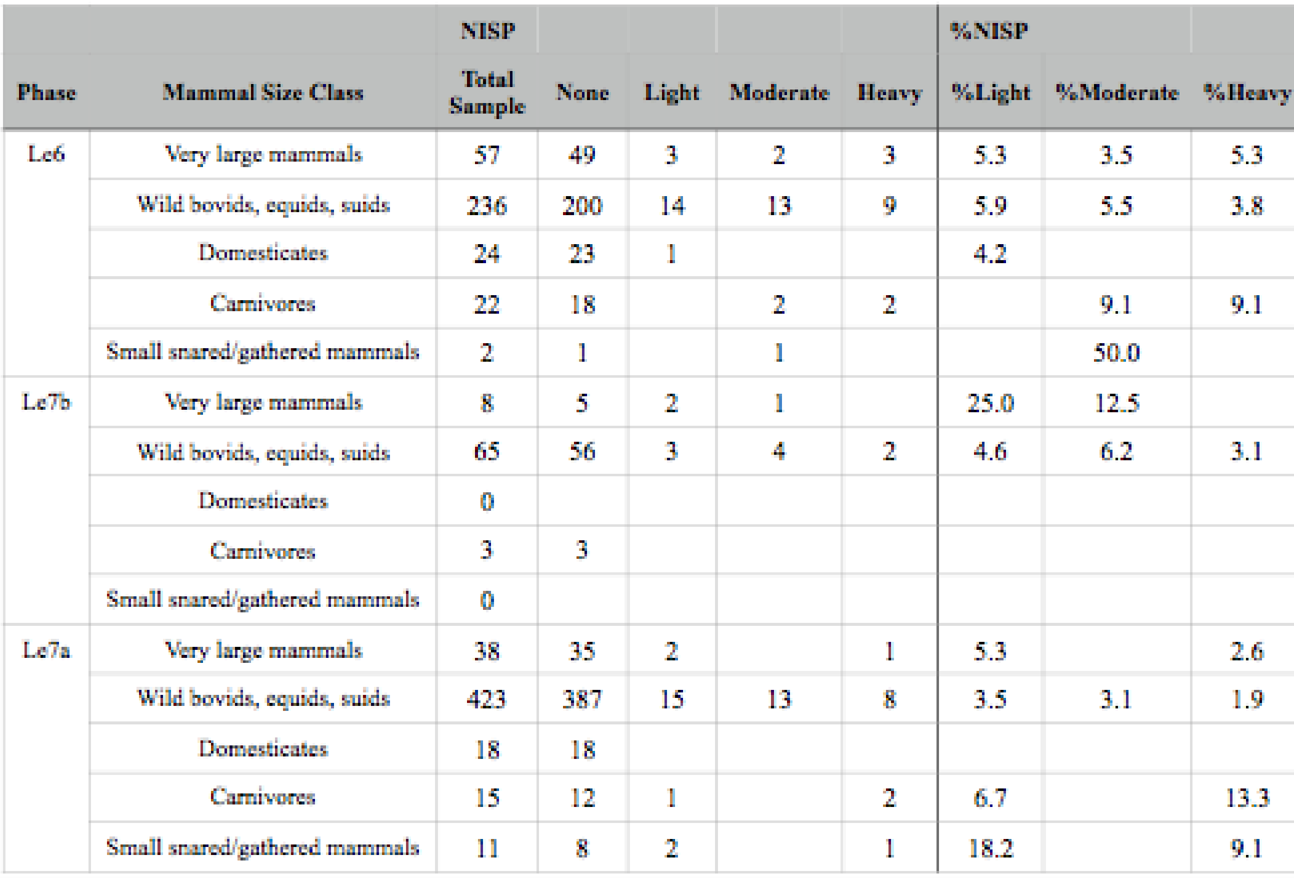
[9] See section 4.4.2 for descriptions of the burning severity categories.

Table 9.2 Number of bones [NISP] and frequency [%NISP] per burning class by phase and size class, identifiable mammal bones only.

		NISP					%NISP		
Phase	Mammal Size Class	Total Sample	None	Light	Moderate	Heavy	%Light	%Moderate	%Heavy
Le6	Very Large	57	49	3	2	3	5.3	3.5	5.3
	Large/Very Large	30	25	2	2	1	6.7	6.7	3.3
	Large	657	552	33	42	30	5.0	6.4	4.6
	Medium/Large	33	29		2	2		6.1	6.1
	Medium	134	117	8	4	5	6.0	3.0	3.7
	Medium/Small	13	7	3	2	1	23.1	15.4	7.7
	Small	4	2		1	1		25.0	25.0
Le7b	Very Large	8	5	2	1		25.0	12.5	
	Large/Very Large	8	8						
	Large	105	82	9	8	6	8.6	7.6	5.7
	Medium/Large	7	5	1		1	14.3		14.3
	Medium	14	14						
	Medium/Small	3	1		2			66.7	
	Small	4	1		1	2		25.0	50.0
Le7a	Very Large	38	35	2		1	5.3		2.6
	Large/Very Large	85	80	3	1	1	3.5	1.2	1.2
	Large	894	824	28	30	12	3.1	3.4	1.3
	Medium/Large	66	60	3	2	1	4.5	3.0	1.5
	Medium	109	99	3	6	1	2.8	5.5	0.9
	Medium/Small	68	57	4	2	5	5.9	2.9	7.4
	Small	19	15	3		1	15.8		5.3

Within the mammal size classes, burning is only slightly more common where samples are very small (Table 9.2), a similar pattern seen when assessed at the features level. Significantly, none of the severity categories reach double digits in samples bigger than n=20. Therefore, it is unclear if the smaller taxa (small, medium/small) really do display higher burning rates or if this is due to sample size. Overall, the different size classes display very similar burning rates. The burning severity within the various taxa groups is virtually the same (Table 9.3). That is to say, at the feature and phase level, both burning and severe burning are rare except where samples are small.

Table 9.3 Number of bones [NISP] and frequency [%NISP] per burning class by phase and taxa group, identifiable bone only.



		NISP					%NISP		
Phase	Mammal Size Class	Total Sample	None	Light	Moderate	Heavy	%Light	%Moderate	%Heavy
Le6	Very large mammals	57	49	3	2	3	5.3	3.5	5.3
	Wild bovids, equids, suids	236	200	14	13	9	5.9	5.5	3.8
	Domesticates	24	23	1			4.2		
	Carnivores	22	18		2	2		9.1	9.1
	Small snared/gathered mammals	2	1		1			50.0	
Le7b	Very large mammals	8	5	2	1		25.0	12.5	
	Wild bovids, equids, suids	65	56	3	4	2	4.6	6.2	3.1
	Domesticates	0							
	Carnivores	3	3						
	Small snared/gathered mammals	0							
Le7a	Very large mammals	38	35	2		1	5.3		2.6
	Wild bovids, equids, suids	423	387	15	13	8	3.5	3.1	1.9
	Domesticates	18	18						
	Carnivores	15	12	1		2	6.7		13.3
	Small snared/gathered mammals	11	8	2		1	18.2		9.1

There may be slightly more frequent and severe burning on the very large mammals, which could point to increased roasting of these very large species. Roasting may have been easier than trying to break these large bones down into ‘pot-sized’ pieces. Alternately, there appears to be less burning on domesticates than wild taxa. This will be discussed in the cooking section below (9.2.1).

On the whole, there is a great deal of similarity between the taxa groups. This is also true when the different types of taxa within these groups are examined. For example, there were no appreciable differences in the burning of migratory versus territorial wild ungulates nor between the most populous ungulates species.

9.1.3 Differential Burning: Skeletal Regions

Given the sample size issues, I only consider the burning on skeletal elements at the phase level. Following the region descriptions in Table 9.4, Table 9.5 uses simplified skeletal regions to allow for the incorporation of non-identifiable material.

Table 9.4 Simplified skeletal regions (*includes some non-identifiable categories).

Head	Axial	Limb	Feet
Skull*	Vertebrae*	Long bones	Phalanges
Mandible	Pelvis	Bone Flakes*	Sesamoid
Hyoid	Rib*	Carpals	
		Tarsals	
		Astragalus	
		Calcaneum	
		Os malleolare	
		Patella	

In terms of broad, overall burning, there is a great deal of similarity between both the phases and the different skeletal regions. There may be slightly less burning present amongst the Le7a material, which supports the trend of the larger samples having the least burning evident.

Within Le7a, burning tends to be more common on the appendicular portions of the skeleton (i.e. limbs and feet). In Le7b, the axial elements and limbs show more comparable rates of burning, while in Le6 both the axial and appendicular elements are remarkable similar. Across all three phases, the head regions are the least burnt. However, there are only a few percent differences between the regions. No particular type of element stands out as dramatically more burnt. The level of similarity between the skeletal types suggests that no element was used or disposed of in a distinct way.

Table 9.5 Specimens [NISP] burnt per skeletal region by phase, bones only (*includes non-identifiable material).

	Le6				Le7b				Le7a			
	Head*	**Axial***	**Limb***	**Feet**	**Head***	**Axial***	**Limb***	**Feet**	**Head***	**Axial***	**Limb***	**Feet**
Total NISP	146	398	973	259	51	59	404	30	688	936	1904	223
Total Burnt	14	74	173	49	8	13	108	5	22	75	223	31
%Burnt	9.6	18.6	17.8	18.9	15.7	22.0	26.7	16.7	3.2	8.0	11.7	13.9

Assessing only the overall mammal sample may mask patterns within the specific types of taxa.

As in the previous section, there is much similarity between the entire mammal sample and that of the ungulates only (Fig. 9.4). This is not surprising, as ungulates make up the majority of mammal sample. The non-ungulates appear somewhat different, being more frequently and severely burnt. But again, smaller samples complicate interpretation, as the skeletal regions in this group only possess between one and eight specimens apiece. As non-ungulates may have been treated differently in terms of burning, I will only use ungulate data for the rest of this section, unless noted otherwise.

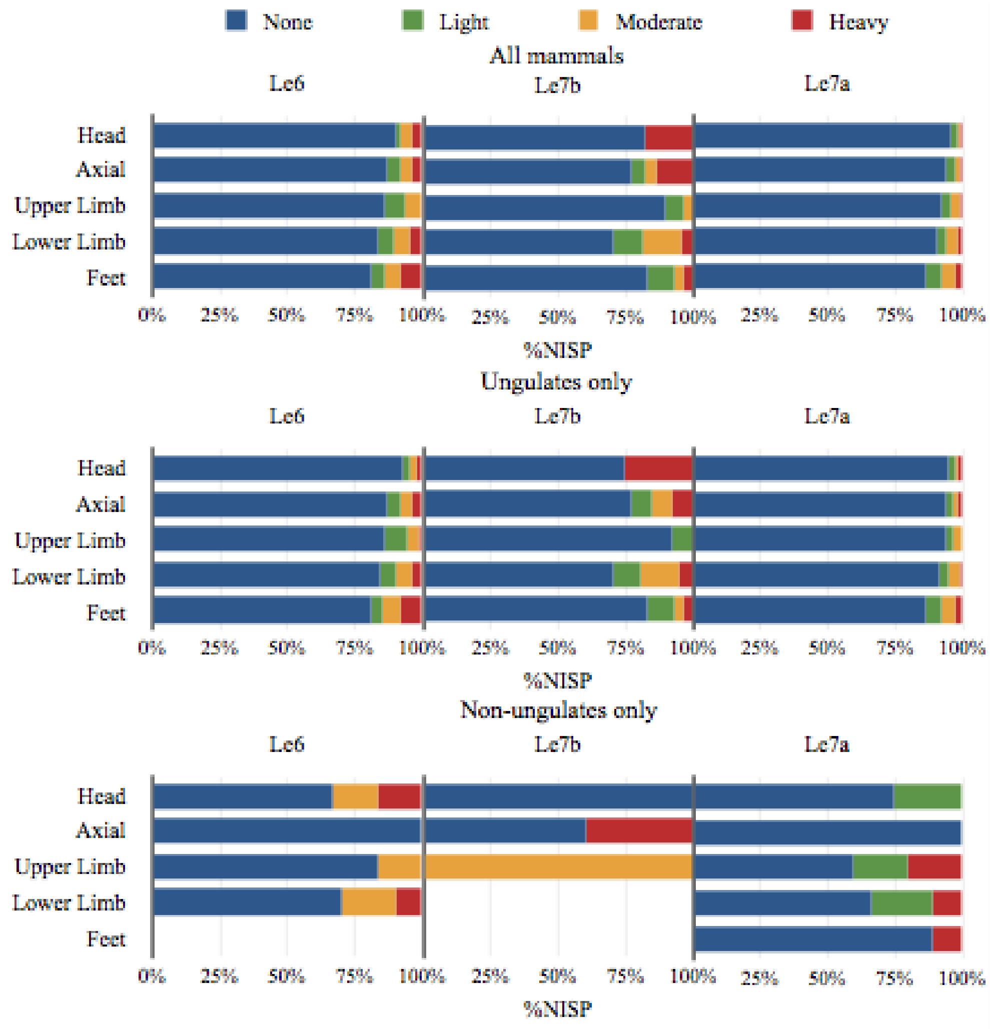


Fig. 9.4 Severity of burning [%NISP] within all mammals, ungulates, and non-ungulates per simplified skeletal region by phase, identifiable bones only.

In the ungulate burning (Fig. 9.4) there may be slightly increased burning on appendicular elements (apart from Le7b, the smallest sample). This is also seen in the ungulate skeletal regions by size class (Table 9.6, Fig. 9.5).

Apart from the small samples[10] (e.g. medium/small ungulates and Le7b), the feet and lower limbs show some of the highest rates of burning across the phases and size classes. Yes,

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[10] Although excluded here because of small sample sizes, the 'large/very large' and 'medium/large' categories generally displayed similar patterns to those of the large species.

the axial elements of the large ungulates in Le6 and Le7b display comparable values, but this region is not as consistently burnt across the groups. Contrary to the previous tables, where often the larger the sample was the less frequent the burning, here the limbs and feet boast some of the largest numbers yet still display the some of the most frequent burning. This may be indicative of specific cooking techniques.

Table 9.6 Severity of burning [NISP] on identifiable bones by skeletal region for various ungulate size classes.

	Le6					Le7b					Le7a				
Very Large	**Head**	**Axial**	**Upper Limb**	**Lower Limb**	**Feet**	**Head**	**Axial**	**Upper Limb**	**Lower Limb**	**Feet**	**Head**	**Axial**	**Upper Limb**	**Lower Limb**	**Feet**
None		11	2	22	14		2	1	2		1	10	7	12	4
Light		1	1	1					2			1			1
Moderate	1				1				1						
Heavy					3										
Total	1	12	3	23	18		2	1	5		1	11	7	12	5
Large															
None	24	45	78	234	148	5	7	15	34	21	90	141	116	255	157
Light	1	3	8	15	6		1	2	3	3	2	3	1	12	7
Moderate		2	5	19	14		1		6	1	2	3	4	10	8
Heavy		3		11	15	1	1		3	1	2	2	1	2	5
Total	25	53	91	279	183	6	10	17	46	26	96	149	122	279	177
Medium															
None	7	7	12	45	33		1	3	3	4	5	10	13	39	11
Light				5	3										1
Moderate				2										2	1
Heav				1	2										1
Total															14
Medi															
Non															6
Ligh															2
Mod															1
Heav															
Total															9

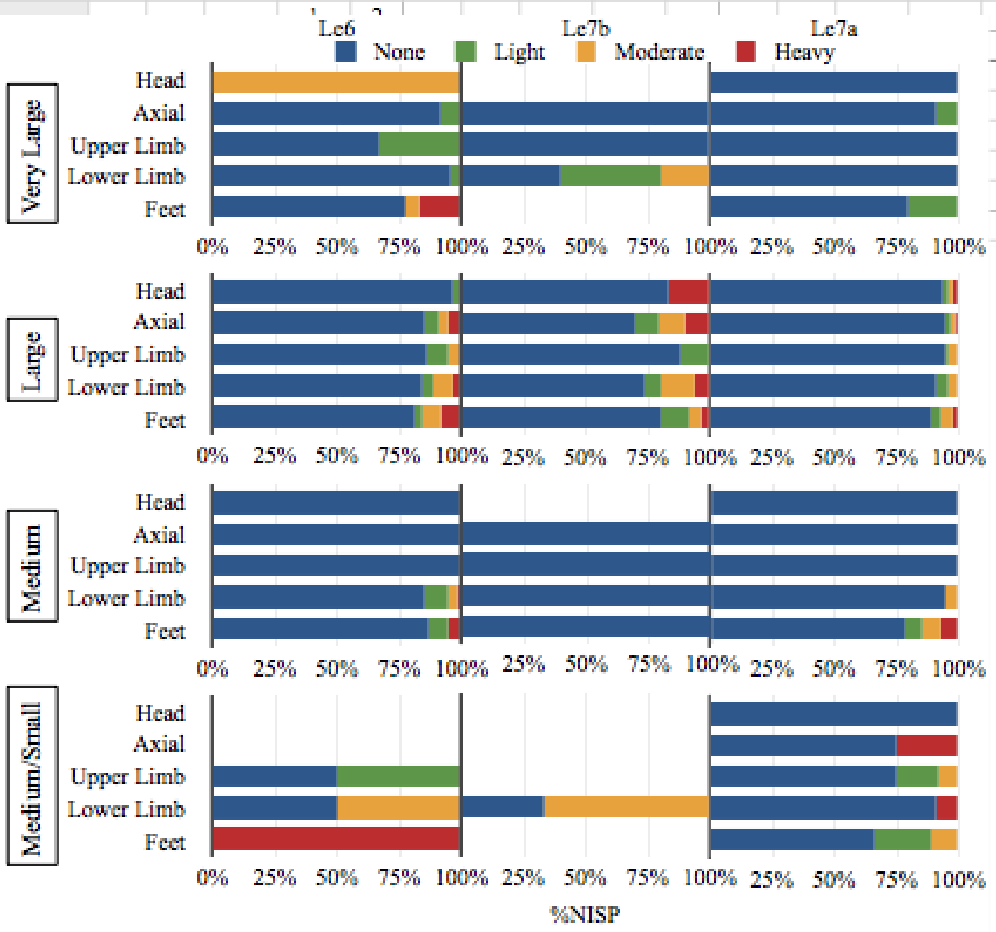


Fig. 9.5 Severity of burning [%NISP] within the skeletal regions per ungulate size class by phase, identifiable bones only.

9.2 Potential Cooking Methods

Roasting is one of the most common cooking methods examined in taphonomic discussions of burning (e.g. Gifford-González 1989; Koon et al. 2010; Russell 2011: 389; Seetah 2008). It is also one of the oldest methods used to cook meat (e.g. Shipman et al. 1984). Crucial for its identification archaeologically, roasting may also leave distinctive traces of burning. Specifically, roasting should theoretically result in uneven burning from charring on the exposed portions of a bone, such as the joint ends of a limb (e.g. Asmussen 2009; Gifford-González 1989). Therefore, roasting could potentially be identified through the burning present on long bone shafts versus epiphyses and joints.

9.2.1 Evidence of Roasting: Joints Versus Shafts

To address potential roasting, I use location (zone) specific burning data. Following section 4.2.6, I grouped limb data into joint, long bone epiphyses, and shafts categories. I have also added feet (phalanges and sesamoids) here, as they too may show more burning when limbs are roasted (*cf.* D. Orton 2008: 262).

Where the samples are of comparable sizes (Table 9.7), there are similar patterns across the various ungulate size classes (e.g. in Le7a) (Fig. 9.6). Specifically, within the large and medium taxa of Le6 and Le7a, there does seem to be slightly more frequent burning on the joints, feet, and epiphyses than on the shafts. Although this type of pattern is uncommon (in that there is so little burning in general), it does suggest that meat was roasted on the bone occasionally. The higher incidence of burning noted on the smallest ungulates in Le6 and Le7b is probably due to sample size.

Within the various types of ungulates, the very large mammals results were identical to those in the 'very large' category of Table 9.7 (as they are, in fact, precisely the same sample). The wild bovid, equid, and suid taxa burning rates were also indistinguishable from of the large ungulates in Fig. 9.6: the proportions of burning within the different phases and limb portions were the same. As the vast majority of taxa in this grouping at Le6 and Le7 are large ungulates, and vice versa, this similarity is as expected. The domesticate remains were distinctly unburnt, with only a single joint bone displaying light burning. This may point to

Table 9.7 Severity of burning [NISP] on limb portions for ungulate size classes by phase, identifiable bones only.

	Le6				Le7b				Le7a			
Very Large	**Shaft**	**Epiphysis**	**Joint**	**Feet**	**Shaft**	**Epiphysis**	**Joint**	**Feet**	**Shaft**	**Epiphysis**	**Joint**	**Feet**
None	3	6	11	14			1		10	5	4	4
Light	1						1					1
Moderate				1					1			
Heavy				3								
Total	4	6	1	18			2		11	5	4	5
Large												
None	107	134	118	148	26	28	10	21	184	197	59	157
Light	6	9	10	6	2	1		3	2	7	5	7
Moderate	3	12	12	14	2	3	1	1	3	8	6	8
Heavy		1	10	15			3	1		2	1	5
Total	116	156	150	183	30	32	14	26	189	214	71	177
Medium												
None	27	26	17	33	4	4	1	4	26	14	10	11
Light	1	2	3	3								1
Moderate			1						2	2		1
Heavy		1		2								1
Total	28	29	21	38	4	4	1	4	28	16	10	14
Medium / Small												
None	1	1	1			1			14	19	4	6
Light		1								1		2
Moderate	1	1			1		1			1		1
Heavy									1		1	1
Total	2	3	1		1	1	1		15	21	5	10

boiling, or their bones being de-fleshed before cooking. The small domesticate samples may also account for this pattern (with 27 NISP for Le6 and 14 NISP for Le7a).

In terms of specific species, the burning appears largely random, fluctuating in severity between portion, phase, and taxa. The clearest possible 'roasting' pattern is seen among the zebra and wildebeest remains (Fig. 9.7). Beyond these two taxa there are no regular expressions of this at the species level. Zebra and wildebeest are the most populous species in

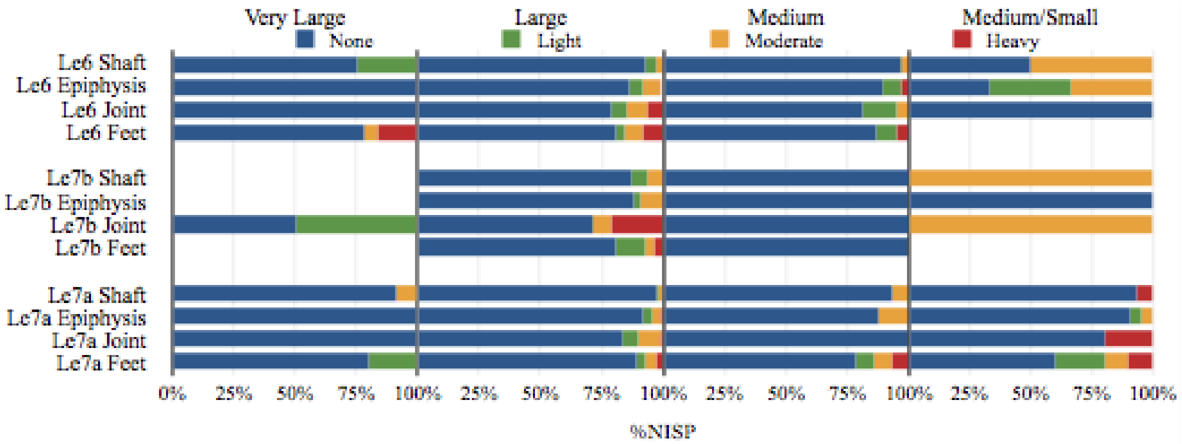


Fig. 9.6 Severity of burning [%NISP] on limb portions per ungulate size class and phase.

the 'wild bovid, equids, and suids' group, which explains why that group shows the clearest signs of burning on the joints and feet. Zebra and wildebeest are the likely drivers of the patterning seen in that group, as well as amongst the large ungulates (Fig. 9.6).

If this burning is evidence of zebra and wildebeest meat roasting, it may be due to logistics. Hunting these gregarious animals may have meant that multiple individuals were brought back to camp at once. The processing of those large animals would take some time (*cf.* Kent 1993). The roasting of a few limbs could have been a less time-intensive method of preparing food while doing such work (e.g. Kent 1993).

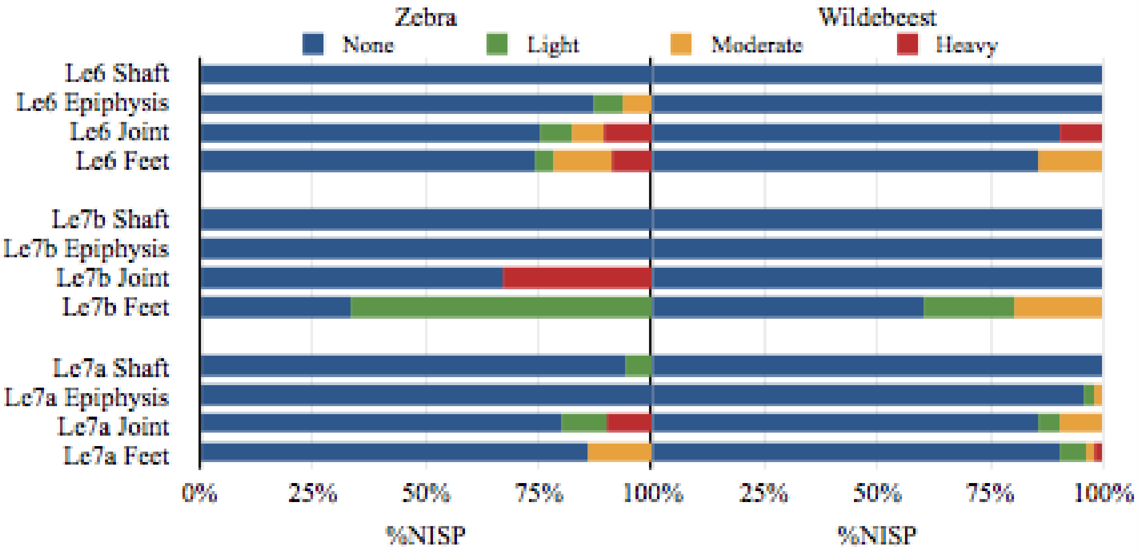
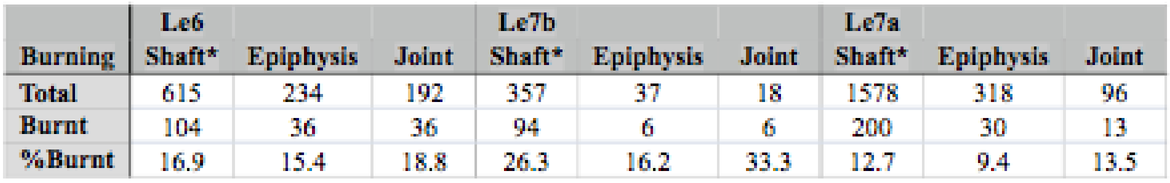


Fig. 9.7 Severity of burning [%NISP] on limb portions for zebra and wildebeest by phase.

9.2.2 Missing Shafts: Non-identifiable Bone Flakes

Within the above categories there is still a key source of data missing: the bone flakes. Chapter 8 clearly shows that the long bone shafts at these sites are more likely to be fragmented than other elements and limb portions (e.g. Fig. 8.3). This means that a greater portion of the shafts are likely to be consigned to the non-identifiable categories. However, these bone flakes may still retain traces of the cooking methods employed at Le6 and Le7. To address this, Table 9.8 uses all mammalian bones to allow for the inclusion of the indeterminate bone flakes within the 'shaft' category.

Table 9.8 Frequency of burning [NISP] in joint, long bone epiphysis and shaft* portions by phase, all mammal bones (*includes non-identifable bone flakes).



	Le6			Le7b			Le7a		
Burning	**Shaft***	**Epiphysis**	**Joint**	**Shaft***	**Epiphysis**	**Joint**	**Shaft***	**Epiphysis**	**Joint**
Total	615	234	192	357	37	18	1578	318	96
Burnt	104	36	36	94	6	6	200	30	13
%Burnt	16.9	15.4	18.8	26.3	16.2	33.3	12.7	9.4	13.5

When these indeterminate shaft fragments are included, the differences between the different portions largely disappear (apart from Le7b - the smallest sample). This may mean that the higher level of burning on joints and epiphyses relative to shafts seen above is an artefact of later fracturing and fragmentation.

Alternatively, these patterns could also be the remnants of multiple cooking methods. For example, the burning of Le6 and Le7 material is rarely uniform across a specimen. A few elements were wholly burnt, but more often the burning was patchy. Patchy burning on long bone shafts may have resulted from these bones being warmed over or near a fire to facilitate marrow extraction after the flesh has been removed (e.g. Gifford-González 1989; Kent 1993; Orton 2012). However, Kent (1993) notes that even bones placed in hot ashes (for the warming of marrow) rarely display any notable colour changes. She also found that even when roasting was the main cooking method, bones usually show no signs of charring (ibid.). These two observations may account for the relatively low incidence of burning at Le6 and Le7.

9.3 Summary

In general, at Le6 and Le7 the frequency and severity of burning on both identifiable and non-identifiable material bones is low. It is known that burning may affect fragmentation rates. Stiner et al. (1995) reported that burning can directly contribute to higher fragmentation, particularly when combined with other taphonomic forces such as trampling. The little burning present, and distinctly rare high temperature damage, on the Le6 and Le7 material may thus have prevented subsequent breakage. This then likely contributed to the greater preservation seen in these assemblages. Larger pieces are also more likely to remain robust than thoroughly comminuted fragments. This means the lower levels of fracturing and intentional breakage (section 8.3) also contributed to the preservation, as did the lower levels of severe weathering and gnawing. Once again this illustrates the highly complex and inter-connected nature of taphonomic forces.

Indeed, processing choices can also influence later carnivore gnawing. Elements that have been stripped of meat and fat (through butchery, breakage, and/or boiling) may become less appealing to scavenging carnivores (e.g. Bunn et al. 1988; Russell 2011: 389; Yellen 1991b). This in turn can affect both the overall prevalence of gnawing as well as the final survival of certain skeletal elements at these Letaba sites. I return to this point in Chapter 11. However, Russell (2011: 389) mentions that roasted bones are more likely to be gnawed than boiled ones, as roasting does not strip the bone of all fats. This may account for why there is still some gnawing present on, in particular, the long bone epiphyses at Le6 and Le7 (e.g. Table 7.10).

In general, the burning in and of itself is unlikely to have significantly altered the composition of these assemblages. The actual impact of burning on fragmentation could be further verified by comparing the correlation between burning and fragment size (e.g. Orton 2012). As that would require re-measurement of fragment size, this remains for a future project. Suffice to say that, as burning is rare, it likely had a negligible affect on the fragmentation seen here, apart from the breakage linked to specific activities such as warming bones for marrow extraction.

Burning patterns may also yield hints about both the processing choices and deposition habits practiced at these two sites. While cooking practices do not always yield macroscopic colour changes (e.g. Kent 1993), some of the burning evident on the Le6 and Le7 material may stem from roasting and/or marrow-warming. However, it does not appear that either of these practices were particularly common, given the scarcity of burnt material. Although there is little higher temperature burning present, it may be the result of bones occasionally being thrown into the fire post-processing, or from hot ash being poured atop the pits and heaps into which they were deposited.

Chapter 10: Butchery

Chapter 10 is the first that deals with taphonomic marks that are indisputably created by humans. Unlike burning, which may have been incidental, butchery marks are only induced by intentional human action. It is still possible that these marks could have been affected by subsequent taphonomic events (Phoca-Cosmetatou 2005). However, as shown in Chapters 6 through 8, it is unlikely that butchery marks on this material have significantly altered by aspects such as weathering and density-mediated attrition. This allows for a more in-depth study of butchery patterns than is usually possible on more poorly preserved EIA assemblages.

While the taphonomic agent might be certain, butchery (and marks produced through it) may stem from a huge variety of activities. These range from the first killing stroke all the way through initial evisceration and dismemberment, partial jointing and/or portioning, de-fleshing, and even specific product retrieval (e.g. Lyman 1994: 295; Seetah 2006a: 130-135). This last point refers to such activities as skinning, chop-assisted breakage for marrow, and retrieving sinews (e.g. Lyman 1994: 295; Reitz & Wing 1999: 242; Seetah 2006a: 130,135). As these lists show, there are many possibilities for why butchery may be carried out and it is this intent behind such choices that should be emphasised in a socially-focussed butchery analysis.

In terms of identification, these processes and actions often result in a similar suite of marks (i.e. cuts and chops). Therefore, it is the nature of these marks that must be considered, and should be examined in conjunction with location and the (likely) intended function of such an action (e.g. Seetah 2006a: 94-100). Fine cuts on a phalanx speak to a very different action and likely activity than deep chops shearing through rib heads, or a long shallow scoop tracing up the shaft of tibia. Beyond the butcher’s specific choices, all the different facets of butchery are also influenced by a host of other variables. The size and specific shape of a species’ skeletal structure may be two of the most influential factors (e.g. Badenhorst 2012; Lupo 2006; Lyman 1994: 296; Seetah 2008).

Thus, section 10.1 begins by examining the overall appearance of the various mark types at Le6 and Le7 before examining the butchery by taxa and size class. Section 10.2 then links the various butchery marks to their skeletal locations to identify varying processing strategies within the different parts of the carcass. This shifts to a finer element and portion scale to identify more specific activities within the overall processing sequence, such as roasting and de-fleshing. Repetition and consistency within those butchery patterns are briefly discussed in section 10.3. Tool types, processing location (i.e. field butchery versus on-site processing), cultural or economic parameters, and the experience or speed of the butchers can also greatly affect the butchery choices made and the resultant marks (e.g. Lupo 2006; Rixson 1989; Seetah 2008). These points, along with considerations of intensity and 'wastefulness', will be discussed in the summary of this section (10.4). Given the scarcity of non-ungulates, it is hard to confidently distinguish patterns in their butchery bata. There are notable deep chops, numerous cuts, and other marks among the remains of these species, so they were not devoid of butchery damage. However, as the samples are small—and space in this thesis is limited—details of the non-ungulate data will be discussed in a future publication.

Following the methodology laid out in section 4.3.3 and 4.4.1, butchery marks are quantified here by counting the number of specimens butchered. This will be examined both at a cumulative element and skeletal region level as well as at a finer inter-element basis in order to identify patterns. Because specimens can be both chopped and cut, they may appear in both categories in the tables and figures below. Therefore, in each I also list the 'Total Specimens Butchered' to avoid presenting an inflated view of how many bones display butchery.

As with quantification, repetition can be difficult to strictly define or delineate (Seetah 2006a: 25). Given this, consistency will be addressed in a very simply and briefly by visually assessing how often elements were butchered in certain manners (e.g. Byers 2002; Seetah 2006a: 135-169).

Only bones—not teeth—will be employed in this section, and non-identifiable material is included where noted.

10.1 Overall Butchery & Presence by Taxa Type

Overall, as Table 10.1 shows, there are a relatively large number of butchered specimens within the identifiable bones. Local comparative data is scarce (section 4.3), but the observable butchery at Le6 and Le7 does appear to be substantially more frequent than that reported at most other southern African EIA sites (e.g. Turner 1987a: 20, b: 26,38). In the Le7 features, chopped specimens far outnumber cut ones, although both cut and scoop marks are present. The Le6 features have a high number of chops but also show a higher incidence of cut specimens and rather fewer scoops.

Table 10.1 Butchered specimens [NISP] per feature and phase within the identifiable and non-identifiable mat

	Identifiable bones									Non-identifiable bones			
Feature & Phase	Total sample	Total Butchered		Chopped Specimens		Cut Specimens		Scooped Specimens		Total sample	Total Butchered		Chop
	NISP	n	%	n	%	n	%	n	%	NISP	n	%	n
Le6.1	23	5	21.7	2	8.7	3	13.0		0	408	5	1.2	1
Le6.25	66	28	42.4	11	16.7	19	28.8	1	3.6	25	2	8.0	
Le6.26	308	149	48.4	93	30.2	81	26.3	4	2.7	563	37	6.6	2
Le6.27	63	30	47.6	23	36.5	12	19.0	1	3.3	42	8	19.0	8
Le6.28	24	9	37.5	4	16.7	5	20.8		0	30	2	6.7	
Le6.28.1	20	12	60.0	9	45.0	7	35.0		0	19		0	
Le6.28.2	33	11	33.3	7	21.2	4	12.1		0	32	2	6.3	1
Le6.29	125	75	60.0	64	51.2	34	27.2	4	5.3	32	4	12.5	4
Le6.30	20	10	50.0	9	45.0	2	10.0	1	10.0	354	17	4.8	11
Le6.31	251	117	46.6	100	39.8	47	18.7	11	9.4	1409	136	9.7	10
Le7.30	51	35	68.6	35	68.6	6	11.8	4	11.4	765	25	3.3	10
Le7.31	18	7	38.9	6	33.3	1	5.6	1	14.3	234	18	7.7	7
Le7.32	58	36	62.1	34	58.6	7	12.1	5	13.9	508	42	8.3	2
Le7.33	23	13	56.5	13	56.5	3	13.0	3	23.1	40	1	2.5	1
Le7/F4/c2	1288	645	50.1	586	45.5	151	11.7	52	8.1	9254	509	5.5	36
Le6	937	448	47.8	324	34.6	215	22.9	22	4.9	2914	213	7.3	15
Le7b	157	94	59.9	90	57.3	19	12.1	13	13.8	1547	86	5.6	4
Le7a	1288	645	50.1	586	45.5	151	11.7	52	8.1	9254	509	5.5	36
Totals	2382	1187	49.8	1000	42.0	385	16.2	87	3.7	13715	808	5.9	56

Butchered specimens occur less frequently within the non-identifiable categories, despite the large samples. Possibly this is due to the fact that the non-identifiable pieces tend to be smaller in size, thus possessing less surface area upon which to identify butchery marks. Had the non-identifiable material displayed notably higher rates of weathering and gnawing it might have been likely that these butchery marks had been obscured or obliterated by such taphonomic processes. However, as shown in Chapter 7, the non-identifiable bones were even less weathered and gnawed than the identifiable, so it seems unlikely the cuts and chops would have been lost through such post-depositional events. As will be discussed below, there may be less butchery on the non-identifiable specimens simply because they represent the portions of the skeleton least likely to incur butchery damage (e.g. vertebrae, long bone shafts) within certain exploitation strategies.

Butchery is known to contribute to breakage and probably played a role in that at Le6 and Le7. This was seen, for example, in the elements split longitudinally with a chop in Chapter 8. Given this, one might expect to find higher levels of butchery, particularly chopping, within the usually more fragmented non-identifiable specimens. Yet the inverse is seen here. This may indicate that, although common, butchery did not greatly affect the overall identifiability of the skeletal elements. Moreover, this may reinforce the argument that the fragmentation within these assemblages is neither severe nor otherwise ‘intense’, as even the butchered specimens still remained largely complete enough to identify.

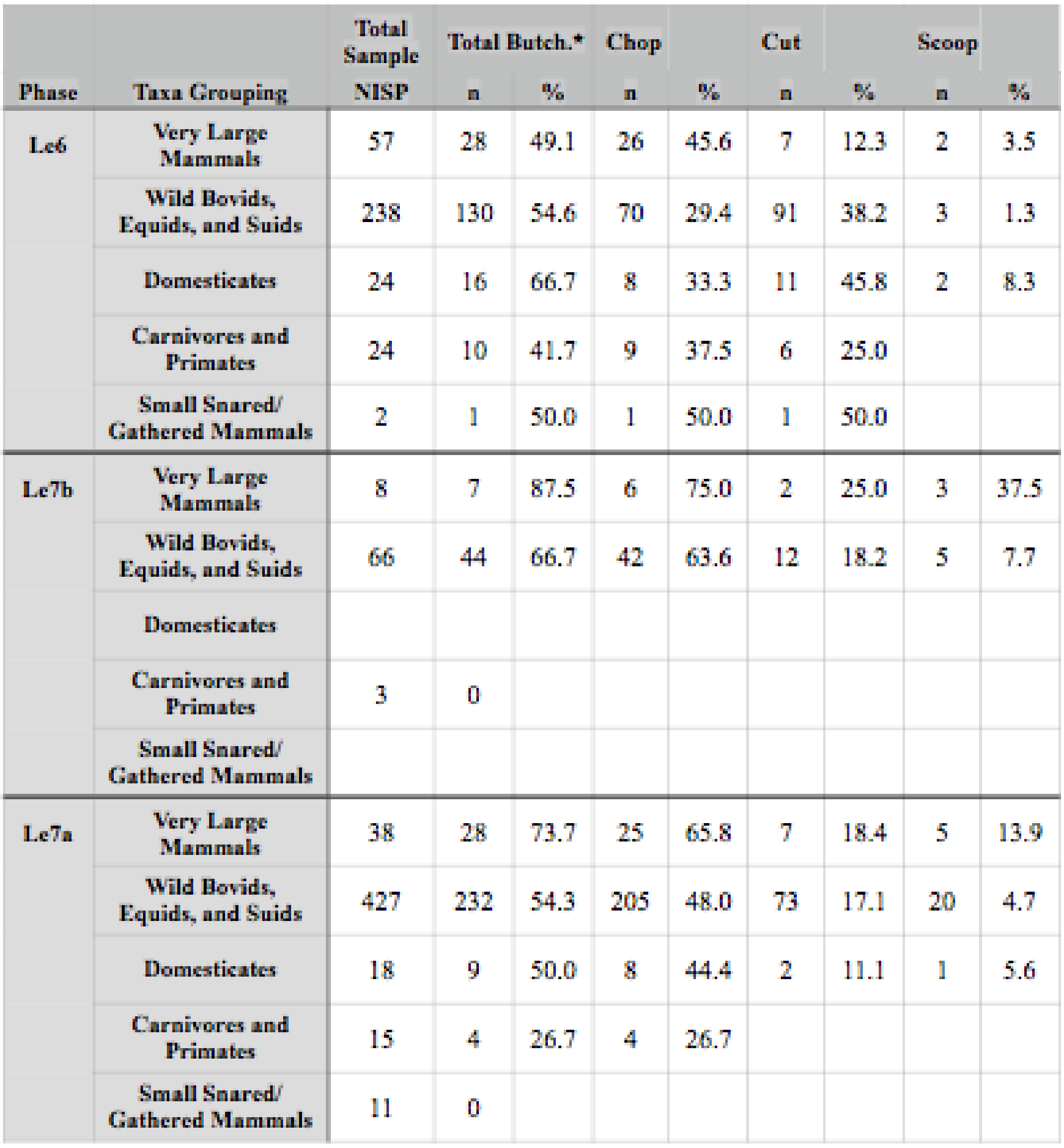
In terms of the different features, most show similarly large numbers of butchered specimens. Le6.1 stands in contrast to this and may provide an example of how other taphonomic forces can influence butchery identification. This feature displays the lowest frequency of butchery in both the identifiable and non-identifiable categories. It is one of the smaller features, so the lower rates of butchery could be related to sample size. However, features Le6.28, Le6.28.1, and Le7.33 are similar in size and yet show more butchery. Le6.1 displays the most severe weathering and gnawing of all the features at these two sites. Thus it seems most likely that the lower levels of butchery noted in Le6.1 are linked to the higher level of bone-surface degradation visible in this feature.

When all the groupings below were assessed feature by feature, the resultant patterns generally mirrored those seen at a phase level. The only divergences between feature and phase occurred when the samples were very small. Given this, all datasets below are analysed by phase. The following sections will examine any differences in butchery based on taxa, size, and skeletal position, to identify potential differential treatment or specific processing strategies.

- *Taxa Types*

As with the features above, there is mostly a high level of butchery modification throughout the broader taxa groupings (Table 10.2), apart from the relatively rare carnivores and small mammal (as discussed in future work). The three ungulate groups show roughly similar rates of butchery to each other per phase. At least at this level, there does not appear to be any significant differentiation in the butchering of these ungulate types. There may be a slight increase of chop marks within the very large mammals. This may be a factor of their size and will be addressed below.

Table 10.2 Total number [NISP] of butchered specimens per taxa grouping by phase (*Total Butch. = total number of butchered specimens).



		Total Sample	Total Butch.*		Chop		Cut		Scoop	
Phase	**Taxa Grouping**	**NISP**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Le6	**Very Large Mammals**	57	28	49.1	26	45.6	7	12.3	2	3.5
	Wild Bovids, Equids, and Suids	238	130	54.6	70	29.4	91	38.2	3	1.3
	Domesticates	24	16	66.7	8	33.3	11	45.8	2	8.3
	Carnivores and Primates	24	10	41.7	9	37.5	6	25.0		
	Small Snared/ Gathered Mammals	2	1	50.0	1	50.0	1	50.0		
Le7b	**Very Large Mammals**	8	7	87.5	6	75.0	2	25.0	3	37.5
	Wild Bovids, Equids, and Suids	66	44	66.7	42	63.6	12	18.2	5	7.7
	Domesticates									
	Carnivores and Primates	3	0							
	Small Snared/ Gathered Mammals									
Le7a	**Very Large Mammals**	38	28	73.7	25	65.8	7	18.4	5	13.9
	Wild Bovids, Equids, and Suids	427	232	54.3	205	48.0	73	17.1	20	4.7
	Domesticates	18	9	50.0	8	44.4	2	11.1	1	5.6
	Carnivores and Primates	15	4	26.7	4	26.7				
	Small Snared/ Gathered Mammals	11	0							

In all three phases chop marks are very common. Le6 shows more cuts than either of the Le7 phases. These Le7 phases instead display more scoops, although these are still greatly outnumbered by the chops.

- *Size Classes*

Table 10.3 and Figure 10.1 display the results by size class, as present in all the mammals and within the ungulates only.

Table 10.3 Butchered specimens [NISP] per size class by phase for all mammals versus ungulate

	Le6					Le7b					Le7a	
Size Classes	Total sample NISP	Total Butch.	Chop	Cut	Scoop	Total sample NISP	Total Butch.	Chop	Cut	Scoop	Total sample NISP	Tota Butc
All Mammals												
Very Large	57	28	26	7	2	8	7	6	2	3	38	28
Large / Very Large	30	12	10	3	1	8	4	4		1	85	51
Large	661	356	246	188	17	112	73	72	15	8	900	493
Medium / Large	34	12	11	1		8	4	4			66	22
Medium	137	36	27	12	2	14	5	3	2	1	112	39
Medium / Small	13	4	4	4		3	1	1			67	12
Small	4	0				4	0				19	0
Totals	936	448	324	215	22	157	94	90	19	13	1287	645
Ungulates Only												
Very Large	57	28	26	7	2	8	7	6	2	3	38	28
Large / Very Large	19	7	6	2	1	4	3	3		1	30	20
Large	634	340	232	181	17	106	69	68	15	8	827	457
Medium / Large	14	5	4	1		5	3	3			24	8
Medium	117	29	20	10	1	11	5	3	2	1	83	27
Medium / Small	5	1	1	1		3	1	1			60	12
Totals	846	410	289	202	21	137	88	84	19	13	1062	552

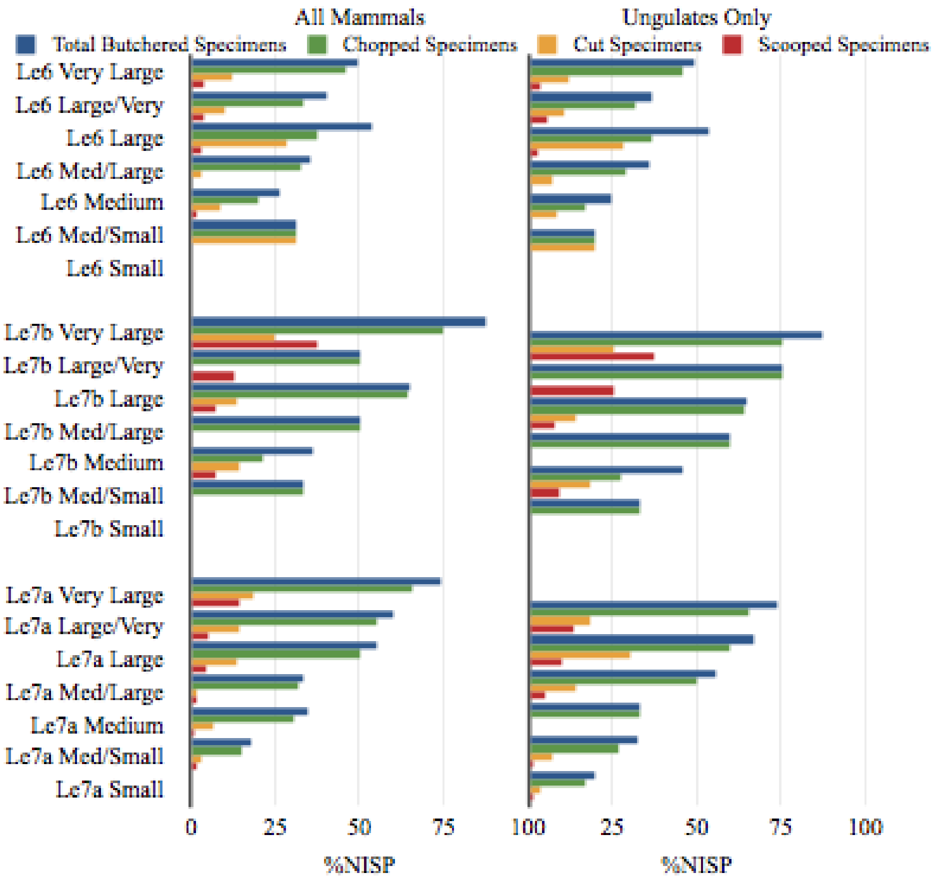


Fig. 10.1 Frequency [%NISP] of butchered specimens for all mammals and ungulates only per phase and size class.

Within both categories at Le7b and Le7a there may be a size differential: the larger the mammal, the more butchered specimens present. This also does not always align with sample sizes. In both mammals and ungulates there are a sizeable number of medium specimens but they still display notably less butchery. It is harder to make confident comparisons with the smallest groups (i.e. medium/small and small), given their low numbers. Despite this uncertainty, there appears to be a relationship between animal size and number of butchered specimens in the Le7 assemblages. This is as expected: larger animals generally require more processing than smaller taxa (Halstead 2007; Lupo 2006). These types of size-based choices also bridge species lines. For example, the same types of marks, placements and orientations of butchery marks, and incidence of butchery are seen on zebra and wild Bov. III elements.

There may be a similar size-based trend within Le6, if less distinct. In this phase there are more balanced proportions of butchery in the largest size classes (i.e. very large to large), which then decline within the medium specimens. The slightly higher level of butchery within Le6 medium/small mammals is likely due to the small sample size.

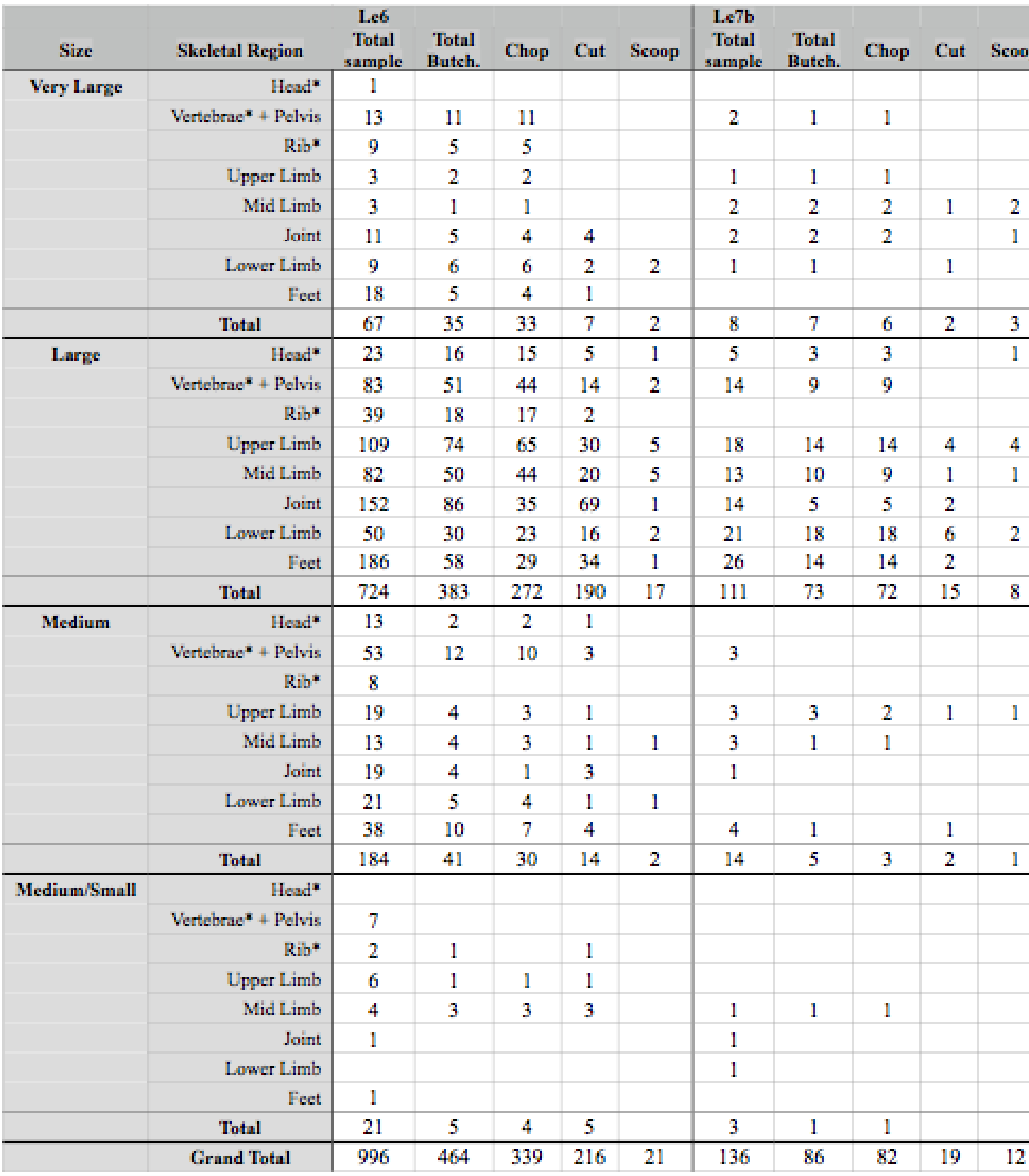
In terms of types of marks present, chopped specimens outnumber cut ones, although Le6 still shows a higher preponderance of cuts in comparison to Le7. Following the total number of butchered specimens, chop marks show a similar decline with size. In contrast, within the Le7 phases the frequency of cut specimens is more even between the various size classes where present. Scoop marks are more prevalent among the largest mammals of Le7b, but these samples are small. The large species at Le6 show a notably higher number of cut specimens in comparison to other taxa. This may indicate that more time was invested to strip meat from their remains, also evident in the few scooped Le6 specimens.

Apart from the smallest, non-ungulate taxa and size classes, figure 10.1 displays the frequent butchery modification at Le6 and Le7. However, examining such marks only at a carcass level may obscure important trends between the skeletal elements. Therefore the following sections discuss the data with more precise locations to gain a better grasp of the actual function of the butchery present.

The following also proceeds using all the mammal data rather than that of ungulates only. As certain elements or portions (*e.g.*, ribs, long bone shafts, skulls) are significantly more likely to be consigned to either family or basic mammal-size class level, key datasets are lost when the data is only discussed at a species, genus, or ‘ungulate’ level. Excluding those pieces by virtue of taxonomic precision not only causes those types of skeletal parts to be severely underrepresented in the data but all of their associated taphonomic information is also lost. This then affects both the scope and quality of any potential interpretations and discussions. The mammal patterns presented here largely speak to the ungulate treatment at Le6 and Le7.

10.2 Butchery by Skeletal Region

Table 10.4 Total number [NISP] of butchered specimens per element type by phase and size class, all mammals (



		Le6					Le7b				
Size	**Skeletal Region**	**Total sample**	**Total Butch.**	**Chop**	**Cut**	**Scoop**	**Total sample**	**Total Butch.**	**Chop**	**Cut**	**Scoo**
Very Large	Head*	1									
	Vertebrae* + Pelvis	13	11	11			2	1	1		
	Rib*	9	5	5							
	Upper Limb	3	2	2			1	1	1		
	Mid Limb	3	1	1			2	2	2	1	2
	Joint	11	5	4	4		2	2	2		1
	Lower Limb	9	6	6	2	2	1	1		1	
	Feet	18	5	4	1						
	Total	67	35	33	7	2	8	7	6	2	3
Large	Head*	23	16	15	5	1	5	3	3		1
	Vertebrae* + Pelvis	83	51	44	14	2	14	9	9		
	Rib*	39	18	17	2						
	Upper Limb	109	74	65	30	5	18	14	14	4	4
	Mid Limb	82	50	44	20	5	13	10	9	1	1
	Joint	152	86	35	69	1	14	5	5	2	
	Lower Limb	50	30	23	16	2	21	18	18	6	2
	Feet	186	58	29	34	1	26	14	14	2	
	Total	724	383	272	190	17	111	73	72	15	8
Medium	Head*	13	2	2	1						
	Vertebrae* + Pelvis	53	12	10	3		3				
	Rib*	8									
	Upper Limb	19	4	3	1		3	3	2	1	1
	Mid Limb	13	4	3	1	1	3	1	1		
	Joint	19	4	1	3		1				
	Lower Limb	21	5	4	1	1					
	Feet	38	10	7	4		4	1		1	
	Total	184	41	30	14	2	14	5	3	2	1
Medium/Small	Head*										
	Vertebrae* + Pelvis	7									
	Rib*	2	1		1						
	Upper Limb	6	1	1	1						
	Mid Limb	4	3	3	3		1	1	1		
	Joint	1					1				
	Lower Limb						1				
	Feet	1									
	Total	21	5	4	5		3	1	1		
	Grand Total	996	464	339	216	21	136	86	82	19	12

When assessing the regions by size class[11] (Table 10.4, Fig. 10.2), there are a number similarities with the previous figures. For instance, there seems to be a size differential. In all of the Le6 samples, except for 'medium/small' mammals, there is a notable relationship

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[11] 'Large/Very Large' and 'Medium/Large' categories were excluded due to their small samples.

between size and frequency of butchery within Le6. This is less notable for Le7a where the butchery marks within the medium mammals are more similar to the larger taxa, although still slightly less frequent. Patterning within the Le7b samples are inconclusive because of small sample size.

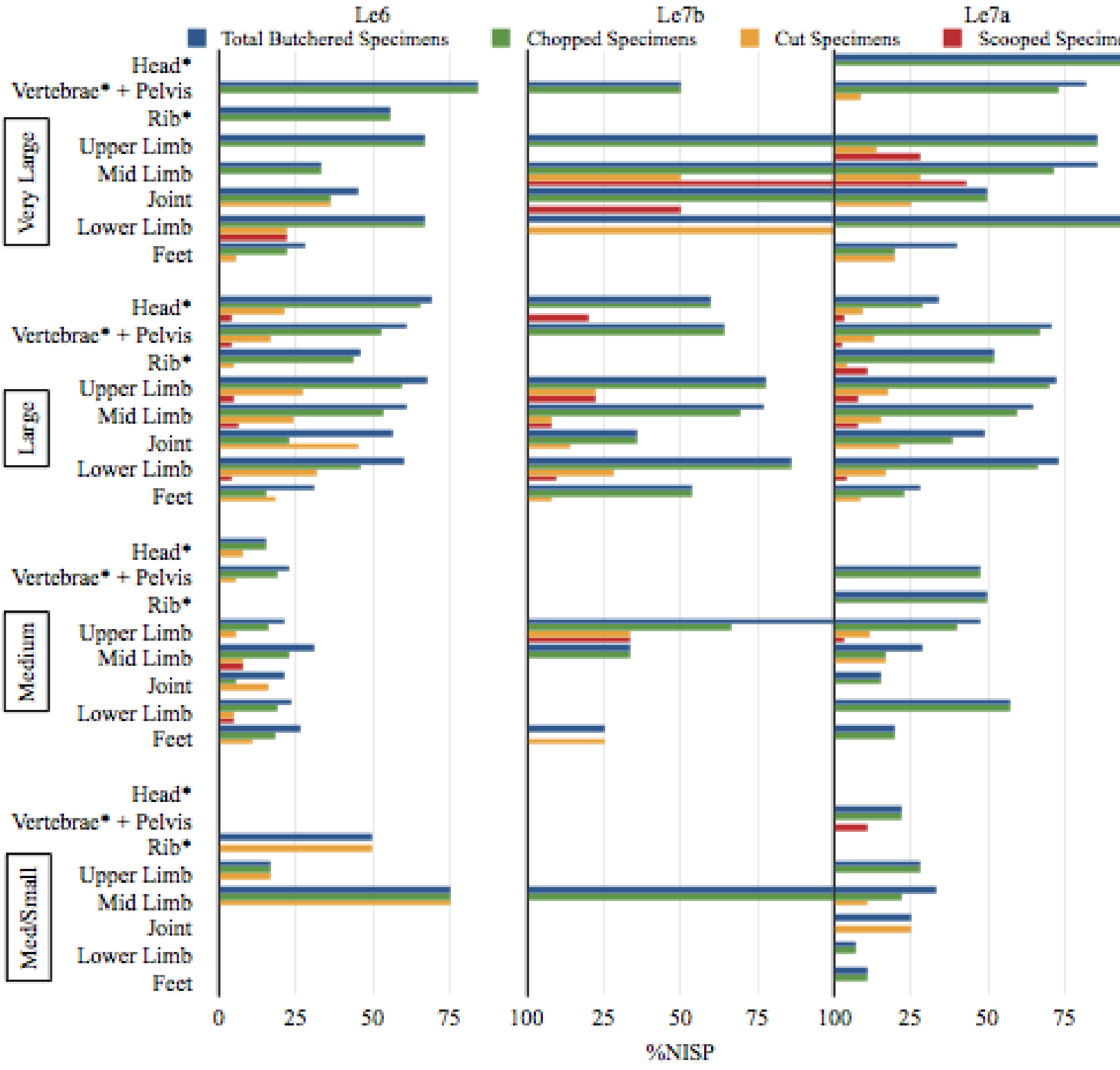
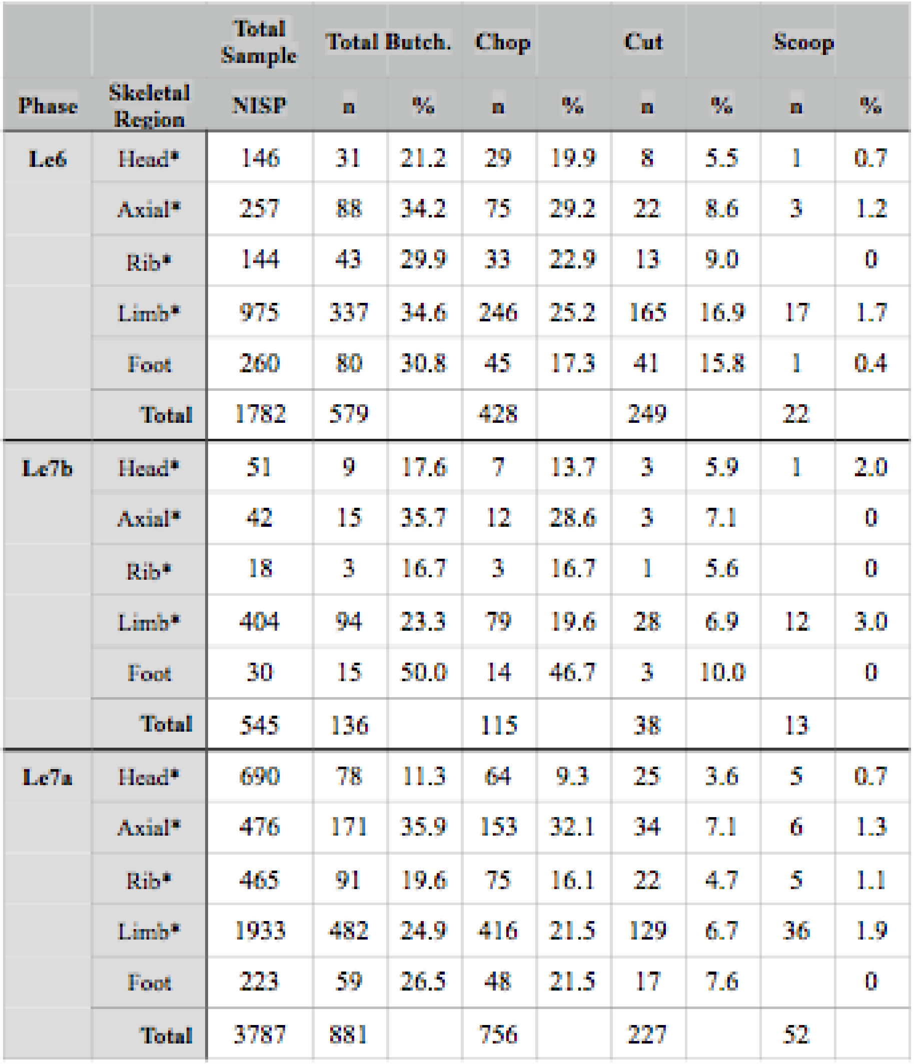


Fig. 10.2 Butchered specimens [%NISP] per skeletal element type by phase and size class, all mamm

While Le6 has the most cut specimens, on the whole there are more chop than cut marks throughout all phases. Ribs, joints, feet, and occasionally heads may show the lowest levels of butchering in various phases. In fact, the joint and feet samples are large yet still show relatively few butchery marks. However, if the size classes are combined to allow for the inclusion of a greater number of non-identifiable specimens, the differences in butchery between the regions largely vanish (Table 10.5).

As seen with the feature level data (Table 10.1), the addition of the non-identifiable data (in this case bone flakes) lowers the overall butchery rate. It also appears to balance the incidence of butchery within the different regions. However, there are still a few variances. Le6 displays a greater number of cut specimens within the limb and foot elements, while the axial elements of Le7a and Le7b as well as the feet of Le7b show more chopping. The head regions of all three phases show the lowest level of total butchery. Apart from these, the proportion of different mark types are quite similar between the regions within their respective phases.

Table 10.5 Butchered specimens [NISP] per region by phase, all mammals (*includes non-identifiable material).



		Total Sample	Total Butch.		Chop		Cut		Scoop	
Phase	Skeletal Region	NISP	n	%	n	%	n	%	n	%
Le6	Head*	146	31	21.2	29	19.9	8	5.5	1	0.7
	Axial*	257	88	34.2	75	29.2	22	8.6	3	1.2
	Rib*	144	43	29.9	33	22.9	13	9.0		0
	Limb*	975	337	34.6	246	25.2	165	16.9	17	1.7
	Foot	260	80	30.8	45	17.3	41	15.8	1	0.4
	Total	1782	579		428		249		22	
Le7b	Head*	51	9	17.6	7	13.7	3	5.9	1	2.0
	Axial*	42	15	35.7	12	28.6	3	7.1		0
	Rib*	18	3	16.7	3	16.7	1	5.6		0
	Limb*	404	94	23.3	79	19.6	28	6.9	12	3.0
	Foot	30	15	50.0	14	46.7	3	10.0		0
	Total	545	136		115		38		13	
Le7a	Head*	690	78	11.3	64	9.3	25	3.6	5	0.7
	Axial*	476	171	35.9	153	32.1	34	7.1	6	1.3
	Rib*	465	91	19.6	75	16.1	22	4.7	5	1.1
	Limb*	1933	482	24.9	416	21.5	129	6.7	36	1.9
	Foot	223	59	26.5	48	21.5	17	7.6		0
	Total	3787	881		756		227		52	

The consistency in the butchery shows that the predominant processing activity on these sites is simply one of wholesale dismemberment. This is evident in the dominance of chopped specimens in all regions displayed above. Additionally, this chopping is not limited to a specific area: almost every type of element is marked by more chops than cuts or scoops.

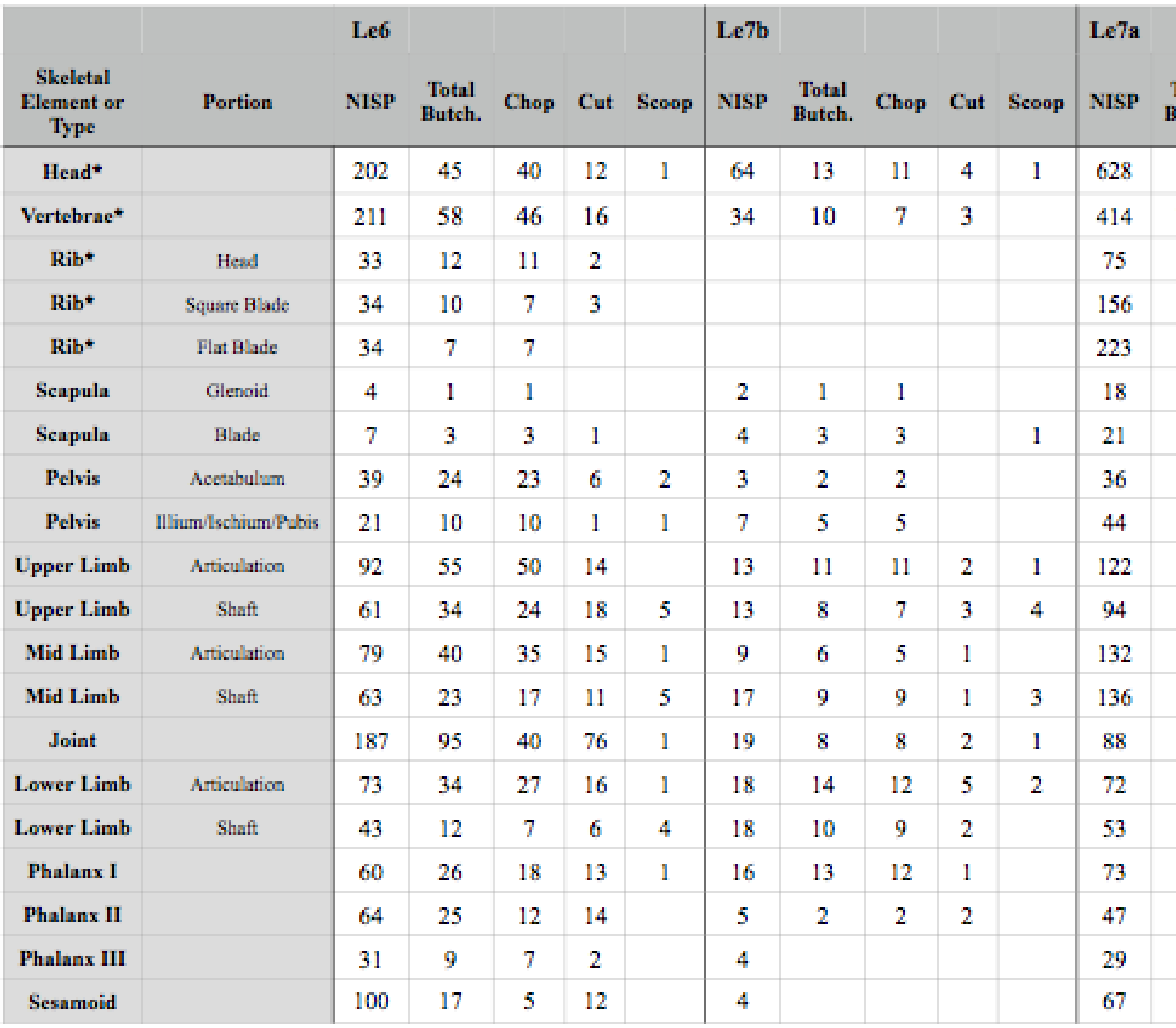
To address the varying butchery mark presence, and the types of specific processing choices they represent, the next section moves within the regions to explore inter-element butchery variation.

- *Butchery at the Element Level*

The following is not discussed by size classes, but when this locational data is split between the size classes, large mammals—which drive the patterns in the overall group, being the biggest contributor—are the same as those discussed below. Although more sporadically present, the very large mammals also show high levels of butchery, in which chopping dominates in every category where there is more than one specimen present. Medium and smaller species show significantly fewer butchered specimens. The bulk of butchery that is present in all size classes is centred within the upper and mid-limb regions.

At the finer level (Table 10.6, Fig. 10.3), chopping is prevalent throughout but there seems to be higher concentrations of butchery in some areas, specifically the limbs. However, no element type is devoid of butchery and all help clarify specific choices made in the processing of the different regions.

Table 10.6 Butchered specimens [NISP] per element and portion by phase, all mammals (*includes non-ident



		Le6					Le7b					Le7a
Skeletal Element or Type	**Portion**	**NISP**	**Total Butch.**	**Chop**	**Cut**	**Scoop**	**NISP**	**Total Butch.**	**Chop**	**Cut**	**Scoop**	**NISP**
Head*		202	45	40	12	1	64	13	11	4	1	628
Vertebrae*		211	58	46	16		34	10	7	3		414
Rib*	Head	33	12	11	2							75
Rib*	Square Blade	34	10	7	3							156
Rib*	Flat Blade	34	7	7								223
Scapula	Glenoid	4	1	1			2	1	1			18
Scapula	Blade	7	3	3	1		4	3	3		1	21
Pelvis	Acetabulum	39	24	23	6	2	3	2	2			36
Pelvis	Illium/Ischium/Pubis	21	10	10	1	1	7	5	5			44
Upper Limb	Articulation	92	55	50	14		13	11	11	2	1	122
Upper Limb	Shaft	61	34	24	18	5	13	8	7	3	4	94
Mid Limb	Articulation	79	40	35	15	1	9	6	5	1		132
Mid Limb	Shaft	63	23	17	11	5	17	9	9	1	3	136
Joint		187	95	40	76	1	19	8	8	2	1	88
Lower Limb	Articulation	73	34	27	16	1	18	14	12	5	2	72
Lower Limb	Shaft	43	12	7	6	4	18	10	9	2		53
Phalanx I		60	26	18	13	1	16	13	12	1		73
Phalanx II		64	25	12	14		5	2	2	2		47
Phalanx III		31	9	7	2		4					29
Sesamoid		100	17	5	12		4					67

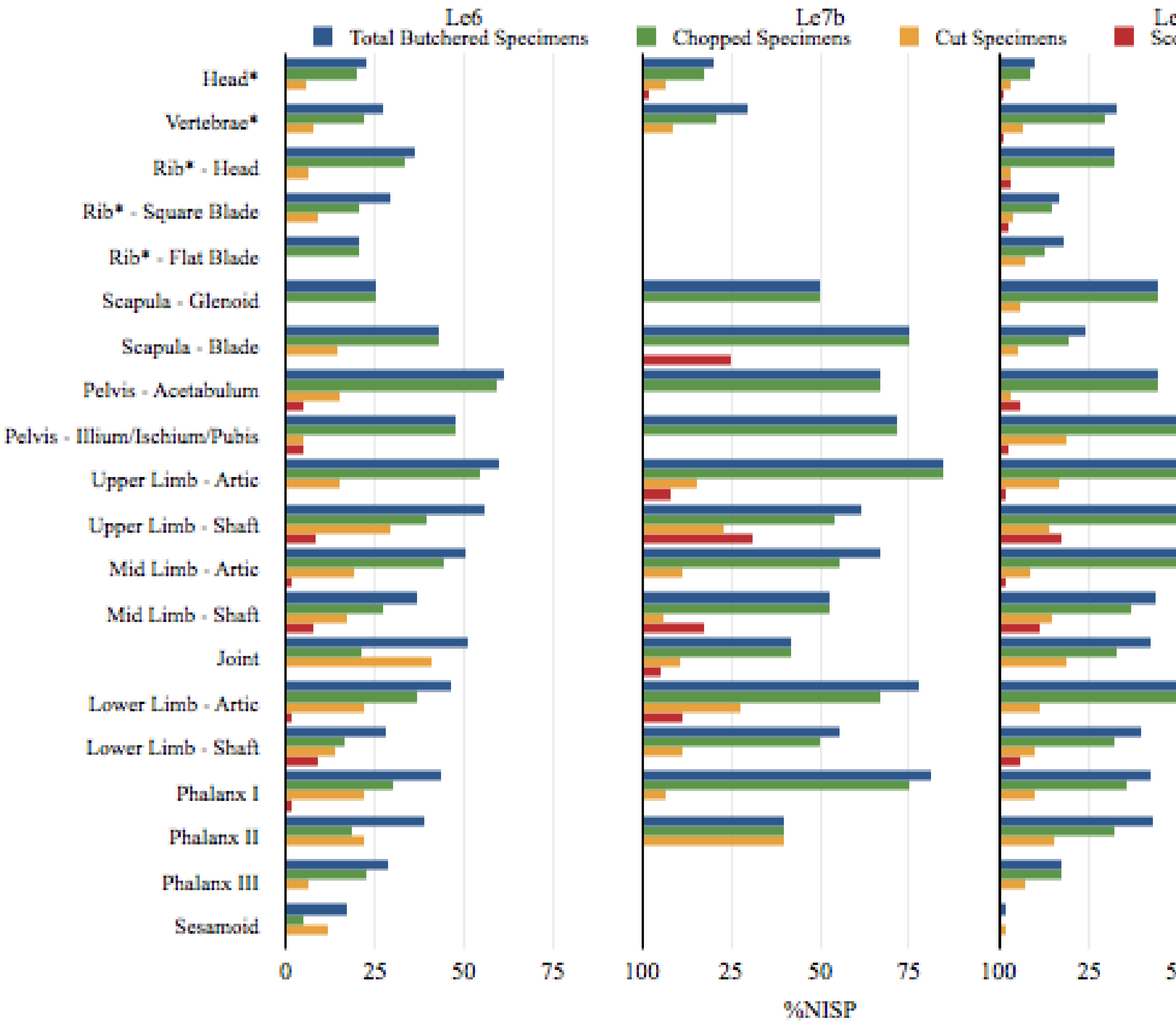


Fig. 10.3 Butchered specimens [%NISP] present per element and portion by pha
mammals (*includes non-identifiable material).

Within the main axial elements (head, vertebra, and rib) there appears to be slightly less butchery overall than in the long bones of all three phases, although chopping dominates in these reduced numbers. Starting with the head, the mandibles were separated from the skull through chops into the mandibular condyles. The occipital condyles are often sheared through where the skull was chopped from the cervical vertebrae, with chops also appearing on the axis vertebrae. Continuing down the spine, vertebrae were often chopped through perpendicularly (including vertical splits sheared straight through thoracic spines). There are also chops across the vertebral processes and rib heads. Rixson (1989) describes such chopping as a quick method for separating meat from the spine. The majority of the butchery on the Le6 and Le7 ribs does occur where they join with the vertebrae. The chops marks that were made on the square portion of the blade were often located only just below the base of the rib head. The aim seems to have been to separate the meat-heavy rib blades from the otherwise rather meat-less vertebrae. Beyond the chops used to separate these differentially meaty portions, there are few signs of effort to exploit the axial elements. These bones show some of the lowest numbers of cut and scooped specimens. While there is some flesh on these elements, there does not appear to have been much concerted effort to retrieve it. Even with the high incidence of chopping, articulated vertebral sections were also present—again indicating limited processing. The pelvis was very fragmented in general. However, as there are few signs of density-mediated attrition (Chapter 7), this damage seems to have been mainly driven by the chops used to portion the spine, remove the meat associated with the hindquarters, and disarticulate the femur.

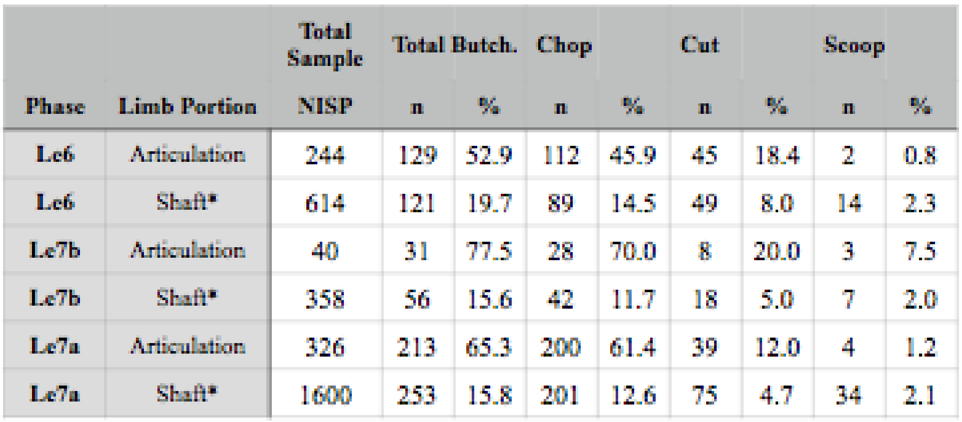
A similar pattern of damage is seen within the scapula. The butchery around the scapula and pelvis is not characterised by careful cuts that would have delicately severed the many ligaments attaching the humerus and femur to their respective articulations. Instead, forceful chops sheared through glenoid, acetabulum, and the proximal humeral and femoral epiphyses for more rapid separation of these elements (e.g. Fig. 10.4).

Fig. 10.4 Example of cleanly chopped through zebra femoral head from Le6. Note the smooth edges and lack of crushing in the bone's interior structure. This may be indicative of the type of tool used.

Beyond chop-driven disarticulation, the greatest number of cut and scooped specimens belong to the limb regions—they display the highest occurrence of de-fleshing marks. Within the limb bones, the shafts have the greatest proportion of de-fleshing marks (seen in the number of cut specimens relative to chops). When the non-identifiable flakes are included, this pattern is even more evident (Table 10.7).

Here there is still a clear indication of abundant dismemberment, as that is likely responsible for the highly butchered—and particularly chopped—articulations (although splitting for marrow extraction also plays a role). The shafts show sparse butchery damage in comparison to the articulations. However, the levels of cutting and chopping are more equivalent in the shaft zones. Thus, a larger portion of the butchery that does occur on shafts seems to stem from de-fleshing activities.

Table 10.7 Butchery present [NISP] on limb portions per phase, all mammals (*includes non-identifiable material).



		Total Sample	Total Butch.		Chop		Cut		Scoop	
Phase	Limb Portion	NISP	n	%	n	%	n	%	n	%
Le6	Articulation	244	129	52.9	112	45.9	45	18.4	2	0.8
Le6	Shaft*	614	121	19.7	89	14.5	49	8.0	14	2.3
Le7b	Articulation	40	31	77.5	28	70.0	8	20.0	3	7.5
Le7b	Shaft*	358	56	15.6	42	11.7	18	5.0	7	2.0
Le7a	Articulation	326	213	65.3	200	61.4	39	12.0	4	1.2
Le7a	Shaft*	1600	253	15.8	201	12.6	75	4.7	34	2.1

Long bones are not the only elements on which cuts appear. The first and second phalanges consistently show some of the highest percentages of cut specimens. Being essentially meat-less elements, cuts around the feet and distal articulation of the metapodials were likely created during skinning (e.g. Seetah 2006a: 130; Yellen 1991a). Where there are chops on these elements (particularly in the first phalanges), they tend to align or be associated with longitudinal splitting and thus potential marrow extraction (section 7.3).

10.3 Butchering Consistency

One of the simplest ways to assess consistency is visually, to ascertain if certain elements are often butchered or broken in precisely the same manner. At Le6 and Le7, such repetition is visible in a wide array of skeletal elements. The breakage patterns described and displayed on the first phalanges (Fig. 4.2) in section 4.3.2 and the metapodia, radii, and humeri (Figs. 12.4-6) in Chapter 12 demonstrate such repetition. In addition, virtually all humeral and femoral heads have been cleanly chopped through during disarticulation (Figs. 10.4-5). The femoral distal condyles are also almost always sheared off, proximal ulnae commonly chopped diagonally through to disarticulate the radius and ulna from the humerus (as described by Rixson [1989]), proximal ribs consistently split from the rest of the blade, and mandibles show recurrent butchery and fracture patterns.

Fig. 10.5 A selection of Le6 and Le7 proximal femur articulations that have all be split through the caput femoris and/or neck.

Some of this breakage may be associated with structural factors and faults. Ribs, for example, are prone to breakage through the blade. However, the repetition in where those breaks occur and in the associated butchery that clearly drove that breakage (e.g. Fig. 10.6) again speaks to human choice in executing those actions and/or in exploiting those physical characteristics.

Fig. 10.6 Proximal portion of a large mammal rib from Le6 displaying 'starter' chops and final point where chopped through at right edge.

If completeness is also counted as, in this case, a [lack of] breakage pattern type, this consistency then extends to the largely unmodified elements such as the carpals, tarsals, sesamoids, and terminal phalanges (as seen in Figs. 12.1-3 in Chapter 12). In all of these, there appears to be repeated patterns in the sections of elements present and the butchery captured therein. These processing strategies are also quite similar between species and size classes (apart from the smaller taxa, discussed below). The implications of this will be addressed in the discussion (Chapter 12).

10.4 Summary

Chopping is very common, while cuts and scoops are also present in variable amounts. This trend is seen not only throughout the features, but also between taxa, size classes, and skeletal regions. Apart from the possible skinning and atypical chopping within the carnivores and small mammals, there is little variation between the various ungulates in terms of butchery. There seems to be some positive relationship between mammal size and incidence of butchery. As a large carcass necessitates more work to reduce it to usable portions, this increased evidence of butchering is to be expected. There also appears to have been more effort spent in the processing of large mammals. The greater number of chopped, cut, and scooped specimens in this category all point to this. Beyond the possible size-based variance, there is some similarity in how the various regions of the skeleton have been processed and a high level of consistency within the butchery. In fact, at both the region and element level there is substantial evidence of chopping in almost every type of bone. Cuts and scoops are more intermittent. This may indicate increased efforts to de-flesh certain elements, such as the limbs, and thus a more selective focus in one aspect of the butchering at Le6 and Le7. I discuss the function of these marks, and the purpose of these butchery acts, in Chapter 10.

The final step in this taphonomic analysis is to examine the presence of the skeletal elements themselves, as this may shed additional light on these potential strategic choices.

Chapter 11: Skeletal Representation

While selective use has been repeatedly discussed in the previous sections, this section investigates whether the elements ‘less selected for’ also missing from the skeletal record. This would indicate that less evidence of use is merely a reflection of their absence. Alternatively, all parts of the carcass may be evenly represented, thereby still displaying unequal processing.

Working under the assumption that a given individual animal, and thus its carcass, possesses a full complement of skeletal elements, if a type of element or skeletal region is absent from the assemblage there must be a reason for its disappearance from the archaeological record. Possible reasons for this include:

- The element may not have been retrieved (such with sieve size issues), collected (selective collection of bones), or identified (due to analytical discrimination between ‘identifiable’ and ‘non-identifiable’ categories).

- The element may have been so thoroughly comminuted, fragmented, or destroyed during processing or post-depositional events that it is no longer identifiable.

- The element could simply be in another, unanalysed portion of the site.

- The element may have been left where the animal was killed or at an intermediate processing or snacking site (e.g. Bunn et al. 1988) and therefore did not make it back to the site with the rest of the carcass.

- The element may have been at these sites for primary processing but was then taken to another site for consumption and ultimate disposal (e.g. Driver 1990).

The first point on this list is a matter of methodology. With the exemplary collection methods employed during the excavation of these sites (section 2.3.1), it is relatively unlikely that any elements, no matter their size, were lost during those steps. Additionally, as I consider both the identifiable and non-identifiable categories, bias is not introduced in that manner. The second point involves the taphonomic processes addressed in the preceding chapters—in particular: 6, 7, and 9. As discussed in those chapters, it is unlikely that these processes had a significant impact on the overall identifiability and representation of skeletal elements at Le6 and Le7. While the overall fragmentation was not intensive (Chapter 8), differential butchery (10) and breakage may have disproportionately affected some elements (namely the long bones). The third point, that elements are on un-sampled portions of the site, can only be addressed with expanded excavation at these sites and thus are moot for these discussions.

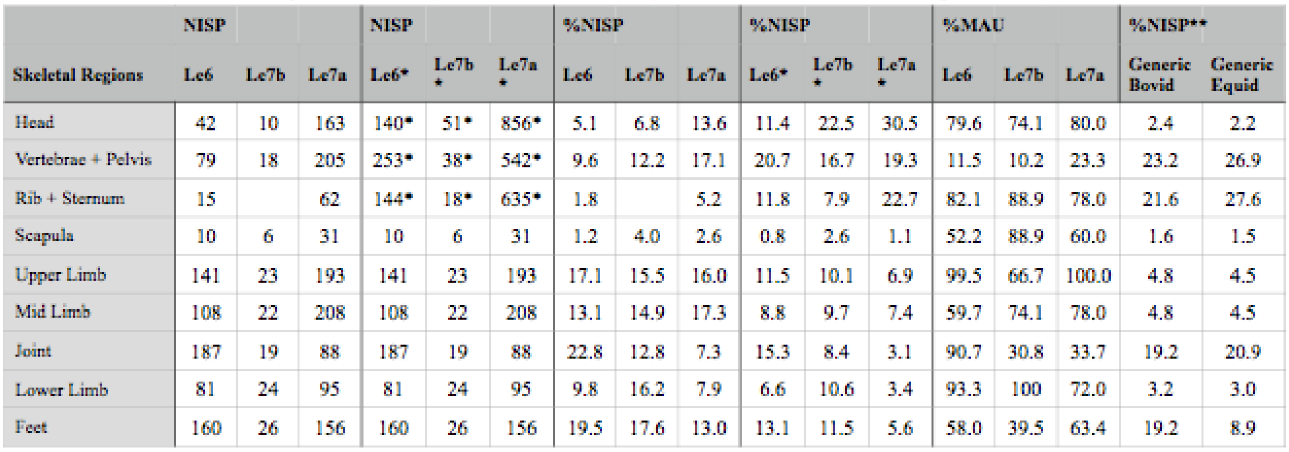
The remaining two points, which involve variables such as carcass transport, particular use strategies, and the nature of the Le6 and Le7 site type remain to be addressed by this chapter. This will be done through an examination of the types of elements present and their frequency (11.1) and mammals size classes and taxa groupings (11.2) to identify differential skeletal presence based on those characteristics. The summary (11.3) presents the implications of these results.

Given the disparate fragmentation between teeth and bones, I only use bone data here. Non-identifiable material is included where relevant. The conglomerated skeletal regions used in this section are described in Table 4.3. Only ungulate taxa types are discussed below. The non-ungulate sample sizes were simply too small.

11.1 Overall Skeletal Representation

While I have solely used NISP in this thesis so far, I briefly deviate from that in this subsection. To explore potential fragmentation inflation, here the overall phase results are compared by both NISP and MAU (*cf.* Lyman 2008: 247-248). The various issues with both methods were detailed in section 4.2.6. Table 11.1 and Figure 11.1 present these results. I did not include an ‘ungulate only’ category here as only the whole mammal dataset allows for the inclusion of the otherwise under-represented non-identifiable parts.

Table 11.1 Relative frequency [NISP, %NISP, %MAU] of skeletal regions by phase compared with skeletal frequencies from generic bovid and equid skeletons, all mammal data. (NISP values calculated with 1) only identifiable material, and 2) including some non-identifiable material in the head, vertebrae, and rib categories - marked by *. %MAU calculated only with identifiable material. ** adapted from Lyman 2008: 228).



	NISP			NISP			%NISP			%NISP			%MAU			%NISP**	
Skeletal Regions	Le6	Le7b	Le7a	Le6*	Le7b *	Le7a *	Le6	Le7b	Le7a	Le6*	Le7b *	Le7a *	Le6	Le7b	Le7a	Generic Bovid	Generic Equid
Head	42	10	163	140*	51*	856*	5.1	6.8	13.6	11.4	22.5	30.5	79.6	74.1	80.0	2.4	2.2
Vertebrae + Pelvis	79	18	205	253*	38*	542*	9.6	12.2	17.1	20.7	16.7	19.3	11.5	10.2	23.3	23.2	26.9
Rib + Sternum	15		62	144*	18*	635*	1.8		5.2	11.8	7.9	22.7	82.1	88.9	78.0	21.6	27.6
Scapula	10	6	31	10	6	31	1.2	4.0	2.6	0.8	2.6	1.1	52.2	88.9	60.0	1.6	1.5
Upper Limb	141	23	193	141	23	193	17.1	15.5	16.0	11.5	10.1	6.9	99.5	66.7	100.0	4.8	4.5
Mid Limb	108	22	208	108	22	208	13.1	14.9	17.3	8.8	9.7	7.4	59.7	74.1	78.0	4.8	4.5
Joint	187	19	88	187	19	88	22.8	12.8	7.3	15.3	8.4	3.1	90.7	30.8	33.7	19.2	20.9
Lower Limb	81	24	95	81	24	95	9.8	16.2	7.9	6.6	10.6	3.4	93.3	100	72.0	3.2	3.0
Feet	160	26	156	160	26	156	19.5	17.6	13.0	13.1	11.5	5.6	58.0	39.5	63.4	19.2	8.9

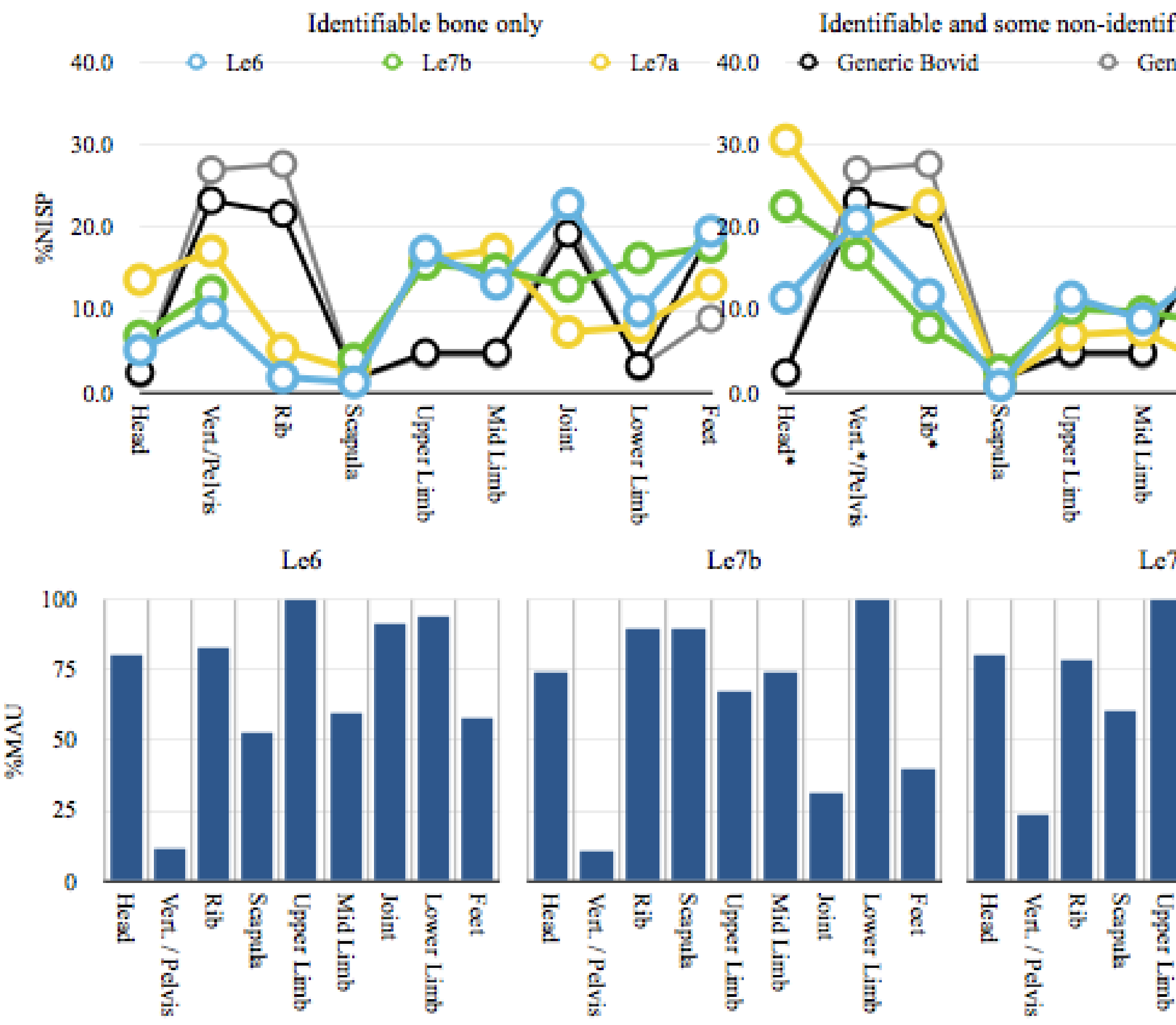


Figure 11.1 Frequency of skeletal regions [%NISP, %MAU] by phase, all mammals.

In assessing NISP, I found it useful to plot these results against a generic, or complete, skeleton to get some idea of what the expected frequency of elements, and their relative position to one another, might be. As bovids and equids are the most common taxa present, they provide a baseline from of which to compare the Le6 and Le7 data. Firstly, the deviations between the two %NISP graphs must be addressed.

Comparing the NISP values with and without non-identifiable material, the biggest difference between the two lies amongst the axial elements. This is particularly the case with the head elements (skull and mandible) and is especially notable when compared to the generic skeletal values. As these head elements are known to be highly susceptible to fragmentation, this is not surprising. However, judging by MAU, the identifiable material may provide a relatively complete picture of their presence on-site.

Conversely, there may be fewer ribs than one would expect in the NISP results; a situation only somewhat ameliorated by the inclusion of non-identifiable material. Yet the MAU values for the ribs are more similar to the other regions. This might be an over-representation, as there were not many rib fragments present. Moreover, many of the rib specimens consisted solely of the head or proximal end of the blade, meaning the majority of the blade was not present.

The vertebrae do not exhibit a similar increase in their MAU values, where they are the least populous region through all three phases. This may be due to both the difficulty of fully counting the MNE (and thus MAU) of vertebrae as well as their likelihood of ending up in the non-identifiable ranks. Exacerbating this is the fact that the zones for the non-identifiable vertebrae and ribs were only recorded on a presence/absence basis. This means the potential overlap between non-identifiable specimens could not be judged, as it had been for the identifiable material. This precluded the inclusion of the non-identifiable specimens in the MAU calculations. However, had they been included it may have evened out the vertebrae %MAU relative to the other regions. If only using identifiable material, at least the vertebrae (if not the ribs as well) are very under-represented. As such, the non-identifiable rib and vertebrae data are included wherever possible[12] below. Altogether, the variations between the identifiable and non-identifiable-included %NISP results may indicate that the head, vertebrae, and rib elements suffer identification, and possibly fragmentation, issues.

The expanded number of the axial elements in the right-hand %NISP graph (Fig. 11.1) depresses the relative proportion of the appendicular regions, which brings them more in line with the expected values. However, there still appears to be some inflation among the long bones. In contrast to the NISP values, which are always higher than those of the generic skeletons, the long bone MAU scores are lower than one would suppose for fully complete

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[12] The non-identifiable skull fragments were not assigned to size classes and thus could not be included in the other categories and groupings. They will not be used in subsequent subsections.

skeletal profiles. These lesser %MAU results may be due to the increased fragmentation of the long bones, likely linked to selective marrow use patterns (as seen in Chapter 8). This would then also account for their inflated presence in terms of NISP. This breakage also affects the relative balance of long bones to carpals, tarsals, and phalanges.

The joints and feet seem under-represented in terms of NISP and complete carcasses. Multiple factors could have contributed to this. For instance, as these types of elements were often some of the most complete (Chapter 8), their numbers would appear to be diminished in comparison to the possibly fragmentation-inflated long bones. However, this would not account for the lower %MAU values in these regions, particularly with the joints. It is also possible that, as these elements are physically smaller, they may have simply been lost during processing and never made it into these deposits (*cf*. Friesen & Betts 2006). Alternatively, and with the lack of evidence for grease extraction, as these elements have little to offer meat wise there may have been a greater predilection to leave them at kill sites (e.g. Bunn et al. 1988). These bones are also often brought back to site if still attached to long bones (e.g. O’Connell et al. 1990). In the case of the phalanges and sesamoids, they may have travelled attached to the skins (e.g. Bunn et al. 1988). Whatever the reason, the joint bones may be relatively more scarce than other regions in Le7a and Le7b, and the phalanges in all phases.

Despite these vagaries, the skeletal profiles at these sites are still largely complete (especially in Le7a). This pattern also holds at the feature level (when samples are large). This is particularly notable in comparison to other EIA sites, where wild species are sometimes confirmed solely by isolated skeletal elements (e.g. Raath 2014: 192). As both quantification methods approach this same interpretation, and as the differences between them have been discussed above, I will proceed using only NISP (cf. Lyman 2008: 248).

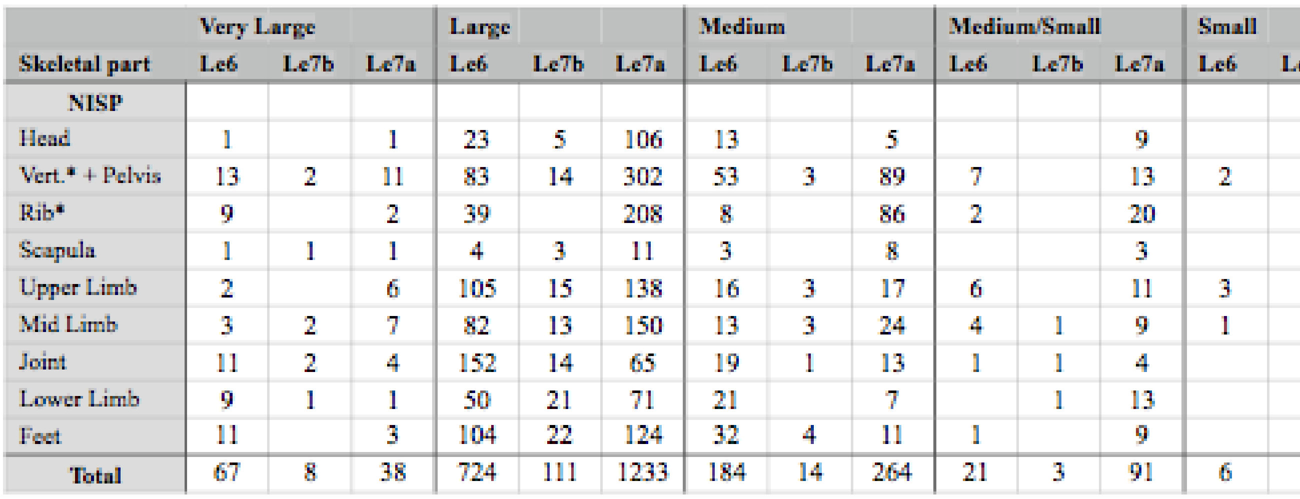
11.2 Skeletal Presence by Size & Taxa

Size can be a highly important factor when it comes to making transport decisions, which then may affect the type of elements in an assemblage (e.g. Bunn et al. 1998; Gifford-González 1993; O’Connell et al. 1990). Even when similar in size, different taxa may elicit dissimilar processing and transport choices that affect the final skeletal tallies (e.g. O'Connell et al. 1990). To assess these, the following section presents the skeletal presence by size class and ungulate taxa groupings.

- *Size Classes*

As the largest samples, the medium and large mammal classes are the most similar to the overall mammal sample, where the skeletal profiles appear mostly complete (Table 11.2, Fig. 11.2). There are a few details to note within them, however. For example, large mammals displayed the least complete long bones (Table 8.2), which may have contributed to inflated long bone values in Figure 11.2. While the Le7a large mammals have the highest frequency of axial elements of the three phases, they also have the lowest proportion of joint elements. In addition, only the large and very large mammals of Le6 and the very large mammals of Le7b show regularly high frequencies of joint elements. For Le6, this is likely linked to the relatively large number of almost complete, articulating carpal and tarsal sets identified in those features (e.g. Fig. 12.1). The possible reasons for this dearth of joint elements were discussed above.

Table 11.2 Skeletal region presence [NISP] by mammal size class and phase (*includes non-identifiable materia



	Very Large			Large			Medium			Medium/Small			Small	
Skeletal part	**Le6**	**Le7b**	**Le7a**	**Le6**	**Le7b**	**Le7a**	**Le6**	**Le7b**	**Le7a**	**Le6**	**Le7b**	**Le7a**	**Le6**	**L**
NISP														
Head	1		1	23	5	106	13		5			9		
Vert.* + Pelvis	13	2	11	83	14	302	53	3	89	7		13	2	
Rib*	9		2	39		208	8		86	2		20		
Scapula	1	1	1	4	3	11	3		8			3		
Upper Limb	2		6	105	15	138	16	3	17	6		11	3	
Mid Limb	3	2	7	82	13	150	13	3	24	4	1	9	1	
Joint	11	2	4	152	14	65	19	1	13	1	1	4		
Lower Limb	9	1	1	50	21	71	21		7		1	13		
Feet	11		3	104	22	124	32	4	11	1		9		
Total	67	8	38	724	111	1233	184	14	264	21	3	91	6	

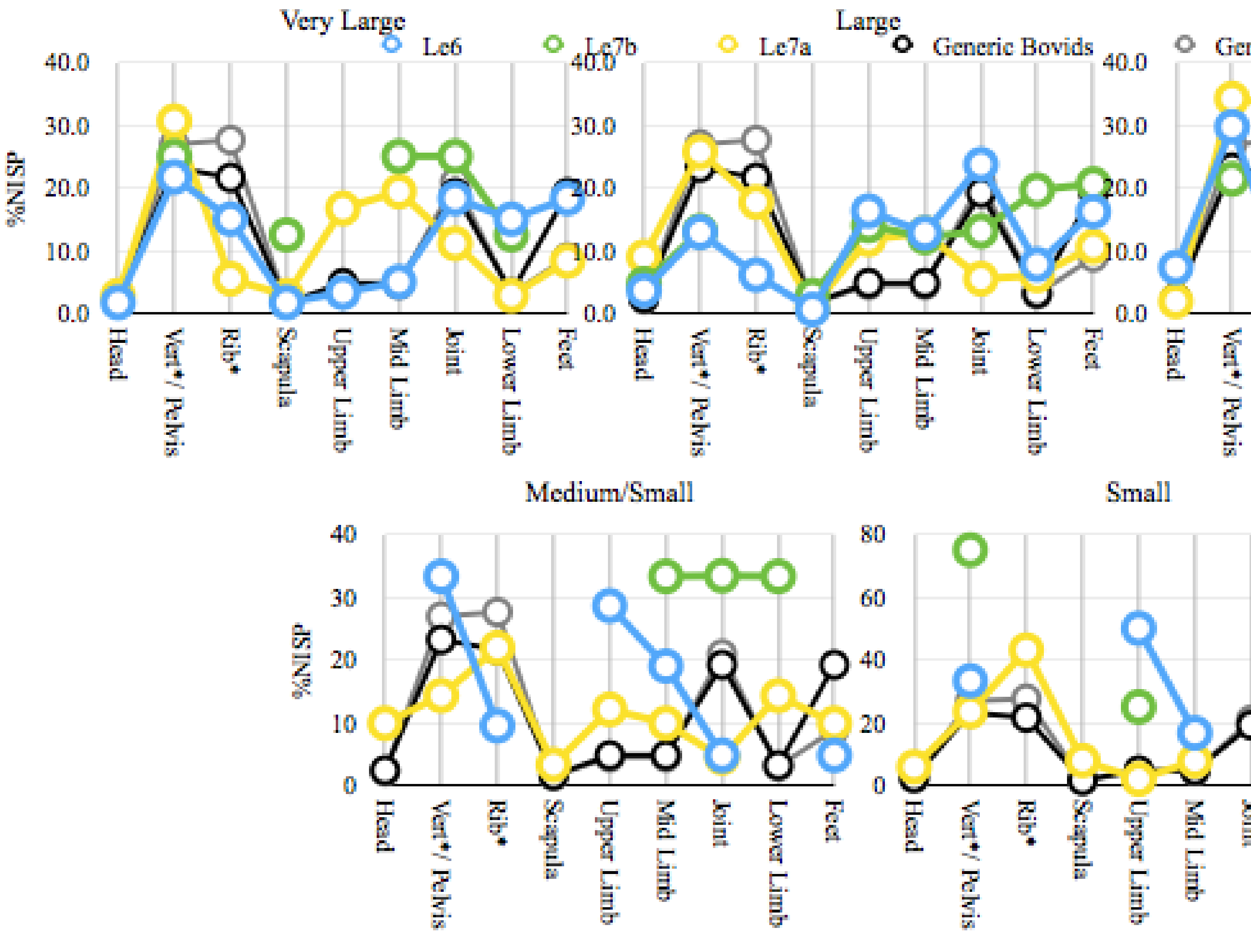


Fig. 11.2 Frequency of skeletal regions [%NISP] by mammal size class and phase, compared t
(*includes non-identifiable material).

Throughout the size classes in Table 11.2 and Figure 11.2, Le7b has the least consistent skeletal presence. This phase is not marked by higher weathering, carnivore gnawing, or burning. There is slightly more frequent butchery, but not in the regions ‘missing’ in Figure 11.2 as they are just not present. This might denote more common retrieval of limbs rather than axial elements during that phase. Limb bones could also have been more frequently abandoned in those features. However, there are some axial elements present in Le7b, and there are axial elements at the phase and feature level. Therefore, this increase in limb elements does not seem to be a strictly defined trend and may have more to do with fragmentation than true element representation. Le7b’s small sample also influences potential interpretations.

The very large mammals will be discussed below with the taxa types, but the medium mammals also have a relatively broad selection of skeletal elements in both Le6 and Le7. This may be related to their size, as it more practical and less energy intensive to carry home an entire impala than a whole buffalo or zebra (e.g. Bunn et al. 1988).

The medium/small mammals, which include the Bov. I species, are only completely represented skeletally in Le7a. This is also the biggest sample for the size class, but at least a few of the taxa involved may have been returned as complete carcasses. The medium/small mammal remains are notably less ubiquitous in Le6 and Le7b. The entire sample for this size class in Le7b is three specimens, a duiker tarsal and Bov. I metapodial in Le7.30 and a Bov. I/II ulna in Le7.31. These are all only limb elements, but I would hesitate to make any claims about size class treatment based only on these few remains. The Le6 sample is slightly more complete, but it derives from 21 specimens scattered across five different features (and includes both bovids and carnivores) and may not signify the presence or recovery complete skeletons. There are also very few small mammal remains. The biggest sample (Le7a) does have representatives in every region, but they stem from a variety of species. These samples are still too small to draw solid conclusions from and shall not be discussed further here.

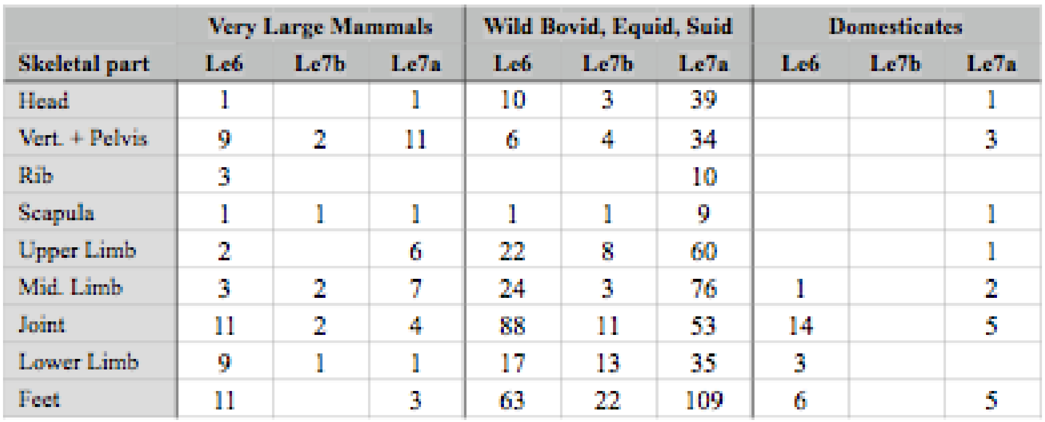
Apart from Le7b's slight inconsistency, the larger size classes and samples appear to follow the trends seen in section 7.5.1, where virtually every region of the skeleton is present in at least some frequency**.**

- *Taxa: Ungulate Types*

Table 11.3 and Figure 11.3 present the ungulate taxa groupings by phase. In this, and at least for the wild ungulates, the results are very similar to those seen above.

At the feature level, there is some variation in the carcass portion presence. An occasional feature may possess a higher number of limb elements from one taxa while another displays more axial elements. However, there do not appear to be consistent trends in part selection. Therefore and overall, as seen in the size classes and at the phase levels, there are no glaring absences in terms of skeletal region. This means two things. Firstly, it indicates that portions of the skeleton have at least some representation across the various taxa types. In addition, the selective taphonomic modification trends seen in the previous chapter (i.e. more butchery of limbs) are not driven only by limited presence of certain types of skeletal elements.

Table 11.3 Frequency of skeletal regions [NISP] by ungulate taxa grouping and phase, identifiable bones only.



	Very Large Mammals			Wild Bovid, Equid, Suid			Domesticates		
Skeletal part	**Le6**	**Le7b**	**Le7a**	**Le6**	**Le7b**	**Le7a**	**Le6**	**Le7b**	**Le7a**
Head	1		1	10	3	39			1
Vert. + Pelvis	9	2	11	6	4	34			3
Rib	3					10			
Scapula	1	1	1	1	1	9			1
Upper Limb	2		6	22	8	60			1
Mid. Limb	3	2	7	24	3	76	1		2
Joint	11	2	4	88	11	53	14		5
Lower Limb	9	1	1	17	13	35	3		
Feet	11		3	63	22	109	6		5

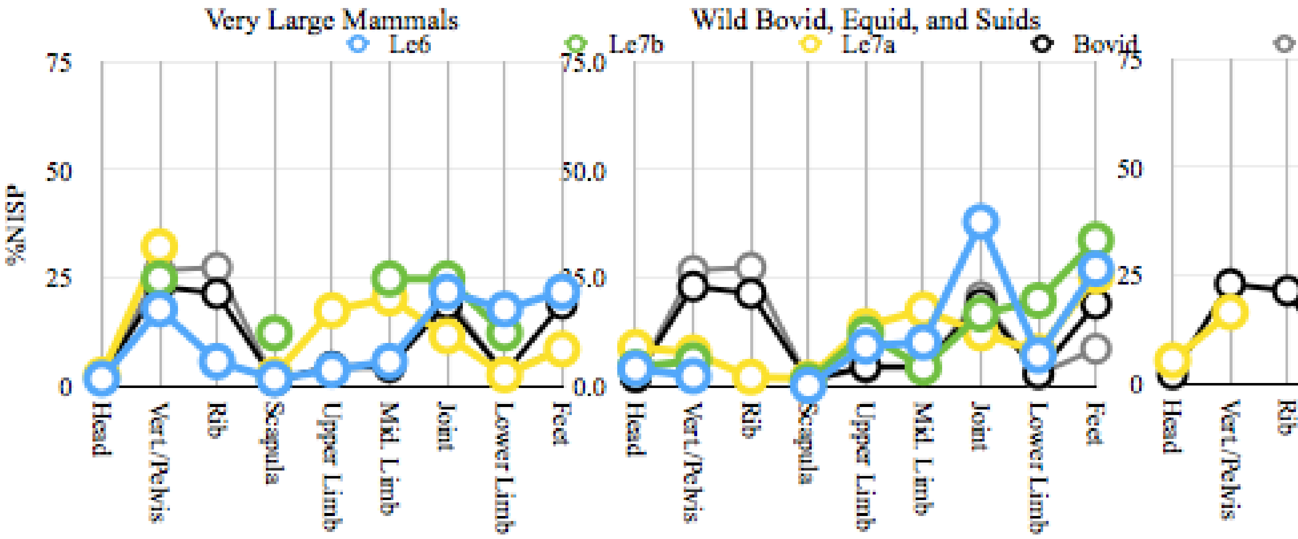


Fig. 11.3 Frequency of skeletal regions [%NISP] by taxa grouping, compared to generic sl

The skeletal presence of specific taxa may still be assessed in future. It should, however, be considered with one key caveat in mind: that specific elements are likely to be missing from taxa level exploration. Given the propensity of certain types of elements, particularly the axial, to only be identified to mammal size class, restricting the assessment to only those specimens confirmed to species will give an artificially incomplete picture of the skeletal regions present. Table 11.4 displays this aspect in rough form (see Appendix Table C.1 for feature-level data). Although not all species have 'confirmed' element representation across the regions, there are specimens in the less determinate classifications (such as 'Mammal, large', 'Bov. III - Wild', and so forth) that may well be the 'missing' portions in their skeletal complement.

Table 11.4 Coarse skeletal presence for ungulates species by broad skeletal region types per phase, with confirmed species' remains (bold) and potential specimens in less determinate classes (light grey, which are possibly applicable elements in family level, bovid, or mammal size classes).

		Le6	**Le6**	**Le7b**	**Le7b**	**Le7a**	**Le7a**
Taxa Group	**Species**	**Axial**	**Appendicular**	**Axial**	**Appendicular**	**Axial**	**Appendicular**
Very Large Mammals	giraffe	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**
	rhinoceros	yes	**yes**	yes	**yes**	**yes**	**yes**
	hippopotamus					**yes**	**yes**
Wild Bovids, Equid, and Suids	impala	**yes**	**yes**	yes	**yes**	**yes**	**yes**
	wildebeest	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**
	roan	yes	**yes**	**yes**	yes	**yes**	**yes**
	sable	**yes**	**yes**			**yes**	**yes**
	waterbuck	yes	**yes**	yes	**yes**	**yes**	**yes**
	steenbok					**yes**	**yes**
	Sharpe's grysbok					yes	**yes**
	grey duiker		**yes**		**yes**	**yes**	**yes**
	buffalo	**yes**	**yes**	yes	**yes**	**yes**	**yes**
	eland		**yes**	**yes**	**yes**	yes	**yes**
	kudu	**yes**	**yes**	yes	**yes**	**yes**	**yes**
	zebra	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**
	warthog	**yes**	**yes**			**yes**	**yes**
	bushpig					yes	**yes**
Domesticates	cattle	**yes**	**yes**			yes	**yes**
	ovicaprine					**yes**	**yes**

Thus, when these less determinate specimens are considered, the taxa groups and species largely mimic the patterns displayed in their respective size classes above. In other words, virtually every element of skeleton is present in at least some quantity for most taxa.

11.3 Summary

There may not be absolutely whole skeletons present (or, at least, recovered) in these assemblages. Specific regions and elements, such as the axial elements and long bones, may have also suffered from fragmentation and issues with identification. However, overall, the Le6 and Le7 patterns do share similarities with the profiles of complete skeletons and all the skeletal regions are frequently represented. The larger size classes and ungulates display a balanced presence in virtually all major portions of the carcass, which is similar to that of the overall phases.

There are also no glaring differences in treatment based on size or species, nor evidence of specific regions being more consistently selected for and returned to site with these large taxa. In fact, even the biggest species, such as giraffe, have remarkably large numbers of bones present. There are ethnographic examples of entire buffalo and zebra carcasses carried back to camp (Bunn et al. 1988). Beyond serving as evidence of significant quantities of energy expended, what do these choices actually imply?

To begin with, the relatively complete skeletal representation indicate that the selective use patterns observed in sections 7.3 and 7.4 are not wholly predicated by mere presence or absence of certain limbs. This means that they may indeed represent selective processing choices, but the implications expand beyond simple reinforcement of the past sections.

Sections 12.2.2 and 12.3 will return to the skeletal presence data in order to discuss Le6 and Le7 carcass use and transport strategies and how that affects the interpretation of these sites. For this data, and those in the previous chapters, illuminate the type of priorities that shaped the production of these assemblages and draw into question the nature of Le6 and Le7.

To assess these priorities, Chapter 12 proceeds with a discussion of the results presented in Chapters 5 through 11.

PART III: CONCLUSIONS

Chapter 12: Discussion & Conclusion

Chapter 12 endeavours to weave together the various strands of evidence presented in Chapters 5 through 11, along with the contextual and theoretical frameworks laid out in Chapters 2 through 4, to examine the focus on wild animal procurement at KNP EIA sites. Here the different aspects of animal-use discussed in each section are tied back to one another—as they are all part of one chain of use. In this, the aim is to present a more fine-scale picture of the actual manifestations and implications of the Le6 and Le7 wild animal use, and the place of such patterns within the spectrum of EIA animal use.

Chapter 12 follows the research questions that guided these analyses (Chapter 3). Chapters 5 through 11 presented the details of the Le6 and Le7 patterns of preparation and utilisation. Therefore, section 12.1 begins by synthesising these patterns to explore the parameters of use: were the Le6 and Le7 faunal choices socially driven, or motivated by more external, environmental, and/or diagenetic factors? Section 12.2 discusses the implications of these choices and 12.3 compares the Le6 and Le7 data to a selection of other site types to explore how processing choices may reflect, and thus help reveal, both production priorities and site function. Morrison’s (1994) framework of intensification is revisited in section 12.4 in order to examine the intensity and scale of animal-use at these sites. Section **12.5** re-assesses the nature of Le6 and Le7 in light of these new findings. The place of these sites within the EIA landscape and the potential drivers of intensification are dealt with in section 12.6. This chapter, and thesis, ends (section 12.7) by discussing future routes of research and the conclusions of this study.

12.1 Patterns of Use: Social or External?

- Procurement

The occupants of Le6 and Le7 did exploit a number of different habitats, evident in the range of species present in these features (Table 5.3). While snared, gathered, fished, and some herded species are present, hunted mammals clearly dominate procurement efforts. At both feature and phase level, there is a highly pervasive focus and effort centred around the acquisition of wild mammals, specifically ungulates. There are notable trends within this group as well.

A few smaller species (such as impala and duiker) and juveniles occasionally appear in the assemblage, but the vast majority of the specimens present are both adult and large. There may also be some preference for gregarious taxa—which could tie to the age and size preferences and thus maximising meat yields per hunt (sections 5.5 and 5.7). Evidence indicates a strong preference for and targeting of large, wild ungulates at these sites (e.g. Fig. 5.4). This fully aligns with Plug's (1989a) original interpretation of 'hunting reliant'. However, this interpretation simply describes the faunal presence and basic subsistence choices, rather than engaging with what drove this selection. This raises questions about whether this wild focus was dictated by environmental conditions, or marks social, or socio-economic, choices that sprung from other drivers.

Plug (1988, 1989a, 1989b) was the first to engage with this question, and presented some details on the environmental conditions for this period (sections 2.2 and 2.4.2). The KNP region as a whole has been identified as a relatively hostile environment for domestic animals, due to both limited grazing potential and various disease factors (e.g. Meyer 1984, 1986: viii; Plug 1989a; Plug & Pistorius 1999; Titoy 1994). Therefore, these factors may have curtailed herding at Le6 and Le7 (e.g. section 2.4.2; Plug 1989a). There are relatively few cattle and ovicaprines present (e.g. Table 5.6), and there may have been an environmentally proscribed element to their use at these sites.

Despite the possible domestic animal-limiting factors, these sites display no signs of meat scarcity. In her studies, Plug (1988: 359) found no evidence of famine foods, a degraded environment, or resource depression, nor was there "evidence that game supplies dwindled" (Plug 1989a: 63). Instead, the species and individuals at Le6 and Le7 were adult animals of great size, suggesting a focus on meat yield. Their size points not only to the robust health of the animals in question but also to favourable grazing conditions. The variety of herbivores present, with their different feeding strategies, also suggest a varied environment capable of supporting a wide mix of species. As wild, non-fenced individuals, these animals would likely not have persisted in this area had the environmental conditions been poor. As they clearly were present, given their existence in the excavated features, it seems that the region surrounding Le6 and Le7 supported a thriving wild faunal community.

Rather than utilising the wide range of taxa available (e.g. Joubert 1986; Plug 1989a, 1989b) there is an explicit procurement focus on select prime species—who were evidently plentiful in number—within this evidently rich environment. The processing strategies point to an equally bountiful situation, as the carcasses in these features are far from being fully utilised. This selective, if not wasteful, use (discussed below) does not suggest resource scarcity or stress. Additionally, the consistency with which these large, adult ungulates appear in these features is unlikely to have developed through mere incidental encounters while hunting. Instead, these taxonomic patterns suggest very deliberate hunting strategies and target selection.

The possibility of scavenging as a procurement strategy cannot be dismissed out of hand (Chapter 5). There is little consensus in terms of what skeletal patterns, if any, might definitively differentiate scavenging and active hunting (e.g. Marean 1998; O'Connell et al. 1990). Given the sheer number of variables that modulate the movement of skeletal material in both circumstances (e.g. Bunn et al. 1988; O'Connell et al. 1990), positively distinguishing between the two—especially in assemblages composed of multiple procurement events—seems unlikely. Given this, I will not attempt to determine if certain species were hunted or scavenged: I interpret the majority of Le6 and Le7 remains as representing actively hunted individuals. For example, the virtually complete complement of skeletal elements present for many of the ungulates align more with definitive hunting than scavenging.

Occasional and/or opportunistic scavenging could be possible. I do not think such incidental activities would drastically alter the overall interpretation of these sites. For instance, the rhinoceros and hippopotamus, or even the giraffe, may have been scavenged, which could account for the types of remains present (i.e. mostly limbs, few scattered axial elements). Alternatively, they may also have been actively hunted. Either way, these animals were selected for use, carried back to site, and processed.

Before discussing the implications of these procurement trends, the predominant drivers of the taphonomy at Le6 and Le7 must be addressed.

- *Processing*

With a socially focussed taphonomic analysis, one must consider whether the observed patterns represent human actions or are the byproducts of other, more diagenetic agents (e.g. Orton 2012). For Le6 and Le7, the former appears to be the most significant taphonomic factor at work.

As there are few, if any, signs of purely density-mediated attrition (Chapter 6), this process likely had little influence on the composition and condition of the assemblage. This fact is further bolstered by the recovery of other highly delicate remains (e.g. neonate bones and rib cartilage). Rodent gnawing also had a negligible effect on this material (Chapter 7). Weathering and carnivore gnawing (Chapter 7) were more frequent but rarely severe. Thus they also probably did not have a significant impact on general attrition at both sites, nor did they much affect the other taphonomic marks present. Burning (Chapter 9) was also rarely severe and even less common, and only minimally affected the structural integrity of the material.

Breakage and fracturing (Chapter 8) played a major role in shaping these assemblages. However, much of that breakage seems to be the result of distinct human choices, rather than peri- or post-depositional fragmentation. For example, ‘old’ fracture types are rare, there is very little comminution overall as pieces are often large if not wholly complete, and the rates of completeness and fragmentation seem to fall in line with a specific fat selection strategy. Additionally, a significant portion of the breakage is evidently driven by, or associated with, the butchering (specifically chopping) of these elements (*cf.* Plug 1984b; Chapter 10). As butchery is a distinctly human process, it does not count as a diagenetic factor nor does the breakage caused by it. Finally, the skeletal elements (Chapter 11) are relatively well-represented throughout the skeletal regions (at least across the ungulate taxa). This pattern implies that the skeletally differential taphonomic patterns are not driven by mere presence or absence of certain elements or regions but by selective processing modification.

The Le6 and Le7 assemblages, and the taphonomic patterns within them, were not produced by vagaries of chance post-depositional processes. Instead, they seem to largely reflect distinct human actions. Nevertheless, these more diagenetic factors do speak to certain aspects pertaining to the creation of these deposits, which will be discussed below.

Altogether, the narrow procurement focus, coupled with the taphonomic nature of these assemblages, points to social choices rather than external parameters shaping use. Section 12.2 now considers the implications of these choices.

12.2 Implications of Choice & Signs of Intensification

12.2.1 Hunting: Target Priorities

Although it has been established that Le6 and Le7 are 'hunting reliant' (Plug 1989a) and almost 'wholly wild', one must also consider the differences between occasional hunting and intensive hunting. The former may mark a more supplemental, part-time activity, where certain wild taxa are occasionally procured to augment other food production strategies (e.g. herding). The latter speaks to much more focused efforts, with more time and energy invested into hunting. One would also expect notable differences in the type and number of animals procured, as well as differences in butchering and processing strategies. This comparison of the two approaches to hunting contrasts two of the main components of Morrison's (1994) paths to intensification: specialisation versus diversification.

As discussed in Chapter 3, Morrison (1994) presents specialisation as one of the three main components of intensification. If specialisation is defined as "the economic focus on a narrow range of resources" (Betts & Friesen 2004: 357 after Morrison 1994), then the pronounced targeting of large wild ungulates at Le6 and Le7 may qualify as 'specialisation'.

The number of different ungulate taxa within this category does not negate this interpretation of a narrow hunting focus: the aim was evidently simply ‘large ungulate’ rather than a particular species. There were also smaller mammals and non-mammals in the assemblages, but these appear to be more occasional captures than regular targets. Additionally, the predominance of large, wild ungulates also points to significant quantities of time and energy being focused on the hunting of these specific taxa types. Therefore, not only do these types of species indicate a suitably narrow focus on a particular type of resource, but the number of individuals from these species—and so the time and effort invested in their acquisition—further indicate an intensified focus.

One must also consider the hunting skill necessary to consistently capture and kill species such as buffalo, rhinoceros, and large groups of wildebeest. Many of these species are known to be dangerous to hunt (*cf.* Skinner & Chimimba 2005: 535,559,624). In the taxa present at Le6 and Le7, the inhabitants of these sites show their distinct hunting prowess. Plug (1999: 194) also concluded that “the variety of species [at KNP EIA sites], including large and dangerous animals, prove that hunting expeditions were well coordinated and that hunting techniques were advanced”. If the Le6 and Le7 bone points and shaft sections (section 5.6) are indeed arrow components, it would also fit in with this strong hunting focus. It may even relate to Morrison’s (1994) element of technological investment (see below). The consistency with which these large wild ungulates appear attests to very particular skills, choices, and investment on the part of the human hunters. As the taxonomic patterns visible in these assemblages are unlikely to have developed incidentally, they point to deliberate selection. It is unlikely these animals were sought simply for the risk involved, as these species and individuals represent valuable hunting targets. This indicates that, instead of ensuring ease or safety in acquisition, the aim of this hunting was centred on maximising the meat (and/or other animal products) produced per animal procured. The river-side location of Le6 and Le7 (Fig. 2.1) may have also aided in this aim, increasing the chance of encountering animals in close proximity to the sites. This in turn may have played a role in the prevalence of nearly complete skeletons (e.g. Chapter 11), as carcasses would not have to be carried far for processing.

Therefore, rather than a more generalised or ‘diversified’ species selection, Le6 and Le7 display quite a narrow and arguably ‘specialised’ intensified focus on mainly one type of taxa—large, adult wild ungulates. This, coupled with the elements of time investment and skill discussed above, suggests that at least the procurement strategies employed at these sites indicate a degree of intensification (as manifest in specialised—following Morrison [1994]—strategies). The discussion now turns to how these animals were dealt with once procured.

12.2.2 Processing Patterns

While the taxonomic selection displays something of a differential focus, do the processing patterns? Are there signs of differentiated treatment and processing? There are signs of selective use at Le6 and Le7, but only in certain parts of the processing and utilisation sequence. This is evaluated first through disposal practices, before returning to cooking and butchering practices.

- *Disposal*

Where the samples were of comparable sizes, no taxa, region, or size class was definitively more or less weathered or gnawed by carnivores (Chapter 7), nor marked by different rates of rodent gnawing or density-mediated attrition (Chapter 6). There may possibly be a slight relationship between animal size and weathering (and possibly size and gnawing), but the significance of this, if any, is unclear. Within the skeletal elements, the joints, feet, and epiphyses may have been more highly and regularly gnawed by carnivores. This seems to have more to do with scavenger preferences (e.g. Marean 1991) than differences in disposal practices. The generally frequent carnivore gnawing still ties to discard practices, in that carnivores were evidently allowed access to these remains. But in terms of the importance of disposal choices, the most significant factor is the relative lack of severe weathering.

Instead of exhibiting the variable weathering types and severity associated with the gradual build-up of material (Behrensmeyer 1978), the rarity of severe weathering at these sites implies rapid burial. Apart from scattered elements found at the surface of these features, there are no signs of significant exposure nor gaps between deposition events in a single feature. It appears that material was deposited and buried rapidly. This is corroborated by the types of weathering present. Fine-line fractures were one of the most common types of weathering identified. These are associated with the earliest stages of cortical weathering (Behrensmeyer 1978; Phoca-Cosmetatou 2005), again pointing to limited exposure prior to burial. This limited exposure aspect also has implications for potential scavengers.

Rather than leaving bones in convenient concentrations, dogs are known to scatter the bones they chew on (Kent 1993). This means finding an accumulation of gnawed bone in the midden implies secondary disposal (e.g. Kent 1993). In other words, someone cleaned up the bones (post-gnawing), and deposited them in the pits and ash heaps of Le6 and Le7. Combining this information with the light weathering observed indicates relatively regular and rapid site cleaning and deposition. The scavengers (domestic dogs or other wild carnivores) did have access to the remains, but only briefly before they were deposited in features, where they were then protected from the elements.

The presence of articulating elements also aligns with this interpretation. Had portions (e.g. hock joints with their full set of articulating tarsals, astragali, and calcanea or full sets of re-articulating carpals: Fig. 12.1) been discarded by the occupants of the site(s) and ‘left to the dogs’ for extended periods, it is likely that those elements would not only have been disarticulated and scattered but also would express greater weathering, gnawing, and overall damage than is visible. Although some of these elements show light weathering and a few superficial carnivore marks, the fact that there are a number of sets that still articulate points to material being quickly removed and deposited.

Fig. 12.1 A selection of the articulating carpal and tarsal sets from Le6 features.

Altogether, there may be no distinct signs of differentiated disposal that shed light on views towards individual taxa types (e.g. Brown & Emery 2008). However, peri- and post-depositional taphonomic forces do indicate that refuse was produced and disposed of quickly, hence the evidence of rapid burial in the very light levels of weathering in particular. This speed of production links directly to the rates and manners of processing.

It is in the more human-linked aspects of processing that the first clear signs of differentiation appear in the taphonomic record. This selectivity does not fall along taxonomic lines—although the large wild ungulates bear the brunt of the taphonomic modification as the most populous group present—but instead seems linked to carcass products, such as specific meats and fats. To explore this, the following subsection discusses the various forms of differentiation, and thus strategy and priority, which appear throughout the patterns of fragmentation, then burning, butchery, and skeletal representation.

- *Fat and Fragmentation*

With high levels of fracturing likely associated with marrow extraction and differential levels of completeness, it seems that Le6 and Le7 show signs of selective but not intensive fat exploitation. There are clear signs of marrow extraction within the traditionally ‘high-value’ elements (e.g. long bones), but extensive use of all possible fat sources is not evident. These assemblages clearly have not been wholly comminuted.

Figs. 12.2-3 A selection of astragali, carpals, and tarsals from Le6 and Le7.

Karr (2015: 4) specifically states that “whole bones represent complete bones that were not exploited for bone fats”, which largely describes the appendicular cancellous bones at Le6 and Le7 (Figs. 12.2-3). Moreover, bones with incomplete shafts but more complete epiphyses are a sign that marrow was exploited but not the epiphyseal bone grease (*cf.* Karr 2015; Outram 2001). While the Le6 and Le7 epiphyses are not complete, their fracturing seems to be more of a by-product of marrow extraction (e.g. longitudinal splitting started at the epiphyses) rather than the higher fragmentation one could expect had bone grease truly been exploited (e.g. Janzen et al. 2014).

Thus it seems that, at Le6 and Le7, there was regular utilisation of the rich marrow housed in the oft-fragmented long bone shafts. However, if there was use of the epiphyses or the other cancellous appendicular bones, it was certainly less pronounced or regular. Within the axial regions, if the structural weakness of many of these elements (e.g. ribs, pelvises) is taken into account and one instead looks at the more robust sections (e.g. vertebral bodies: Table 8.7), there is notably higher completeness among these possibly less ‘valuable’ and certainly less accessible fat sources (e.g. Bunn et al. 1988).

The focus appears to be only on the easily extracted and rich sources (e.g. where there is the most output for least energy expended, such as in the long bones, first phalanges, and certain mandibles). If combined with the speed and efficiency that may be indicated by the longitudinal chopping method (discussed below), these may be signs of both selective use and possibly standardised processing methods. The repeated methods and patterns of breakage seen in this material begin to speak to a certain repetitiveness in the processing. The same patterns are evident between phase, feature, and species (excluding the carnivores and small mammals). Size may have been a slightly modulating factor, but on the whole, very similar patterns are seen between the size classes as well.

Within the large ungulates present, the same elements are seen to be repeatedly fractured in the same ways. For example, the metapodia are split axially between the distal condyles (Fig. 12.4), the radii through the proximal epiphysis (Fig. 12.5), and the humeri sheared straight through the distal condyle (Fig. 12.6). Part of this repetition is certainly driven by physical characteristics, as the structure of these bones in some ways requires such strategies (Seetah 2006a: 103). That does not wholly remove the butcher’s agency, as they still consciously chose to split these long bones in this manner.

Figs. 12.4-6 A variety of longitudinally split metapodia, radii, and humeri from Le6 and Le7.

These types of butchery methods also introduce an important question about tools. For example, the type of clean longitudinal splitting can be indicative of the type of instrument used. In fact, Seetah (2006a: 122-123) uses these same characteristics to describe cleaver-type damage in an assemblage. I return to this point with the butchery below, where the question of speed will also be re-addressed, as chopping through these elements in this manner may have been faster.

Altogether, these factors may begin to elicit the nature of these sites. In discussing North American bison processing sites, Morlan (1994) specifically notes that bone completeness at kill sites is quite high. Bamforth (2011: 28) echoes this sentiment in describing bison "carcasses [left] largely intact" at large kill events. Conversely, greater processing (e.g. higher fragmentation) characterises longer-term settlements (Morlan 1994). The completeness of the Le6 and Le7 assemblages seems to align more closely with Morlan's (ibid.) predictions for a kill site than a longer-term residential site.

Moreover, this material has not been evenly processed. The greatest focus and modification (e.g. fragmentation and fracturing) was evidently on those elements with the highest value fats. In terms of subsistence, these types of patterns are typically described as "wasteful" (e.g. Halstead 2007: 36),[13] in that not every dram of nutrition has been extracted from the given skeletal material. There are other signs of 'wasteful' usage at these sites. Which then begs the question: what drove such waste? Given the size of the many animals present, there was certainly a surfeit of meat available, so perhaps there was simply little need for more intensive extraction of the 'lesser' remnants of nutrition in the skeletons (*cf.* Seetah 2008).

At first, given the sheer quantity of meat present at these sites, any fat use might seem anomalous or superfluous from a purely economic or subsistence-based modern standpoint. With the large quantities of high value meat present, why use fat? This view ignores a few key aspects. The first is purely physiological: a person will get sick if subsisting primarily on only lean meat protein (e.g. Speth & Spielmann 1983). Adding fat to the diet is an easy way to avoid this (e.g. ibid.). Additionally, the avoidance or de-valuation of fat is a modern trend

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[13] Although see page 189 for discussion of the use of 'waste' here and Seetah (2008) for a broader discussion of culturally or socially shaped views of what constitutes waste or wastefulness.

(e.g. Outram 2001; Seetah 2006a: 30,84,92-93; Speth & Spielmann 1983). In the past, fat would have likely held higher value than today—for both dietary and non-food uses (e.g. Binford 1978: 24; Lupo et al. 2013; Outram 2001; Rao et al. 2015; Seetah 2006a: 48).

Fat preparation is more often associated with residential sites (e.g. Morlan 1994), although there are also ethnographic examples of marrow being eaten at kill sites (e.g. Bamforth 2011; Bunn et al. 1988; Kent 1993). This could be particularly true if the animals to be processed were large, like those found at Le6 and Le7, as "[l]arger animals generally take more time to process for transport during which time people get hungry" (Kent 1993: 336; Bunn et al. 1988). This point is raised again in the context of both burning and skeletal representation.

Despite the evident marrow use at Le6 and Le7, many sources of in-bone fat, and thus nutrition and/or non-food resources, were ignored. This type of usage can also be described as narrow, in that it focusses on a specific product, which returns us to one hallmark of intensification: specialisation (Morrison 1994). While the fat usage is not 'intensive' in regards to the full utilisation of all available resources—as is seen in the highly fragmented assemblages at other EIA sites (e.g. Voigt 1984a)—it does seem to fit in with the specialisation facet of Morrison's (1994) view of intensified use.

Unlike the evidently highly selective fat use, the scant burning present on Le6 and Le7 bone does not present any clear signals as to carefully and significantly differential patterns. The burning may still shed some light on a few potential human choices which could tie into the overall priorities at Le6 and Le7.

- *Burning*

The burning on the Le6 and Le7 assemblages is likely the result of multiple processes. The patterns seen may be indicative of both roasting and/or marrow warming. The possibility of either boiling or de-fleshing prior to cooking may account for the absence of burning on certain taxa (as in the absence of burnt domesticates discussed in section 9.2.1). De-fleshing is relatively common across the taxa (Chapter 10), which may account for the overall scarcity of burning on the bones. It seems less likely that boiling was a regular practice at these sites.

The size of the skeletal fragments seems somewhat incongruous if boiling was common (*cf.* Janzen et al. 2014; Kent 1993). An assessment of the size and types of ceramic vessels found at these sites (e.g. whether they were notably bigger so as to accommodate larger pieces) could help illuminate these questions.

It does seem that Kent’s (1993) assertion that burning is an equivocal tool at best, at least regarding macroscopic colour changes, appears to hold true for these two sites. When linked with other lines of evidence, such as fracture analyses, burning may still aid in interpretation. For instance, while the bones themselves display few signs of charring, there are a fairly large number of fractures that may be associated with heat treatment (section 8.2). Ethnoarchaeological and experimental studies also indicate that marrow is easier to remove when heated (e.g. Gifford-González 1989; Kent 1993; Outram 2002). Thus, while the burning is largely absent, the fracturing patterns indirectly confirm the cooking and preparation activities that did take place. Butchery, especially marks related to dismemberment, is another route through which to address potential roasting.

If roasting were common, one might expect fewer signs of dismemberment, especially below the shoulder and hip, as larger portions are generally roasted at once (e.g. Kent 1993; D. Orton 2008: 266). This is not the case for the Le6 and Le7 material. There is evidence of dismemberment (via chopping) throughout most skeletal elements, including the various portions of the limbs. Yet, if this butchery is compared to the possible roasting-related burning (i.e. articulation specimens burnt brown or black), there are potential signs of occasional roasting. It may be that individual elements, rather than sizeable limb portions, may have been occasionally roasted. This would account for the burning present as well as the greater number of chops.

Altogether, roasting does not appear to have been a regular practice at these sites. Although cooking habits can greatly affect butchery strategies (e.g. Gifford-González 1993; Seetah 2006a: 91-92; Yellen 1991a), sporadic roasting likely had little influence on the overall Le6 and Le7 processing choices. If roasting seems to have been only an intermittent event, what of the de-fleshing also suggested above? This, and the cuts and scoop marks associated with it, will be discussed below.

In terms of intensity, the burning evident on the Le6 and Le7 material can hardly be described as intensive. If there is some roasting evident in the material, it may also point to 'wasteful' practices. Russell (2011: 389) has suggested that roasting may be classified as wasteful, as boiling is a more efficient method for extracting all possible nutrients from a bone. However, time may have been an additional factor, as roasting may be the faster cooking method (Kent 1993).

Yet the butchery marks do not show a particularly strong ‘roasting signal’ (in the dismemberment patterns) and instead show signs of significant de-fleshing (e.g. meat removed prior to cooking). This raises significant implications about priorities, time-management, and use strategies. Cutting meat off the bone before cooking takes more time and effort than doing so afterwards (e.g. Bunn et al. 1988; Gifford-González 1993; Halstead 2007; Henrikson 2003; *cf*. Lupo et al. 2013). It may also lead to increased butchery damage, as uncooked bone may be more susceptible to retain traces of butchery marks (e.g. Halstead 2007). If filleting raw meat requires more energy expenditure, it also implies a specific reason for doing so. Preservation may be one such reason, and brings the discussion back to a consideration of the nature of these sites.

If Le6, Le7, or any phase therein was a kill site, there may be certain characteristics one would expect. For instance, there may be fewer signs of cooking, as not all meat procured was consumed there (e.g. Gifford-González 1989). This brings up a key point. Cooking, and with it burning, are often approached with the assumption of immediate consumption. If that was not the case, and instead most processing was undertaken with preservation in mind, the methods used may greatly influence both the choices made and the resultant assemblages (e.g. Friesen 2001; Friesen & Stewart 2013). As freezing was not an option for the southern African EIA hunters, smoking, salting, or drying were other ways in which to extend the usability of meat (*cf*. Friesen 2001; Friesen & Stewart 2013; Henrikson 2003; Rixson 1989).

Filleting is also a key part of certain preservation methods. This is particularly true for drying[14], during which meat must be removed from the fatty bones to facilitate proper dehydration and to avoid putrefaction (e.g. Henrikson 2003). Especially in the warm climate of the KNP, the preservation processes would have to be started very quickly to prevent spoilage (*cf*. Friesen & Stewart 2013). If preservation was the intention at Le6 and Le7 and transportation was also a crucial consideration, the resultant filleting would mean bones were rarely burned, as the meat was stripped before any further processing took place. Additionally, as long-distance transport may have been a crucial factor in decisions at a kill site, it is also likely that meat would have been filleted from the bone simply because of weight issues (e.g. Bunn et al. 1988; Driver 1990; Gifford-González 1993; Grayson 1989; Henrikson 2003; Kent 1993; Lupo 2006).

The use of preservation methods does not mean that there would have been no cooking at Le6 and Le7. Any portions that were eaten at the site during the larger processing activities may still show cooking damage. Such on-site consumption is highly likely as the processing of the many large animals at Le6 and Le7 would have taken considerable time (e.g. Kent 1993; Lupo 2006).

The next stage considers the butchery practices involved in this processing. In addition, I identify any further signs of speed, repetition, or wastefulness that may be related to a kill site assemblage.

- *Butchery*

Apart from the original procurement choices, butchery appears to have had the single biggest impact on the Le6 and Le7 assemblages. In particular, it appears that either most of the carcasses were returned largely complete or that, on average, most parts of the skeleton were returned to site (Chapter 11). Indeed, not only is there much butchery, but it also directly links to the breakage seen[15], which was the other major taphonomic modification factor at

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[14] Presumably this applies to salting and smoking too, as they also involve the removal of moisture from the meat.

[15] Breakage in all skeletal regions often retained the remnants of the chop that drove it, such as the chopped-through long bone epiphyses and first phalanges.

these sites. As presented in Chapter 10, not only is there very frequent butchery, but chopping dominates throughout all features, phases, taxa, sizes, and skeletal regions. The distribution of cuts and scoops is less even and frequent and the function of these varying marks must be addressed.

Both chopping and cutting may be used to disarticulate elements (e.g. Seetah 2006a: 96-97, 2006b). If cuts were used rather than chops for dismemberment—as slicing through ligaments takes less energy and strength than chopping through a joint (e.g. Seetah 2006b)—one would expect cut marks to essentially replace chop marks in the breakdown of butchery marks present. Instead, cuts are 'added' to the chops at Le6 and Le7: in the features, phases, and elements with greater numbers of cut specimens there is not an accompanying decrease in the prevalence of chopping (e.g. Fig. 10.3, with the Le6 joint category being the only potential exception to this). Moreover, while cutting can be used for multiple purposes, it is simply not practical to utilise chopping as a main de-fleshing tactic (*cf.* Seetah 2006a: 20). It therefore seems that chopping was primarily used to separate the skeletal elements, as can be expected with the type of processing undertaken at these sites (e.g. Bamforth 2011; Frison 1970; Seetah 2006b).

Dismemberment may have occurred at a variety of different stages in the processing sequence. Some chopping may have been part of the original portioning of the carcass to transport it to site (e.g. Bunn et al. 1988; Lupo 2006). Many of the species at Le6 and Le7 weigh (at least) hundreds of kilograms apiece (e.g. Skinner & Chimimba 2005). Therefore, dividing a carcass between carriers at the kill site could have facilitated their transport back to the site for further processing (*cf.* Bunn et al. 1988; Lupo 2006). There would have been additional disarticulation during preparation sequences as well, when bones and regions are first separated from one another and then de-fleshed and/or broken open for their marrow (e.g. Seetah 2006a, 2006b). A carcass may also be split apart so that multiple people could work on it at the same time (e.g. Bunn et al. 1988), or so that different portions can be shared out to different people (e.g. Bunn et al. 1988; Lupo 2006). Overall, given the overwhelming ubiquity of chop marks, disarticulation was clearly one of the most frequent processing actions at Le6 and Le7.

The cut and scoop marks prevalent at Le6 and Le7 probably occurred while stripping meat from the bones of these carcasses and possibly (in the case of the cuts on elements like phalanges and metapodials) from skinning. Some of the chops may also have been incurred during coarse though quick meat removal (*cf.* Rixson 1989). Nevertheless, the majority of chops likely stem from dismemberment and portioning, while cuts and scoops relate to de-fleshing and finer processing. In contrast to the consistently present dismemberment, there appears to be selective patterns of use in the further processing of these carcasses.

Beyond cataloguing specific types of actions, these mark types also elucidate the overall goals of this butchery and processing. For instance, the Le6 and Le7 butchery patterns do not appear to mainly cater for a variety of cooking methods (i.e. roasting of large potions). Nor does it seem that significant time was spent assiduously removing every scrap of meat with a suite of careful cuts, as de-fleshing marks are not that widespread throughout the carcass. There may be signs of occasional cooking and on-site consumption, visible in the possible roasting of some elements and eating of certain marrow sources (e.g. metapodials, phalanges, and mandibles) (e.g. Kent 1993; Frison 1970). These sporadic events seem insignificant in contrast to the apparently main purpose of butchery on these sites: large-scale processing. This magnitude is seen in manifold ways: the sheer number of carcasses that were procured and thus required processing, the number of butchered remains, the consistency in butchery patterns, and the relatively specific focus of that processing.

The utilisation patterns suggest that efforts were concentrated on the exploitation of certain resources within the carcass. For example, little effort seems to have been spent stripping all meat from certain portions of the skeleton, such as the axial elements. Given the complex shapes of the axial elements, notably more time and, for example, cutting is required to completely remove all meat (e.g. Bunn et al. 1988; *cf.* Lupo 2006). Instead, the butchery in this region is dominated by chops to separate these bones from those possibly more valuable (in terms of meat weight) and easily processed (e.g. rib blades and long bones).

In contrast, Lupo (2006) describes the ease and speed with which appendicular elements can be de-fleshed. It is therefore perhaps unsurprising that there appears to be the most ‘intense’ butchery (e.g. frequent marks) on appendicular bones even though the overall utilisation of the skeleton can be classed as neither thorough nor intense. This limb focus is also notable in the increased occurrence of cuts and scoop marks, especially amongst the meat-rich upper and middle long bones. This pattern raises the question of why de-fleshing was practised. It may be associated with cooking, as in the roasting or boiling of bone-less fillets. Alternatively, as mentioned above, it may relate to preservation methods as de-boned meat is easier to dry (e.g. Henrikson 2003) or to reduce weight in transport (see below).

As filleting is both time consuming (e.g. Gifford-González 1993; Henrikson 2003; *cf.* Lupo et al. 2013) and nutritionally wasteful (e.g. Seetah 2006a: 88, 2008), there would have to be specific factors or circumstances that motivated those choices. What might drive this type of selective use and potential wastefulness ties back to the precepts of a socially-focussed butchery analysis. It is necessary to consider the main motivating factors behind these processing strategies, the butcher’s personal actions, and the nature of these sites. These factors all may draw back to the idea of intensification: in this case manifest in not only the selective use of carcass parts, but also in skills and practice at a specific type of act. For Le6 and Le7, it is skill and practice at butchering large mammals in consistent, repetitive manners and possibly doing so rapidly.

- *The Butchers*

The selective use seen within processing patterns must be addressed. The narrow product focus refers back to Morrison’s (1994) specialisation in the process of intensification. In this, the Le6 and Le7 butchery mirrors the procurement strategies, with the narrow focus on large ungulates. Furthermore, much of that selective butchery appears to be concentrated within this taxa type, which points to a doubly focussed goal: the exploitation of particular meats and fats from these specific animals. That still does not wholly explain why there is such ‘wastefulness’ apparent in the processing here. It is difficult to unequivocally define waste and as a term it can be problematic (e.g. Halstead 2007; Seetah 2006a: 89-90, 2008). Here it is employed as a heuristic device to describe elements that the butchers and other processors elected to not fully process. At Le6 and Le7, the presence of articulating elements, whole elements, and entire regions whose nutritional potential does not appear to have been fully exploited all point to 'wastefulness'.

These choices could have been shaped by simple preferences for certain portions and products over others. However, that would seem somewhat arbitrary, especially in comparison to the thorough usage seen in other EIA assemblages (e.g. Voigt 1984a). It would seem that more concrete factors may have driven these choices. Travel and transport weight were discussed above, but time restrictions could play a comparable role in shaping these types of evidently wasteful decisions.

Time limitations could be imposed in a variety of ways. Large numbers of carcasses arriving on site in a short period of time means the meat would have to be processed rapidly to avoid spoilage. A site only occupied for a limited time would also induce a similar need for carcass processing speed. In either or both cases, this kind of situation might concentrate selection and utilisation efforts on those elements or portions that proffered the best yield for time spent processing (e.g. Lupo 2006: 30; Lupo et al. 2013; Metcalfe and Jones 1988). Time-based selective use patterns would then be evident in the types of elements that were heavily and thoroughly exploited, as is seen at North American bison mass kill sites (e.g. Bamforth 2011: 28; Byerly et al. 2005: 621-622; Frison 1970; Widga 2004) and here in the Le6 and Le7 material. Therefore, selective use could be one strategy for dealing with limited processing time. There are also other signs of processing speed at these sites as well, such as the rate of deposition in the pits and ash heaps and specific butchery techniques.

- *Signs of Speed*

As aforementioned, the often complete and un- or under-utilised skeletal remains in these features display virtually identical weathering and overall taphonomic conditions, indicating that each faunal specimen (and the animals they came from) was captured and introduced to the deposits at the same relative times. There is no evidence of the kind of weathering, or layers of more extreme weathering, that one would expect if the pit fill had been slower. It seems that the Le6 and Le7 inhabitants were obtaining essentially prodigious quantities of meat (evident in both the number and size of the species procured) for these 7-8 ha sites (Meyer 1986: 149) in some haste, which resulted in the rapid production of waste and subsequent discard and burial of the faunal remnants. The processing choices made also display haste in action.

While it may take more time to de-flesh and fillet an uncooked element (e.g. Gifford-González 1993; Halstead 2007), chopping is faster than cutting when dismembering a carcass (*cf*. Seetah 2006a: 99, 2006b). The presence of significant chops could well indicate an interest in speed on the part of the butcher. Seetah (2006a: 100) specifically states that this type of chopping indicates a distinct "need to disarticulate the carcass rapidly" and that if there were not a "need for fast […] dismemberment" such mark types and patterns would not be seen. Seetah (2006a: 223) goes on to specifically list "chopped femoral heads [and] scoop marks"—both seen in the Le6 and Le7 assemblages—as two butchery points that can "point towards fast, economic methods of portioning" in archaeological assemblages. All of these aspects are found at Le6 and Le7. These butchering strategies also necessitate the use of proper tools.

Although I did not distinguish the type of tool responsible for the Le6 and Le7 butchery, most marks possess the hallmarks of metal tools (i.e. very even v-shaped marks) (*cf*. Greenfield 1999). It would also be exceptionally difficult to execute some of the butchery seen (e.g. chopping cleanly straight through epiphyses) with stone tools. Thus, much, if not all, of the butchery at these sites was probably undertaken with metal implements.

If one considers the forces involved in chopping through, for example, the dense distal epiphysis of a robust adult buffalo humerus, it is unlikely that a knife would have lasted long in such activity (*cf*. Seetah 2006b). It seems more likely, and certainly preferable from the perspective of the butcher, to have cleaver-type[16] tools that could cope with this kind of high intensity usage (ibid.). When considered in conjunction with the number of large mammal

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[16] This might include axe-like tools (cf. Bunn et al. 1988), but a more comprehensive discussion of specific tool attributes or possibilities would require further archaeometallurgical work.

remains that were processed in this precise manner, having such tools would have been a necessity.

The finer cuts at Le6 and Le7 may indicate that there were also knives (or similarly slimmer blades) present. While it may be possible to remove meat with a “chopper” (Rixson 1989: 50-51), it is easier to strip meat with the proper tools (i.e. knives) (Seetah 2006a: 20). The variation in the de-fleshing marks could also point to different types of tools. Seetah (2006a: 123-124) describes ‘scoops’ being left by a larger blade employed to strip meat, while finer slices may suggest the use of smaller, slimmer knives. If the Le6 and Le7 chops, cuts, and scoops resulted from of a variety of tool types it would point to the type of technological investment described as another factor of intensification (Betts & Friesen 2004; Morrison 1994).

Even with the best tools, the butchery methods described above are not easy. While these techniques require less time, they do require more effort in terms of physical strength and energy expenditure (Seetah 2006a: 223, 2006b). One may take for granted that butchery was a common activity in daily life during the EIA. Yet, it is substantially more difficult to execute some of these actions than others: chopping through a femoral head, as opposed to carefully cutting away the attaching ligaments, takes greater strength and a practiced hand (*cf.* Seetah 2006b). This ties back to the possibility of special skill on the part of the butcher (Seetah 2006b). In the Le6 and Le7 material, this experience is seen both in the types of butchery choices made and in the consistency present.

- *Consistency: Special Skill?*

Elsewhere, consistency in butchery patterns has been associated with the rise and development of professional butchers (Sykes 2014: 15) and may provide insightful examples with which to compare the Le6 and Le7 assemblages. 'Professionalism' and its many implication are not aspects I am in a position to address within the context of these sites and the EIA of southern Africa. However, the similarities in the butchery between ‘professional’ assemblages (e.g. Seetah 2006b: 111-112) and those at Le6 and Le7 do speak to certain traits, qualities, and priorities on the part of those carrying out this type of processing. These correspondences include the signs of speed and efficiency in utilising faunal remains, skill and practice in handling large mammals consistently that relate back to questions of intensification and specialisation, as discussed below (section 12.4 and 12.5). But the similarities also include a specific interest in certain products, as is apparent in the 'wasteful' patterns at these sites. It is essential to note that here 'waste' or 'wastefulness' does not relate to inexperience or sloppy practices (e.g. Seetah 2008). Rather, the patterns at Le6 and Le7 show 'waste' in the sense that only specific products were consistently sought, selected, and utilised, with the remainder being discarded. These are highly conscious choices and speak to specific value systems at work within the butchers and hunters at Le6 and Le7. In fact, returning to the concept of specialisation, Seetah (2008: 141) states that practices where the bones are largely un-processed and left un-used (such as at Le6 and Le7) "[are] highly wasteful and possible only within specialised societal situations". Again, this means that these patterns point not to incidental actions nor accidental situations, but to intentional choices and specific strategies.

The final element, carcass transport, physically connects primary hunting with the remaining processing choices. In this it not only reflects comparable concerted and significant choices, but may also pertain to the potential off-site movement of the processed animal products. Skeletal element representation is used to examine transport, the strategies and significance behind the movement of fresh carcasses to be processed, and how that ties in with the nature of Le6 and Le7.

- *Skeletal Element Presence: Questions of Transport*

The skeletal element profiles at Le6 and Le7 are remarkably similar to those of complete skeletons (section 11.4). Apart from the least frequent and generally smaller taxa, most taxa on site are represented not by solitary skeletal elements, but by whole portions of the skeleton. As mentioned above, this means that there truly are differentiated patterns in the taphonomic results discussed in this section. The limbs do not appear to be more heavily modified only because there are significantly more limbs present: they simply have been more heavily utilised. These skeletal profiles, along with all the other hunting and processing choices made, also have important connotations for Le6 and Le7 animal-use strategies. In this case, element presence speaks to the carcass transport choices made and, especially, the energy expended in that activity (e.g. Lupo 2006; Metcalfe & Jones 1988). The representative variety of skeletal elements present in these features implies that virtually all parts of these carcasses were carried back to site[17]. As these carcasses stem from predominantly large—and thus very heavy—wild mammals, what could drive such energy-expensive choices?

There is often an inverted relationship between the size of an animal and the amount of its carcass returned to site, explicitly because of the effort involved with carrying large quantities of weight (e.g. Bunn et al. 1988; Metcalfe & Jones 1988; O'Connell et al. 1990). There are ethnographic examples of complete large animals carried back to site (e.g. Bunn et al. 1988; Plug 1989a), but generally the larger the animal the more selective the hunters are in choosing portions for transport. Therefore, the fact that Le6 and Le7 display large numbers of skeletal remains from large mammals points to distinct choices.

It is possible that animals were mostly killed close to the sites. As Le6 and Le7 are on the banks of the Letaba River (Fig. 2.1), their river-side location may have made them a prime spot for encountering animals (e.g. Bunn et al. 1988; Lupo 2006). It may be unlikely that all animals present at these sites were killed in the immediate vicinity. Lupo et al. (2013) reported that, with the Bofi and Aka (Central African foragers), virtually all carcasses of animals smaller than an elephant were almost wholly transported back to site if procured within 5 km. If the same were true for the occupants of Le6 and Le7, then even the entire carcasses of those animals procured at some distance may have been carried back to the site(s).

Even if all taxa present were encountered within a 5 km radius, there is still significant effort involved in the transport of species like the many buffalo, wildebeest, and zebra present on these sites. Bunn and colleagues (1988: 420) specifically reported that it required 20

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[17] Alternatively, as discussed in section 11.3, it may mean that there were no particular trends in part selection, and so the overall dataset presents a semblance of complete carcasses. However, many of the different elements in these features appear to belong to the same individuals: they have precisely the same degree of weathering and other taphonomic modification, are the same ages, sizes, and often even articulate. Thus, it is very possible that these represent portions from the same animals.

people to carry all portions of a buffalo carcass 1.3 km to a camp site. Thus, the Le6 and Le7 species list and skeletal profiles signify significant amounts of effort expended transporting carcasses to site. This speaks to a rather more complex use strategy—one that is not simply based on minimising energy expenditure in proportion to resources gained—and so the other factors at play in carcass transport must be considered (e.g. Gifford-González 1993).

Once an animal has been killed, decisions must be made as to how to deal with the carcass. A carcass may be carried back whole if small enough (e.g. Yellen 1991a), it could be dismembered so that the entire carcass may be brought back as portions (e.g. Lupo 2006; Lupo et al. 2013), or the carcass may be partly or wholly processed, with either meat and some bones or only meat being returned to the site (e.g. Bunn et al. 1988). While only transport costs have been mentioned thus far, it must be noted that field butchery also incurs energy (and time) costs on the part of the hunter-cum-transporter (e.g. Metcalfe & Jones 1988). Therefore, choices must be made between the amount of field butchery and carcass portions carried; a topic much discussed in skeletal element and carcass transport studies (e.g. Faith & Gordon 2007; Grayson 1989; Lupo 2006; Metcalfe & Jones 1988). Portioning carcasses can make it easier to carry more of a big carcass (e.g. Lupo 2006; Kent 1993), but even portions of large animals are still quite heavy. Further processing in the field would lessen that weight (by de-fleshing and discarding the bones) but it would also mean losing potential resources (in terms of remnant meat and, especially, in-bone fat) by leaving them behind (e.g. Lupo 2006; Metcalfe & Jones 1988).

At Le6 and Le7, there may have been some portioning of the carcasses at the kill site (as seen in the many chops) to facilitate transport, but it appears (in the skeletal profiles) that a great many of those portions were still returned to site. Thus, more effort was expended in returning carcasses to these sites, rather than spending time stripping the carcass of meat in the field and/or leaving behind less ‘valuable’ or desired portions and bones[18].

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[18] Field de-fleshing may also have been utilised, but as it renders the carcass products archaeologically invisible, I can only speak to those carcasses that were not wholly de-fleshed (and thus were returned to site and ultimately deposited in these features).

Considerable energy was spent to return all parts of the carcass to site. This cost in transport likely ties to priorities. As mentioned above, field butchery may lessen transport costs, but a portion of carcass resources may be lost during such processing, as well as the time spent doing so (e.g. Metcalfe & Jones 2006). However, if the main priority on a site is "to maximize the *quantity* of the parts returned to the [site]" (Metcalfe & Jones 1988: 494, original emphasis), then the goal would be to return as much of any given carcass as possible. Additionally, and especially with these large animals, it may be significantly more efficient to carry the carcass back to the site for processing. For example, the more heavy duty butchering tools may be kept on site (as they are unlikely to have been brought on the hunt [Gifford-González 1989, 1993]) and they are essential for the faster type of chopping evident in this material (*cf.* Seetah 2006a: 100, 2006b). It may also be possible to set up more systematic, fast, and efficient processing on site than in the field. In fact, the transport decisions mirror those made around butchery in some ways. In both situations it seems the faster yet more energetically costly methods were chosen. This still produces a somewhat paradoxical set of decisions. Extraordinary amounts of effort were expended on more energy-expensive transport and processing choices, and yet significant quantities of skeletal resources were left unused (e.g. bone grease). It is here that the importance of a second stage of transport may arise.

If carcasses were not procured for on-site consumption, but instead were intended for further travel (be it for trade or for long-distance provisioning [e.g. Driver 1990]), it may explain this evident wastefulness at Le6 and Le7. As discussed above, additional transport would induce weight limitations, not to mention preservation issues. Therefore, the aim at these sites might have been to maximise the meat stripped per carcass as the bones were too heavy to carry (particularly in proportion to their remaining, meat-less value [*cf.* Lupo 2006]). This may then have justified the high energy expenditure in bringing back most of the carcass to be processed, and also the limited amount of field butchery, as time may have been a significant issue. Once back on site, it may have been easier and faster to process the carcasses, given the tools, the signs of speed, and evidently selective processing efforts.

Essentially all of the faunal-use choices made at Le6 and Le7—from the types of animal hunted, to the whole carcasses returned for processing, and the processing patterns themselves—are precisely the type of strategies one would expect, and see, at large-scale kill and processing sites, such as those in North America (e.g. Bamforth 2011; Byerly et al. 2005; Frison 1970; Widga 2004). Processing and settlement sites may have comparable species compositions (e.g. Driver 1990), making them potential indistinguishable in terms of their species list. However, and in addition to varying taphonomic markers of use and intensity, the skeletal elements present at these different types of sites may be distinctive (e.g. ibid.). Therefore, skeletal profiles may prove illustrative in interpreting the nature and function of a site, and here the Le6 and Le7 skeletal profiles are compared to those from different site types with varying food strategies—including kill and processing sites.

12.3 Comparison of Skeletal Presence Across Sites Types

Table 12.1 presents a brief overview of the sites to which the Le6 and Le7 assemblages are compared.

The comparative sites were selected to represent a variety of hunting and processing strategies, as well as different types of sites. These include the following:

- Sites where there were both a specific focus on the hunting of particular large taxa and processing strategies centred around de-fleshing carcasses and abandoning bones: the North American bison processing and kill sites (Byerly et al. 2005; Frison 1970; Logan 1998; Widga 2004) and African ephemeral butchering stands and hunting camps (Lupo 2001).
- Residential sites where bison (Byers 2002; Driver 1990) and other wild animals (Plug 1997a) were consumed but which do not exist solely as processing locations: the “residential sites”.

Table 12.1 Comparative sites for skeletal representation.

Site Name	Location	Site Use	Length or nature of occupation	Taxa present in data compared here	Reference
Bonfire Shelter	U.S.A	processing site, medium size kill (24 individuals)	short - single kill and processing event	bison, few other large mammals	Byerly et al. 2005
Glenrock	U.S.A	bison jump and primary processing site, large scale kills	shorter occupations, re-used over long period of time	bison	Frison 1970
Spring Creak	U.S.A	processing site, small-med kill (13)	short occupations, seasonal	bison	Widga 2004
White Rock	U.S.A	processing and bone grease production	- data here is from one feature, a pit evidently used for bone grease production	bison	Logan 1998
Hell Gap	U.S.A	small residential site, but very close to kill site: processing and fat-extraction undertaken	short term occupations	bison	Byers 2002
Bonnell	U.S.A	permanent residences	long term occupation	bison, few other large mammals	Driver 1990
Phillips	U.S.A	permanent residences	long term occupation	bison, few other large mammals	Driver 1990
Block	U.S.A	permanent residences	long term occupation	bison, few other large mammals	Driver 1990
Robinson	U.S.A	permanent residences	long term occupation	bison, few other large mammals	Driver 1990
Combined Sierra Blanca sites	U.S.A	permanent residences	long term occupation	bison, few other large mammals	Driver 1990
Kadzi	Zimbabwe	permanent or semi-permanent residence with focussed hunting of large mammals	longer term occupation	buffalo, impala	Plug 1997a
Tsipitibe	Tanzania	residential base camp	seasonal	impala, zebra, alcelaphines	Lupo 2001
Mugugu	Tanzania	residential base camp	seasonal	impala, zebra, alcelaphines	Lupo 2001
Hadza butchering stands 1-3	Tanzania	one time butchering event after a kill	very temporary	medium - sized carcass (~40 kg.)	Lupo 2001

It should be noted that there is one key difference between these North American sites and the southern African ones listed here: there were no domestic animals at either the North American bison processing or residential sites (e.g. Byers 2002; Driver 1990; Frison 1970). The presence of domesticated species will affect the hunting and carcass transport decisions therein. For example, cattle may provide both meat and traction for carrying hunted carcasses. Therefore, if a broader comparison of bison sites to southern African assemblages were undertaken, the focus in the latter would have to be on the skeletal presence of the wild component (as it largely is here, given scant domesticate presence), so as to account for this difference. Additionally, at the southern African sites, real consideration would have to be given to whether the domestic or wild species were responsible for any axial bones present as they are a key part of this comparison. Other analyses and techniques, such as ZooMS and strontium isotopes, could prove valuable in these kinds of questions. For now, and on the whole, these North American sites still serve as a valid and illuminating example with which to compare Le6 and Le7.

The main limiting factor to the inclusion of more sites (and particularly of a greater number of African and/or EIA sites) was a dearth of available data. Few published papers or reports furnished the taphonomic data (especially of skeletal part presence) necessary to build these comparisons. Therefore, this group of sites represents not an exhaustive selection, but hopefully an illustrative set of distinctive types with which to compare and contrast the Le6 and Le7 data, the details of which are discussed below.

Figure 12.7 presents the skeletal frequencies of these sites compared to the Le6 and Le7 whole mammal assemblage (see Appendix Table C.2-3 for the data tables associated with this figure). I have not included Le6 and Le7 species or taxa level comparisons here as the arguably artificial dearth of axial remains in these groups makes them rather incomparable. That being said, where the taxa are plentiful and when the axial regions are removed for all sites (i.e. only comparing head and appendicular elements) the patterns of these results are largely the same as those expressed by the entire mammal sample.

In the calculation of these regions, elements that are rarely reported (e.g. sesamoids) or whose numbers may vary between individuals (e.g. caudal vertebrae, dew claws) were not included. Additionally, as authors calculate MNI, MNE, and MAU in many different ways (e.g. Lyman 2008: 57-66,248,262-263), I am only employing NISP here.

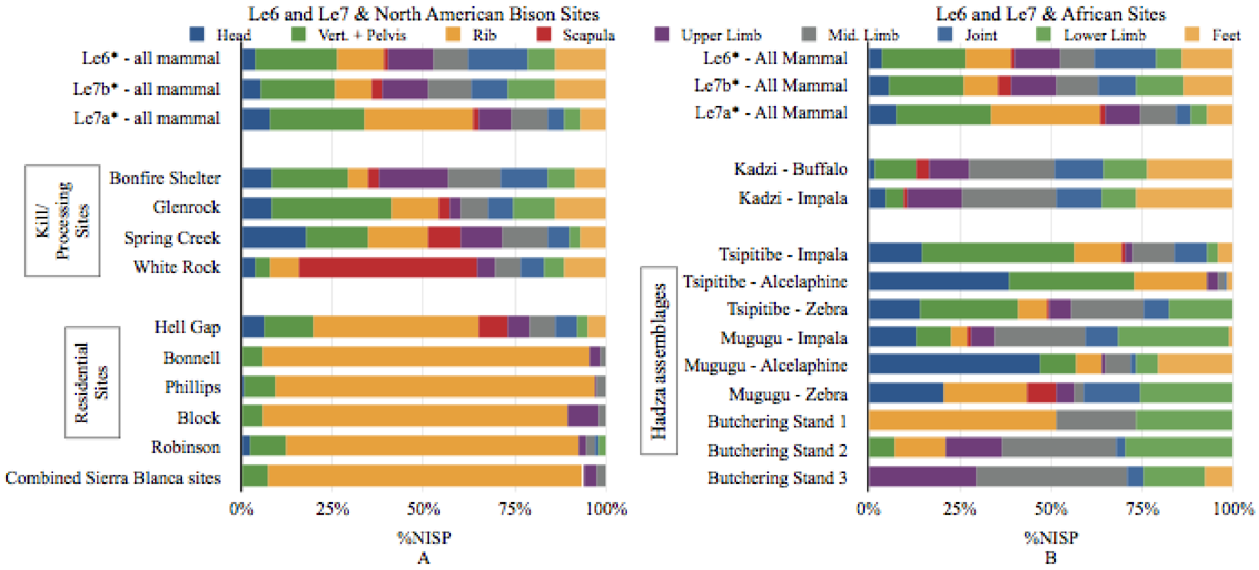

Fig. 12.7.**A+B** Skeletal frequencies [%NISP] in the entire Le6 and Le7 mammal assemblages versus **A)** a selection of North American bison processing and residential sites and **B)** African archaeological and ethnographic assemblages (*includes non-identifiable ribs and vertebrae).

- Le6 & Le7 Versus North American Bison Sites

The most distinct aspect of the Fig. 12.7.A is the remarkable differences between the processing and residential sites. As these sites have significantly different purposes, such disparity both aligns with the presumed differences and may also provide a manner for distinguishing site uses zooarchaeologically.

While the Le6 and Le7 vertebral presence is somewhat lower, overall their skeletal profiles greatly resemble those of the bison processing sites. These sites all demonstrate relatively high rates of skeletal frequency across virtually all categories except for a pronounced dearth of ribs. Significantly, ribs are definitely the most common element at the residential sites. Notably, Le6 and Le7b most align with Bonfire Shelter in the proportions and frequency of the different skeletal regions. With the processing remains of moderately sized kills (Byerly et al. 2005), this site may be the most similar to the scale of hunting and processing that occurred in the Le6 and Le7b features.

Le7a seems to stand out both from Le6 and Le7b and the bison processing sites. There are some similarities, in coarse proportions of axial to appendicular elements, between Le7a and

Spring Creek. Nevertheless, there are certain aspects of the Le7a assemblage that may share an affinity with residential camps (that were not long term occupations and were located near kill sites) such as Hell Gap (Byers 2002). At Hell Gap the normal meat-focussed processing strategies of the period were supplemented by distinct long bone breakage patterns, which Byers (2002: 359) believed represented specific “fat-seeking” behaviour and strategies.

Le7a also exhibited the most percussive damage of any of the three phases. Additionally, the feature of this phase (Le7/F4/e2) was also the largest of any discussed in this thesis (section 5.1). This large ash-heap may well have been produced by a more lengthy occupation than those responsible for the small pits and heaps in the other phases. Le7/F4/e2 may then have demarcated perhaps a month or two of use instead of a few weeks. Moreover, this assemblage consists of, at the very least, portions of more than two dozen individuals. In comparison with the mere handful of individuals evident in other features, it would have taken more time to both hunt and process this large number of animals, not to mention created more waste, which may account for the size of this ash-heap feature.

It should still be noted that, beyond the increased evidence of marrow use (Chapter 8), the taphonomy in Le7a greatly resembles that of the other phases. In fact, most groupings in this phase are less burnt than in the other phases (Chapter 9) and it has the lowest levels and least severe weathering (Chapter 7). While there may be minimally higher levels of carnivore gnawing (Chapter 7), the Le7a taphonomy does not indicate a slower build-up of deposit, even though there was more material in the phase. Indeed, it demonstrates an equally rapid acquisition of animals and production of waste as the other phases, possibly just over a marginally longer time. That increase in occupation length may have simply allowed more time for fat-extraction, or there really may have been an increased interest in accessing marrow in this feature and phase.

None of the three phases much resemble White Rock, in either skeletal representation (especially in the dominance of scapulae) or taphonomy. As the highly comminuted White Rock sample does exemplify heavy grease processing efforts (Logan 1998), the dissimilarity to the Le6 and Le7 patterns may bolster the assertions made in Chapter 8 that, while some high-quality marrow was utilised, there were few signs of interest in exploiting or accessing bone grease at these sites.

- *Le6 & Le7 Versus African Sites*

The skeletal presence patterns from the Hadza residential camps and butchering stands are highly variable (Fig. 12.7.B). In addition to Lupo’s (2001) work on these sites, Bunn et al. (1988) and O’Connell et al. (1990) also reported great diversity in which elements were transported or abandoned in any given Hadza hunt. The Le6 and Le7 phases display little resemblance to them. This may be due to time-averaging, as the Hadza ethnographic examples portray relatively brief periods of activity, while the Le6 and Le7 phases likely amalgamate a number of hunting and processing events. The disparity may also testify to the differentiation in the strategies employed: the assemblages produced by general hunting for normal camp subsistence as opposed to much more potentially intensive hunting and processing at Le6 and Le7.

Comparing the Letaba assemblages to Kadzi (Plug 1997a) exemplifies the issues with not including or assessing the other axial elements. As the axial elements are not reported for Kadzi, it becomes virtually incomparable with Le6 and Le7 due to that major methodological difference. Despite that, if the limbs alone are compared, the resultant patterns are similar, with highly comparable proportions in the different appendicular regions. Without greater, and particularly more detailed, taphonomic information, it is difficult to draw conclusions from this appendicular similarity.

Altogether, all three phases at Le6 and Le7 more closely resemble the bison processing sites than conventional, full-time residential sites. Although Hell Gap, the site to which Le7a was compared, was described as more residential (Byers 2002), it is actually more of a transitional type between the two extremes. Rather than a permanent sedentary site or the location of highly ephemeral processing, Hell Gap is a shorter term occupation at which both processing and fat-extraction activities took place (ibid.). In this, it may proffer an instructive example for understanding Le6 and Le7.

Le6 and Le7 do not seem to fit within the traditional narrative of dichotomised site types: these are not small, once-off hunting camps nor do they appear to be full residential consumption sites. Instead Le6 and Le7 denote a scaled difference from incidental hunting and processing to these possibly intensive efforts to procure and then produce specific products—i.e. the meat from large wild mammals. The other bison processing sites provide further examples of this type of use—and the skeletal patterns that result from it—with sites of varying sizes used, occasionally repeatedly, for precisely this same purpose.

This is key, as kill and processing sites and strategies introduce another important factor. That is, that the hunted carcasses and their resultant animal products had to be transported not only to the site, but also from it to the final point at which the meat and other animal products were finally consumed. This aspect may have played an essential role in driving the selective choices discussed above, and ties into aspects including speed, weight, and 'wastefulness'. At both Le6 and Le7, and these bison kill-sites, these certain hallmarks of use speak to not only specific strategies, but also intensified ones.

In discussion of these strategies, certain themes emerge: time, effort and energy, skill, speed, selective focus, and waste. These have been assessed through hunting, cooking, butchering, transport, and even discard practices. All of these aspects and actions tie into intensification.

12.4 Theoretical Frameworks: Intensification

Chapter 4 laid out Morrison's (1994: 142) three components of intensification: specialisation, "intensification proper", and diversification. At Le6 and Le7, as discussed in Chapters 6-8, there do not appear to be any particular signs of diversification. Indeed, there seems to be a distinct "reduction of diversity" (Morrison 1994: 143): in neither the procurement nor processing is a full nor wide-ranging utilisation of the available resources evident. Within the evidently biologically rich environs of the KNP, the Le6 and Le7 occupants are seen to use a variety of species, but it is hardly a comprehensive selection of the available fauna (e.g. Plug 1989a, 1989b; Joubert 1986). Plug (1988: 358) shared a similar sentiment, declaring that while “the KNP has great exploitation potential, relatively limited use was made of the resources available”. Moreover, within the taxa present there is a definitive focus on a distinct, narrow subset of those species: the large wild ungulates. The same limited use is also seen in the processing strategies. Rather than a diversified utilisation of skeletal resources, the brunt of the taphonomic modification evident in these assemblages appears to be linked to distinct carcass products, such as certain meat portions and fats.

Therefore, both the procurement and processing patterns at these sites display the characteristics of Morrison’s (1994) specialisation-track of intensification. If these narrowly-focussed hunting choices, processing patterns, and even the potentially special processing tools signify a new use strategy for the southern African EIA, they also fall within “the development of new technologies and procurement strategies” (Betts & Friesen 2004: 357) that indicate Morrison’s (1994:142) ‘intensification proper’. This introduces a second component of intensification to the Le6 and Le7 interpretation. The energy in these animal-use strategies certainly qualifies as the “increased investment” (Morrison 1994: 142) that was also described as part of ‘intensification proper’.

Therefore, the wild-focussed, hunting-intensive, selective processing patterns at Le6 and Le7 appear to indicate specialised intensified use patterns. The final question revolves around how these findings align with the original interpretations of these assemblages and sites. I do not believe these use strategies are concurrent with the basic, small-scale, domestic, subsistence-focused patterns one would expect for a small, “marginal” (Meyer 1986: viii), full-time residential EIA agro-pastoralist site.

Up until this point, I have largely put forward one possible explanation for these Le6 and Le7 patterns and the priorities: that these assemblages, and sites, were created through specialised (and thus intensified) strategies that typify kill and processing sites. However, zooarchaeology and taphonomy are both prone to equifinality (e.g. Gifford-González 1991; Orton 2012). Given this, and although it has been touched upon throughout this chapter, at this point the interpretation of these sites—their nature and the various possibilities therein—

must be specifically addressed, and considered within the larger landscape of the southern African EIA.

12.5 Le6 & Le7: Site Nature and Type

Le6 and Le7 may represent a number of different site type permutations:

1. Full-time, small, residential sites
2. Full-time, small sites with feasting
3. Full-time sites with intensified hunting
4. Shorter-term sites with ‘normal’, non-intensive hunting
5. Shorter-term sites with feasting
6. Shorter-term site with intensified hunting

The first option on this list is the original interpretation of these sites. As described in Chapter 2, these sites were designated as small, “peripheral” (Plug 1988: 357), “marginal” (Meyer 1986: viii), residential sites. In other words, traditional full-time EIA agro-pastoralist settlements (*cf*. Huffman 2007: 3) but small and domesticate-poor (e.g. Plug 1989a). Yet, as discussed in this chapter and the two proceeding it, the Le6 and Le7 procurement and processing choices seem incongruous with this description. The ‘dangerous’ species targeted and the sheer number of those species (and the quantity of meat that entailed) seem unusual for small residential sites. Furthermore, the speed at which they were procured would be highly inconsistent with such a site. If a site were occupied permanently, there would be no particular need to kill so many animals in a similarly short amount of time (as shown in the rates of deposition and weathering). The often complete and un- or under-utilised skeletal remains in these site features display virtually identical limited weathering and overall taphonomic conditions, indicating that each specimen was captured and introduced to the deposits at the same relative times. There is no evidence of the kind of weathering that one would expect if the pit fill had been slower. It appears that the occupants of Le6 and Le7 were obtaining essentially prodigious quantities of meat for these 7 to 8 ha sites (Meyer 1986: 149) in some haste. In addition to these evidently high volume hunting choices, one would also not expect to see a focus on speed in processing nor, especially, significant portions of skeletal resources ignored at a continuously occupied site. These choices simply do not seem to fit in with a small-scale residential site type.

Questions could be raised regarding feasting with this type of selective use, which brings up the second site possibility listed above. ‘Feasting’ is a relatively loaded—and controversial—concept zooarchaeologically, in part due to difficulties in identification and interpretation, as discussed below (e.g. Gifford-González 2014; Orton 2012; Sykes 2014: 3-4,61). Nonetheless, feasting deposits may share certain similarities with the Le6 and Le7 assemblages, especially in factors like waste and selective use. Feasting may be a possible explanation for at least some of these deposits, and perhaps it should be investigated further, particularly considering the potential relationship between specialised hunting and feasting (Sykes 2014: 61). Hypothetically, feasting could have created the need to procure many animals, and their numbers and arrival on site in a short amount of time could then drive the speedy processing seen. However, I am also unsure as to the likelihood of feasting occurring at this scale (given the number of animals present) on sites of this size, although there are other small feasting sites in southern Africa (e.g. Sadr 2004).

Identifying Le6 and Le7 features as feasting deposits solely because of the selective processing and low utilisation is also problematic. For example, feasting might be expected to centred on the selection of highly specific regions (e.g. Binford 1978: 81; deFrance 2009) as opposed to the “bulk strategy” (e.g. Binford 1978: 81)—or a focus on quantity rather than some quality—that seems to be the priority Le6 and Le7. Another common component for distinguishing feasting remains is the presence of distinct, separate, or otherwise notably different deposits for feasting versus the standard domestic refuse (e.g. Gifford-González 2014; Gumerman 1997; D. Orton 2008: 170-171, 2012). Yet no notably different ‘domestic’ deposits seem evident at these sites, as all features studied thus far display a similar complement of selectively processed large wild ungulates. It may be possible the smaller animals that make up a much smaller proportion of these assemblages represent the more daily meals, meaning that quotidian and ‘feast’ remains were all mixed together in each feature. However, I do not believe that feasting is the most compelling explanation for Le6 and Le7.

The third possible site type above suggests that these may indeed be intensified hunting sites but still as full-time residences. As with the first site type, this still begs the questions as to why there would have been a need for a great number of animals and rapid processing, as well as why there was so much waste. In this suggested site type, it is possible that some of the de-fleshing may have still been for meat preservation; either for longer term meat storage or for some type of meat trade. It still does not seem to be the most fitting explanation of the Le6 and Le7 patterns.

Similarly, a shorter-term site with typical hunting patterns does provide the limited time parameter discussed in the processing section. Yet, the scale and intensity of hunting still seem incongruous for more ordinary, domestic-scale hunting strategy, which might be based on more immediate consumption patterns. A more ephemeral site with feasting basically shares the above issues of options three and four combined.

Altogether, the final option listed above—shorter-term site with intensified hunting—seems to be the best fit for the given data. It should also be noted that such a site does not necessarily imply a highly ephemeral, once-off hunting camp. As seen in the North American bison studies (e.g. Bamforth 2011; Byerly et al. 2005; Frison 1970; Logan 1998; Widga 2004), kill and processing sites range from small sites where a handful of animals were processed once, to repeatedly used large-scale kill sites, and various combinations thereof. Therefore, this site type should not immediately be related to the small temporary hunting camps locally associated with foragers (e.g. Huffman 2007: 3). Instead, processing sites may display a variety of characteristics (in size, duration of occupation, or instances of repeated re-occupation) but there should be a distinctive and identifiable patterning in the animal-use choices evident (i.e. intensified hunting and processing).

As in the sections discussed above, Le6 and Le7 display a great deal of similarity with intensified or specialised hunting site types in terms of their main procurement and processing strategies. This is also not the only aspect that these two sites have in accord with the processing sites. For example, while one can expect less cooking at a processing site, many still show signs of occasional cooking and marrow use (e.g. Bamforth 2011; Bunn et al. 1988; Frison 1970; Kent 1993): a pattern also seen at Le6 and Le7.

Even the domesticates present at these sites may represent something besides, or in addition to, active herding. The cattle, sheep, and goats could ostensibly be used as provisions that would carry themselves to the site. They, particularly the cattle, could also be highly valuable for transport and traction. Plug (2000: 122) suggests there is "some evidence oxen were used in the Limpopo Valley during the Iron Age". If the increased size of the Le6 and Le7 cattle, as described in section 5.3.2, could be attributable to castration, it may indicate the presence of oxen at these sites. As castration makes oxen both larger and more tractable, they may very well have been used for traction. Given the quantity of meat produced at these sites, and the proposed possibility that that meat was to be taken elsewhere, the assistance and increased carrying capacity offered by oxen could have been highly beneficial at Le6 and Le7.

Beyond the faunal presence, other archaeological materials and characteristics of these sites also point to these being short-term occupations. Although these sites may not have been traditionally residential in function, that does not mean there would not be other, more domestic refuse present. At the large Head-Smashed-In bison processing site in Canada, Bamforth (2011: 31) describes there being not only "literally millions of bones" but also "over a million projectile points" clearly associated with hunting, as well as "hundreds of thousands of potsherds". Although the mass kills at Head-Smashed-In were substantially larger than those evident at Le6 and Le7, it still provides an example of the other archaeological refuse at this type of site. Even though it is a highly specialised processing site, there are still ceramic sherds, evidence of some cooking, and so forth (Bamforth 2011).

These domestic materials are also to be expected when one considers the amount of time it would take to process these animals. For instance, if we accept Plug's (1988: 337) assertion that Le6 and Le7 pit and heap features represent the refuse of only "a few weeks, or months at most”—possibly weeks for the pits, and a month or months for ash heap Le7/F4/e2 on Le7a— it would be unusual not to find, for example, various ceramics including cooking vessels (e.g. Jordaan 2011; Meyer 1986) and the types of grooved stones occasionally associated with bone point production (e.g. Meyer 1986: 187).

Head-Smashed-In and the other sites like it also highlight another important point about the nature and formation of these deposits. The millions of artefacts at that site did not build up from one massive processing session, but were produced through the repeated re-use of the site (e.g. Bamforth 2011). A similar pattern of re-occupation could explain the amorphous medley of ash-filled pits and heaps that characterise Le6 and Le7 (e.g. Meyer 1986).

Most significantly, the palimpsest layout of the sites, the lack of strata in the features and the re-fits in material within them, the mostly Mzonjani ceramics with small-scale variations throughout (Jordaan 2011), and the scarcity of domestic debris (compared to the plethora of intensive, specialised hunting refuse) at Le6 and Le7 should be noted. On the whole, and in contrast to Meyer’s (1986: 223,226) interpretation of chronologically distinct longer-term occupation horizons, these factors suggest a shifting and more intermittent occupation pattern. This scenario would explain the dating and ceramic variation between the features of a single purported occupation ‘phase’ (sections 2.4.2 and 2.5). For example, if these re-occupations happened at relatively short intervals there would likely only be slight changes in the ceramics, making the assemblage somewhat resemble that of a single continuous occupation (e.g. Meyer 1986) but with more small-scale variation (e.g. Jordaan 2011). Therefore, rather than a clearly defined progression from Le7(a) to Le6, and then back to Le7(b) (Meyer 1986: 223,226), the suggestion here is of a more mixed and muddled sequence and use of space. It therefore seems these features may stem from repeated re-use and re-occupation of this area between the sites.

The general grouping of the carbon derived dates, the ceramics associated with them, and the similarities in carcass treatment throughout the features all seem to point to many repeated re-occupations of the Le6 and Le7 over, perhaps, a few hundred years. However, these dates do not appear to represent discrete ‘single-use’ occupations with distinct temporal signatures.

Instead, the features within these sites appear to be composed of conglomeration of separate events that happened in this place over a period of time. Although it is hard to parse out specific features, generally the dates cluster together, indicating that all likely occurred within a roughly 300 year window. Over that period, there always appears to have been the same intention and purpose behind the occupation of these sites: specialised intensified hunting and processing of large wild ungulates.

12.6 EIA Animal-Use & Intensification

If Le6 and Le7 are short-term, repeatedly occupied sites at which intensive yet specialised procurement and processing strategies are employed, their place within the southern Africa EIA must be addressed. To the best of my knowledge, this would be a new use strategy and site type for this period and region. Having been identified, the drivers of these strategies should now be considered. As established in section 12.1, these are definitively socially-modulated patterns, in that they involve distinct socio-economic choices and priorities rather than any form of external parameter guiding use. They are a solid example of how basic ‘energetic costs’ or ‘nutritional needs’ do not always directly explain the food choices made by humans (e.g. Gumerman 1997; Russell 2011; Seetah 2006a, 2008; Sykes 2014; Twiss 2012). At Le6 and Le7 there appears to be a more abstracted ‘future returns-focussed’ set up. Here enormous effort was spent in procuring, transporting, and processing significant quantities of animals, not for normal household food—nor do I believe for some type of exaggerated, wasteful ‘feasting-type’ situation—but for some other form of future consumption. What the form of consumption is, and the driving motivator behind the creation of such sites, remains to be established.

Trade and long-distance provisioning are two possibilities (*cf*. Driver 1990). Long-distance provisioning would involve a group of hunters from some community travelling to these sites and procuring these products (e.g. meats, skins, fat) for community use and consumption back at their primary residential site (ibid.). This would mean that the occupants of Le6 and Le7 would probably have had another primary occupation (i.e. as typical EIA agro-pastoralists) but for a few weeks or months would engage in this specialised hunting and processing so as to procure meat (and other animal products) for their own community's use (see Antonites 2005, 2013; Evers 1979; Plug 1999 for comparative examples at salt-production sites).

The situation, regarding the identity of the occupants, might be the same if trade were the driver behind such use. In this case, procurement would not be for community consumption but for bartering, likely beyond the community. However, if these use patterns are trade-oriented, it also introduces the possibility of a further aspect of specialisation: that the Le6 and Le7 occupants are not just employing specialised strategies, but are actually specialists in the hunting and processing of large wild mammals. This would highlight the difference between Muller's (1984: 490, original emphasis) "*site* specialization and *producer* specialization". In terms of the latter type, there has been speculation about "professional hunters" (Plug & Pistorius 1999: 182) in the Iron Age, though it has never been confirmed. Perhaps Le6 and Le7 indicate the existence of this type of specialists?

Such a possibility requires further examination before any type of substantiation is possible. Whether for long-distance provisioning or for trade, these sites do appear to introduce a new use strategy for the southern African EIA in their specialised practices. This not only sheds new light on one manifestation of wild animal use within the widely varied spectrum of EIA faunal use, but also raise the question of why this type of intensification arose.

Intensification linked to scarcity or stress—usually manifest as diversification—has also been associated with increasing social or technological complexity within forager groups (e.g. Lupo et al. 2013). The Le6 and Le7 type of intensification (i.e. via specialisation, with no signs of scarcity or stress) may also signify similar changes in complexity, or may be related to socio-economic systems that can both support and encourage such specialisation (*cf.* Seetah 2008). In other words, this could have developed as some type of niche differentiation, where the Le6 and Le7 occupants opted to specialise in hunting within the broader EIA economy. Alternatively, it may indicate a "micro-regional specialization" (D.Orton 2008: 110), where a site was developed to make particular use of a specific environment.

As with the site versus producer specialisation discussed above, it would be hard to definitively distinguish between such possibilities by only examining these strategies at a site-level scale. Especially as this scale of procurement and processing seems to indicate the production of animal goods for consumption beyond the bounds of Le6 and Le7, attempting to fully interrogate this intensification and specialisation in isolation is difficult (Morrison 1994). The only way to address these questions of production and identity introduced by these questions of intensity would be to examine these strategies and their intrinsic economic relations at a more community-based level (Costin 1991). This brings the discussion to potential future research and the conclusions of this study.

12.7 Future Research & Conclusions

A major part of substantiating intensification at Le6 and Le7 would be to expand these analyses to a region level. This approach would, ideally, allow for the identification of not only more production sites, but also the 'consumption sites'—the final residential sites where these animal products were finally consumed.

It is possible that other sites within the modern KNP boundaries may also be these types of specialised hunting sites. For example, Plug (1984a: 233) concluded that the "[KNP] sites studied thus far differ generally from most other [Limpopo Iron Age] sites in that herding appears to have been of minor importance". In addition, throughout the KNP "relatively limited use was made of the resources available" (Plug 1988: 358) and that the use patterns visible do actually seem to "reflect preference rather than necessity" (Plug 1988: 359). Perhaps more of the KNP sites share similarities with Le6 and Le7. It may be that they are not just the small-scale refuges of EIA agro-pastoralists paradoxically trying to eke out a herding-centric life in an area in which they "could not practise farming to subsistence level" (Plug 1989a: 62), but instead denote groups intentionally heading to this region to utilise the wild resources present. That may explain why the "economic strategies did not differ markedly between the various ceramic traditions" (Plug 1989a: 62) visible in the various KNP assemblages, as even those stemming from variable socio-cultural backgrounds were coming to the KNP region for the same purpose—to utilise the wild species thriving in this region. These other wild-dominated KNP EIA sites would have to be re-evaluated in a similar manner to Le6 and Le7 to establish this.

Identifying the consumption sites may present more of a challenge. While section 12.3 did demonstrate how that might be done in terms of skeletal element presence, it raises key issues of methodology and research development that have to be addressed. For example, both these and the other potential processing sites can only be identified by combining taphonomic studies with a re-assessment of the types of species present so as to move beyond the broadest domestic versus wild animal dichotomy and simple procurement studies.

Moreover, it also necessitates consideration of the traditionally 'non-identifiable' categories. The presence of ribs and vertebrae may be a key factor in identifying these more residential consumption sites (Driver 1990; section 12.3). Additionally, as first mentioned in section 5.7, many of the assertions made about the species present at Le6 and Le7 are only possible because of the very high methodological standards and thorough collection strategies employed. If there were obvious taxa collection biases introduced by the excavation methods (e.g. large and/or no sieves, partial collection of material, or non-specialists attempting sorting), one could not confidently claim that large species were the foci of a site as many of the smaller taxa may have been lost during excavation. This also applies to the skeletal parts and taphonomy: if selective retrieval and collection occurs, one cannot be sure the patterns produced are not due to excavation biases rather than true processing strategies (e.g. Orton 2012).

Even if the more stringent methodological factors are accepted and employed, the identification of these types of sites and animal use patterns also involves reconsidering some of the broader interpretational frameworks involved. Zooarchaeologically, this not only means exploring new theories (such as intensification) but also re-addressing the role of animals in EIA contexts. This particularly applies to the wild taxa: rather than mere environmental proxies or ‘forced’ dietary substitutes—turned to only when environment or socio-cultural standing proscribes the presence of the purportedly preferred cattle, sheep, and goat—these wild species may also serve important roles with the broader EIA economies.

Archaeologically, these specialised use patterns may necessitate a different approach to the identification and interpretation of site types. In southern Africa, EIA sites are often approached as *de facto* settlements, which leads to a variety of other *a priori* assumptions about their nature and interpretations. If, rather than assuming that all Iron Age “farmers lived in permanent settlements consisting of [certain] features” (Huffman 2007: 3), the archaeological material, the mode and manners of production, and other aspects of use may be used to reveal more emic clues about the nature of a site. This in turn may uncover more sites that deviate from the expected residential type.

For the EIA sites and the faunal variety within them: are these all truly full-time settlement sites that display vastly different subsistence patterns? Or is this evident variation built from the amalgamation of multiple sites types, all with very different natures and use strategies? I believe that re-assessment of site types (and the other lines of archaeological evidence present within them) coupled with fine-scale procurement and processing studies may not only aid in identifying other cases of intensification, but may also prove crucial in understanding why there are widely divergent faunal use strategies present in the southern African EIA.

Altogether, there is certainly much work left to be done on the patterns and questions posed by Le6 and Le7, but also on the role of animals within the southern African EIA itself. The aim of this thesis was to present one case study of wild animal use (Le6 and Le7) and explore what the broader implication of that use might be. Through this, I have presented a detailed assessment of the specific processing and procurement choices as well as introduced what may be a new use strategy for this period. In so doing, I have provided an example of how ‘wild’ may not simply nor immediately equate to ‘marginal’ or ‘peripheral’ in all cases, nor how such use must be environmentally or externally forced upon a community. Instead, the wild taxa presence and patterns visible at Le6 and Le7 represent a specialised intensified set of socio-economic strategies, driven not by deterministic need but by choice. I also hope this study has highlighted the value of adding interdisciplinary methods and new theoretical frameworks, which may aid in moving zooarchaeological studies of the southern African EIA beyond procurement.

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Appendices

Analyst: **Date Analysed:**

Site: **"Feature":** **Level:** **Date of Excavation:** **other info.:**

Catalogue #: **Weight (g.):**

Species: **Skeletal Part:** **Side:** Left/ Right / Right of Pair / Left of Pair / Unknown / n/a

Zones: **Portion:** prox / dist / shaft / epi / lat / med / cr / cd / dorsal / ventral / isch / peri

Measurement (mm):

Worked?:

Age: Neonate / Juvenile / Subadult / Adult / Unknown / n/a

Fusion: Unfused / Fusion line visible [VF] / Fused

Ash?: patches / <50% / >50% **Fresh breakage?:** minor / edges / extensive

Bleached?: patches / moderate / extensive **Organic Staining?:** black spots / chestnut patches / other

Digested?: **Pathology?:**

[Tooth type: **Wear stage:** **Root resorption?:** **other tooth pathology?:]**

CUT: single [S] / multiple [M] : shallow [Sh] / deep [Dp] : Zones + portion + orientation

CHOP: single [S] / multiple [M] : shallow [Sh] / deep [Dp] : Zones + portion + orientation

Chiselling/Scoop: single [S] / multiple [M] : Zones + portion

- **Percussive damage?** - describe location/zone in notes

GNAWING: Severity **:** 1-4 : 1 = possible, 2 = marks, 3 = punctures/heavy damage, 4 = portions destroyed

  RODENT: single [S] / multiple [M] : Zones

  CARNIVORE: single [S] / multiple [M] : Zones

BURN: Severity: Not Burnt [NB] / Lightly Burnt [LB] (<50% carbonised) / Moderately burnt [MB] (>50% carbonised) / Highly burnt [HB] (calcined)

  Colour: Brown [BR] / Black [BL] / White [W] / Grey [G] / Blue [BU] : Zones

WEATHER: **Severity**: 0-3 : 0 = unweathered, 1 = light, 2 = moderate, 3 = heavy

  Type: Flaking [Fk] / Fine-line [FL] / Root-etch [RE] / Erosion [E] / Chemical pitting [CP]

Break/Fracture: **Diameter** : *only note when at least 50% present

  Shaft breakage type: Stepped/columnar [S/C] / sawtooth [SW] / y-shaped [Y] / flaking [FK] / irregular-perp [IP] / smooth-perp [SP] / spiral [SL] / longitudinal [LG] / round [R] / angular [A]

    : longitudinally split [L-S] / triangular [T] / "sheared through/off"

Figure A.1 Full identification and data entry sheet.

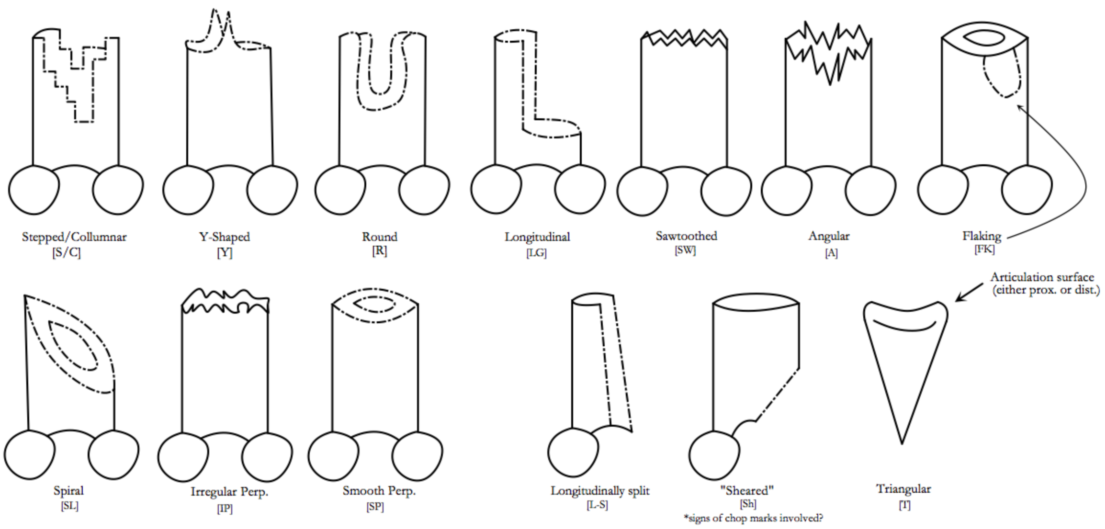
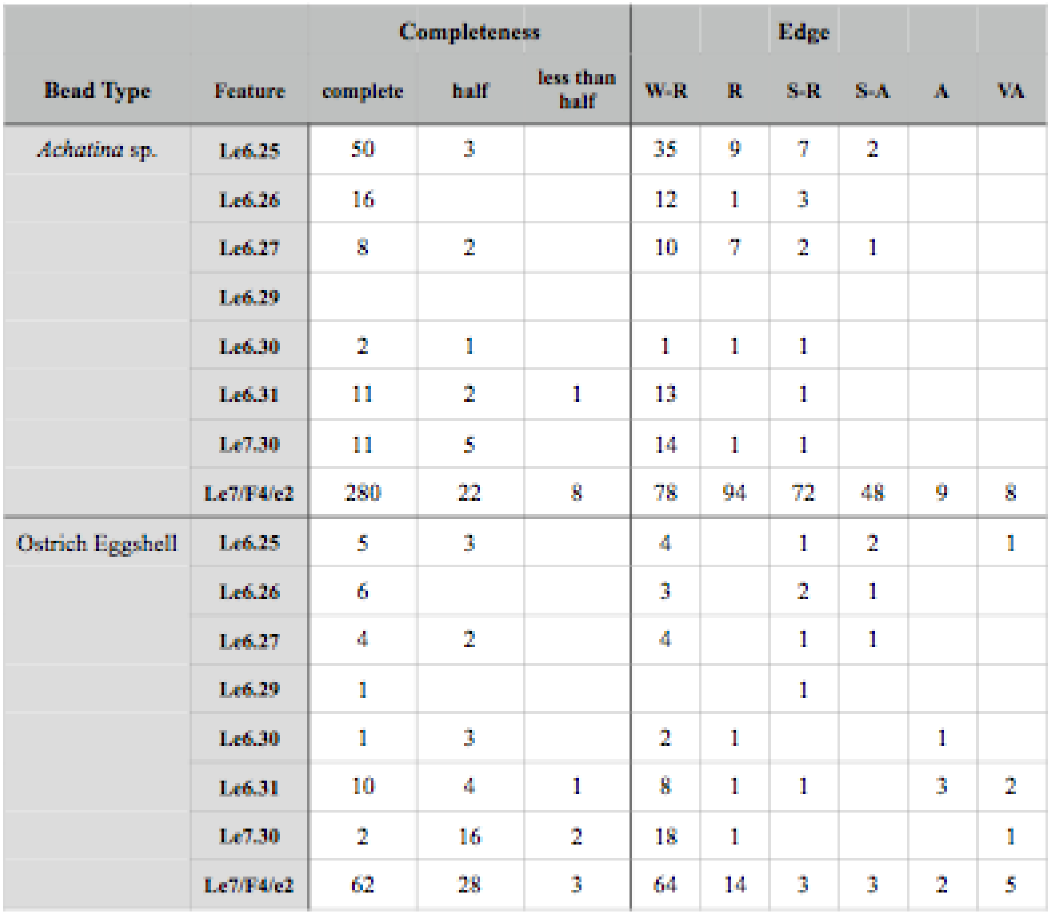


Fig. A.2 Fracture types recorded in this thesis, in part adapted from Marshall (1989: 14 in Lyman 1994: 319).

Table B.1 Bead completeness and edge data [NISP] by feature



		Completeness			Edge					
Bead Type	**Feature**	**complete**	**half**	**less than half**	**W-R**	**R**	**S-R**	**S-A**	**A**	**VA**
Achatina sp.	Le6.25	50	3		35	9	7	2		
	Le6.26	16			12	1	3			
	Le6.27	8	2		10	7	2	1		
	Le6.29									
	Le6.30	2	1		1	1	1			
	Le6.31	11	2	1	13		1			
	Le7.30	11	5		14	1	1			
	Le7/F4/e2	280	22	8	78	94	72	48	9	8
Ostrich Eggshell	Le6.25	5	3		4		1	2		1
	Le6.26	6			3		2	1		
	Le6.27	4	2		4		1	1		
	Le6.29	1					1			
	Le6.30	1	3		2	1			1	
	Le6.31	10	4	1	8	1	1		3	2
	Le7.30	2	16	2	18	1				1
	Le7/F4/e2	62	28	3	64	14	3	3	2	5

W-R = well-rounded, R = rounded, S-R = sub-rounded, S-A = sub-angular, A = angular, VA = very angular

Table B.2 Measurements [mm] for Achatina beads per feature (sample total in NISP).

Achatina		Le6.25	Le6.26	Le6.27	Le6.29	Le6.30	Le6.31	Le7.30	Le7/F
Total		53	16	10		3	14	16	31
Thickness	Range	0.27 - 1.59	0.53 - 1.68	0.53 - 1.27		0.72 - 1.22	0.42 - 1.15	0.47 - 0.99	0.36 -
	Avg.	0.85	0.93	0.87		0.90	0.79	0.69	0.8
Diameter	Range	3.56 - 6.44	3.04 - 6.80	4.31 - 7.95		3.76 - 5.36	4.12 - 8.94	3.67 - 8.71	2.97 -
	Avg.	4.76	4.85	5.83		4.44	5.96	5.44	5.5
Perforation	Range	1.27 - 2.38	1.37 - 2.30	1.41 - 2.22		1.78 - 2.20	1.80 - 2.59	1.80 - 3.11	1.08 -
	Avg.	1.79	1.67	1.77		2.02	2.25	2.45	1.7

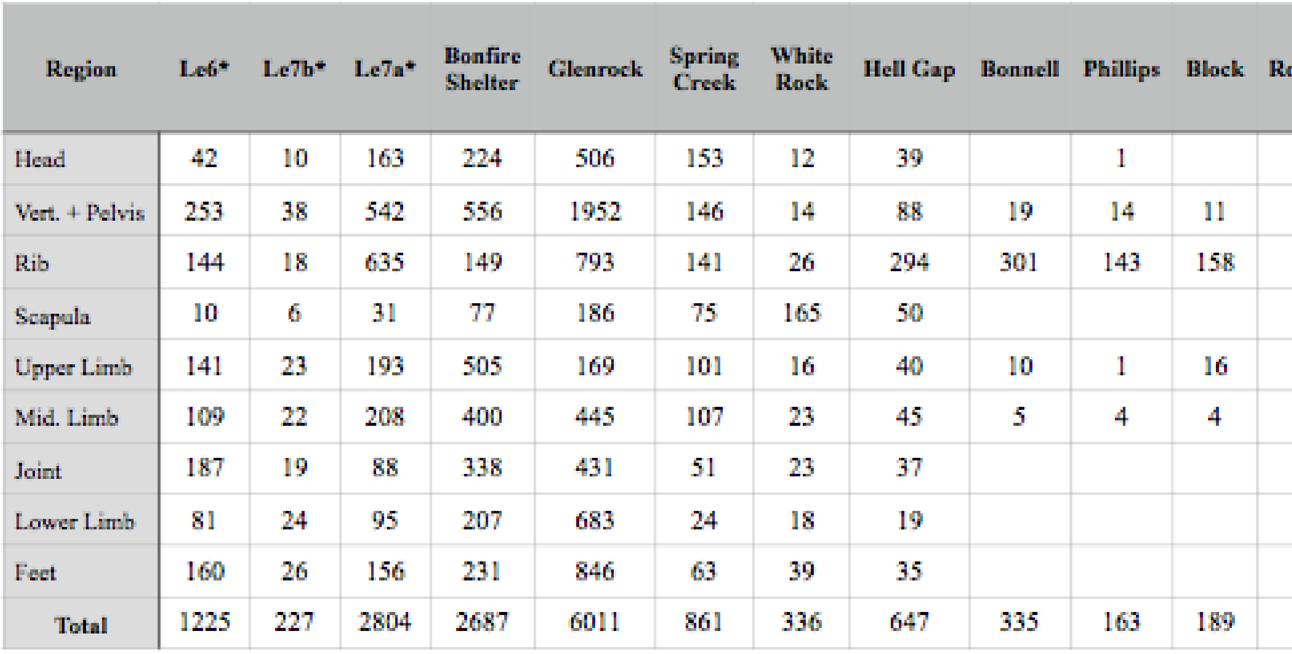
Table B.3 Measurements [mm] for ostrich eggshell beads per feature (sample total in NISP).

OES		Le6.25	Le6.26	Le6.27	Le6.29	Le6.30	Le6.31	Le7.30	Le7/F
Total		8	6	6	1	4	15	20	93
Thickness	Range	1.24 - 1.77	1.53 - 2.06	1.34 - 1.85	1.77	1.34 - 1.76	1.30 - 2.06	0.93 - 1.89	0.71 -
	Avg.	1.59	1.80	1.62		1.58	1.71	1.35	1.5
Diameter	Range	3.03 - 10.33	4.80 - 8.73	4.73 - 8.87	5.35	4.50 - 8.35	3.73 - 10.39	4.76 - 7.67	4.28 - 1
	Avg.	6.23	7.17	6.21		6.70	6.12	6.15	6.5
Perforation	Range	1.58 - 2.67	1.85 - 2.87	2.03 - 2.49	2.11	2.09 - 2.69	1.17 - 3.33	1.97 - 3.58	1.30 -
	Avg.	2.21	2.38	2.27		2.35	2.48	2.58	2.3

for ungulates species by broad region types per feature, with confirmed species' remains (bold) and potential specimens in less determinate classes (light grey, which are possibly applicable
family level, bovid or mammal size classes). Ax. = Axial - includes head as well as vertebrae, ribs, and pelvis, App. = Appendicular - includes all of the limb elements

.1	Le6.25		Le6.26		Le6.27		Le6.28		Le6.28.1		Le6.28.2		Le6.29		Le6.30		Le6.31		Le7.30		Le7.31		Le7.32		Le7.33		Le7/F4/e2	
App.	Ax.	App.	Ax.	App.	Ax.	App.	Ax.	App.	Ax.	App.	Ax.	App.	Ax.	App.	Ax.	App.	Ax.	App.	Ax.	App.	Ax.	App.	Ax.	App.	Ax.	App.	Ax.	App.
		yes	**yes**	**yes**		**yes**		**yes**			**yes**	**yes**	yes	**yes**			**yes**	**yes**	**yes**							**yes**	**yes**	**yes**
		yes	yes	**yes**									yes	**yes**			yes	**yes**					yes	**yes**			**yes**	**yes**
																											yes	**yes**
y	**yes**	yes	**yes**	**yes**	yes	**yes**			**yes**			**yes**		**yes**			**yes**	**yes**				**yes**					**yes**	**yes**
	yes	**yes**	**yes**	**yes**	**yes**	yes	yes	**yes**	yes	**yes**			**yes**	**yes**			**yes**	**yes**	**yes**	yes	**yes**	yes	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**
									yes	**yes**											**yes**	yes	**yes**	yes			**yes**	**yes**
			yes	**yes**									yes	**yes**													**yes**	**yes**
y			yes	**yes**															yes	**yes**	yes	**yes**					**yes**	**yes**
																											yes	**yes**
																											yes	**yes**
		yes										**yes**								**yes**							**yes**	**yes**
	yes	**yes**	**yes**	**yes**	**yes**	**yes**		**yes**	**yes**	**yes**	yes	**yes**	**yes**	**yes**			**yes**	**yes**	yes	**yes**	yes	**yes**	yes	**yes**			**yes**	**yes**
yes	**yes**	**yes**	yes	**yes**					yes	**yes**			yes	**yes**			yes	**yes**	yes	**yes**			yes	**yes**			yes	**yes**
			yes	**yes**															yes	**yes**							**yes**	**yes**
yes	yes	**yes**	**yes**	**yes**	yes	**yes**	**yes**	**yes**		**yes**	**yes**	**yes**	**yes**	**yes**		**yes**	**yes**	**yes**	**yes**	**yes**		**yes**	**yes**	**yes**		**yes**	**yes**	**yes**
			yes	**yes**												**yes**	**yes**	yes									**yes**	**yes**
																											yes	**yes**
	yes	**yes**	yes	**yes**	yes	**yes**	**yes**	**yes**			yes	**yes**	**yes**	**yes**			yes	**yes**									yes	**yes**
																											yes	**yes**

Table C.2 Skeletal region presence [NISP] at Le6 and Le7 versus a selection of North American bison processing and (*includes non-identifiable material in rib and vertebra regions), see Table 12.1 for references.



Region	Le6*	Le7b*	Le7a*	Bonfire Shelter	Glenrock	Spring Creek	White Rock	Hell Gap	Bonnell	Phillips	Block
Head	42	10	163	224	506	153	12	39		1	
Vert. + Pelvis	253	38	542	556	1952	146	14	88	19	14	11
Rib	144	18	635	149	793	141	26	294	301	143	158
Scapula	10	6	31	77	186	75	165	50			
Upper Limb	141	23	193	505	169	101	16	40	10	1	16
Mid. Limb	109	22	208	400	445	107	23	45	5	4	4
Joint	187	19	88	338	431	51	23	37			
Lower Limb	81	24	95	207	683	24	18	19			
Feet	160	26	156	231	846	63	39	35			
Total	1225	227	2804	2687	6011	861	336	647	335	163	189

Table C.3 Skeletal region presence [NISP] at Le6 and Le7 versus a southern African EIA site and ethnographic assembla material in rib and vertebra regions), see Table 12.1 for references.

	Le6*	Le7b*	Le7a*	Kadzi	Kadzi	Tsipitibe	Tsipitibe	Tsipitibe	Mugugu	Mugugu	Mugu
Region						- impala	- Alcelapine	- zebra	- impala	- Alcelapine	- zebr
Head	42	10	163	4	4	24	102	32	19	61	8
Vert. + Pelvis	253	38	542	27	4	69	91	60	14	13	0
Rib	144	18	635			21	53	18	7	9	9
Scapula	10	6	31	9	1	2	0	2	1	0	3
Upper Limb	141	23	193	27	13	3	8	13	10	1	2
Mid. Limb	109	22	208	57	22	19	5	45	37	9	1
Joint	187	19	88	32	11	15	1	16	13	2	6
Lower Limb	81	24	95	29	8	5	0	39	45	8	10
Feet	160	26	156	58	23	7	5	1	2	27	0
Total	1225	227	2804	243	86	165	265	226	148	130	39