The Collection Behaviour and Taphonomic Signatures of Hyaenids

By

Brian F Kuhn

A thesis submitted to the University of Pretoria, South Africa, in fulfilment for the requirements for the degree of Doctor of Philosophy
Submitted in Pretoria, 15 December 2006

Dedication

Dedicated to the memory of my father, Jesse Wayne Kuhn (September 4, 1930-February 15, 1997) and to my mother Bettelene Kuhn

And especially to my Uncle, Alwin Goodman Leupold
April 27, 1925-December 10, 2006

Abstract

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The collecting behaviour of specific animals is increasingly becoming of interest to a variety of scientific disciplines. Collectors can be found in the rodent and carnivore mammal populations, as well as certain avian species. Of the carnivores it is hyaenids and leopards (*Panthera pardus)* that appear to be the most prolific collectors of faunal remains. Of the four species in the hyaena family, three are known to collect various quantities of faunal material in their prospective dens; they are spotted hyaenas (*Crocuta crocuta*), brown hyaenas (*Parahyaena brunnea*) and striped hyaenas (*Hyaena hyaena*). The question surrounding the collector of faunal remains in the archaeological record is as important as it is old. This is an in depth examination of the bone collections of all three extant hyaenids and the related taphonomy corresponding to each species. New collections were made from various dens and locations in southern Africa for both *Parahyaena* and *Crocuta*. Additionally previous collections of *Parahyaena* were reanalysed and data from *Hyaena* collections in Jordan reviewed. In all a total of 23,324 bones and bone fragments were examined during this study, specifically looking at species collected, skeletal elements, minimum number of individuals (MNI), number of identified specimens (NISP), fusion data, fragmentation, weathering and an assortment of taphonomic characteristics. Specific taphonomic characteristics recorded were crenulated edges, striations, punctate depressions and punctures, scouring, acid etching and all combinations thereof. The main thrust of this research is to determine if hyaenids in general can be positively identified from other collectors as the collector of a specific assemblage of faunal remains and to determine if the three species of hyaena can be distinguished from one another by studying the faunal collections alone.

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Abbreviations

BPI	Bernard Price Institute
CBRL	Council for British Research in the Levant
Dis	Distal
MET	Ministry of Environment and Tourism, Namibia
MNI	Minimum Number of Individuals
NISP	Number of Identified Specimens
PAST	Palaeoanthropological Scientific Trust
Prox	Proximal
PURE	Palaeoanthropology Unit for Research and Exploration
Phalanx 1	Proximal phalange
Phalanx 2	Medial phalange
Phalanx 3	Distal phalange

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CHAPTER ONE

INTRODUCTION

BACKGROUND OF THE STUDY

The concept of hyaenids being responsible for faunal accumulations has been around for over a century, as the reverend William Buckland stated as early as 1821 in relation to the Kirkdale Cave site in the United Kingdom (Brain, 1981). In that instance, Buckland established that spotted hyaenas (*Crocuta crocuta*) were responsible for the large quantity of faunal remains discovered within the cave. However, Hughes' research (1954a, 1954b, 1958 & 1961) questioned whether spotted hyaenas were major accumulators of faunal remains, as did Dart in 1956 where he concluded that indeed hyaenas are not important in the accumulation of faunal material. Nevertheless, Sutcliffe (1969 & 1970) expanded upon the hypothesis that spotted hyaenas are accumulators of bones, even suggesting that there are two different sites of accumulation. One where the assemblage would be made-up of mostly hyaenid remains and the second consisting of mostly prey species. In addition, Kruuk (1972) concluded that spotted hyaenas do not bring food per se back to their dens, but do bring back various items on which to chew. In later studies, Hill (1989) examined specific bone modifications by spotted hyaenas. Moreover, in contrast to earlier studies Bearder (1977) investigated six spotted hyaena dens in South Africa that yielded a substantial amount of remains for him to conclude that they are important accumulators of faunal remains. Further research by Henschel *et. al.* (1979) and again by Skinner *et. al.* (1986) confirmed that spotted hyaenas do indeed collect various quantities of bones and therefore could be responsible for fossil bone assemblages. In 1976 Kruuk established that striped hyaenas (*Hyaena hyaena*) in East

Africa, in contrast to spotted hyaenas, bring back quantities of faunal remains to maternity dens. In addition, research on brown hyaenas (*Parahyaena brunnea*) by Skinner (1976), Mills & Mills (1977), Mills (1978) and Owens & Owens (1978) all attribute various bone accumulations to the species, be they at maternity dens or sites to cache food for future consumption. More recently studies by Skinner & van Aarde (1991), Skinner *et al* (1998), Skinner (2006), Kuhn (2001, 2005), Lacruz & Maude (2005), Maude (2005), Maude & Mills (2005) and Wiesel (2006), have shown both striped hyaenas and brown hyaenas to be prolific collectors of faunal remains.

Brain (1981) expanded on the idea of hyaena bone collections and noted that different accumulators may share the same dens (e.g. porcupines (*Hystrix cristata*) are commonly found in both spotted hyaena and brown hyaena dens). At this time Brain also explored the taphonomic implications of hyaena tooth action upon the faunal remains. Differences between bone fragments caused by hyaenas or other agents, be they carnivore or man, were examined by both Brain (1981) and Newman (1993) and in even greater detail by Backwell (1999) in her research on bone tools and bone damage. Other studies with regards to the taphonomy, carnivore activity and general modifications of bones have been carried out by Haynes (1980), Richardson (1980), Behrensmeyer & Boaz (1980), Behrensmeyer (1984), Lyman (1994), Capaldo & Blumenschine (1994), Blumenschine *et. al.* (1996), Andrews & Fernandez-Jalvo (1997), Capaldo (1997, 1998) and Selvaggio (1998). Moreover, use of teeth marks as an indicator of carnivore identity has been studied extensively (Haynes, 1983; Dominguez-Rodrigo & Piqueras 2003, Dominguez-Rodrigo & Barba 2006 and Selvaggio &Wilder 2001). The former two studies indicating the need to examine carnivore gnawing in greater detail in order to identify the accumulator to species

level. Additionally Dominguez-Rodrigo & Piqueras (2003) indicate that although relative size of punctures can yield the size of carnivore responsible, this is not indicative of species. They concluded that more research needs to be undertaken and completed over a larger region in order to extend the data set for more carnivore species, be they known collectors of faunal remains or not.

In 1980 Maguire, Pemberton and Collett listed nine specific taphonomic signatures that are indicative of hyaena activity upon faunal remains. The nine characteristics include ragged edge chewing, localized shallow pitting, punctate depressions or perforations, crescent shaped or lunate fracture scars, striations or gouging, irregular or random grooves, scooping or hollowing, acid etching or erosion of bone, and splintering or shattercracking. Furthermore, Haynes (1983) published a brief overview of the patterns of gnawing for spotted hyaenas, wolves (*Canis lupus*), bears (*Ursus arctos* and *U. americanus*), lions (*Panthera leo*), tigers (*P. tigris*), and jaguars (*P. onca*). While Haynes provides insight into the subtle differences between the taphonomic signatures of these species, he only deals with the hind limbs of large bovids and examined a relatively small sample size. Sample size is also a point of contention with Maguire *et. al.* (1980), considering they had only 335 samples from spotted hyaenas and just over 300 from striped hyaenas. While the identification of taphonomic signatures 'unique' to hyaenas is beneficial, more in depth studies should be undertaken for all three-hyaena species before any definite conclusions can be drawn with surety. Additional research by Maguire *et. al.* (1980) also examined human damage upon bones, specifically that which Khoisan do to the remains of bones from domestic goats (*Capra hircus*) they have consumed. They report that the Khoisan are capable of damaging bones extensively, specifically producing damage

known as ragged edge chewing that is nearly indistinguishable from the ragged edge chewing by hyaenas. Only close observation reveals the conical depressions associated with carnivore activity. Maguire also indicated that there are other signatures unique to the Khoisan themselves, such as human molar activity upon soft bone and butchery marks. The fact that some taphonomic signatures overlap between species while others do not is of value in determining the extent of any further research. With the exception of Maguires' research, Brain (1981), Skinner *et. al.* (1980, 1986), Marean & Bertino, (1994), Selvaggio & Wilder (2001) and Pickering *et. al.* (2004) other publications fail to stress the possibility that other accumulators may have contributed to a given assemblage. In addition to extant species where there may be secondary carnivore activity (Marean & Bertino, 1994), in the fossil record one must take into account the number of extinct carnivores and rodents that may act as accumulating agents and further complicate the analysis (Ewer, 1955a, 1956a, 1956b, 1956c).

In addition to the taphonomic evidence there have been many studies investigating the composition of assemblages and then using these data to determine the collecting agent (Klein 1982; Hill & Behrensmeyer, 1984; Hill, 1984; Stiner, 1991; Cruz-Uribe, 1991; Horwitz, 1998; Pickering, 2002; Lacruz & Maude, 2005 and Kuhn, 2005). The research of Stiner and Cruz-Uribe put forward seven criteria that are indicative of hyaenas being responsible accumulating agents as opposed to ancient hominids. Moreover Stiner suggests that as a criterion, 'a purported pattern of excessive proportions of horn or antler in hyaena-accumulated assemblages' is indicative of hyaena den occupation. Similarly, Cruz-Uribe suggests the following six criteria to confirm hyaenas as collecting agents: 'A purported absence or low occurrence of

small, hard, compact bones such as sesamoids, carpals, smaller tarsals, and phalanges in hyaena-accumulated assemblages'; 'A purported tendency for smaller ungulates to be better represented by cranial bones and for larger ungulates to be better represented by post-cranial bones' suggests a hyaena assemblage; 'A purported tendency for bovid mortality profiles to be attritional in hyaena-accumulated assemblages': 'A relative abundance of carnivores (≥20 percent of the total MNI) in hyaena-accumulated assemblages'; 'An abundance of limb bones with relatively complete shafts, but are lacking epiphyses, in hyaena-accumulated assemblages'; and lastly 'Hyaena-inflicted bone surface damage in hyaena-accumulated assemblages'.

Of all these 'criteria' recent research by Pickering (2002) rejects all but the latter three established by Cruz-Uribe and believes that only they be used in establishing between hyaena and hominid accumulated assemblages. Research by Lacruz & Maude (2005) and Kuhn (2001, 2005) support Pickering's results with the exception of the relative abundance of carnivore remains being equal to or greater than 20%. The final two criteria, 'an abundance of limb bones with relatively complete shafts, but are lacking epiphyses' and 'hyaena inflicted surface damage on bones', that are accepted by Pickering, Kuhn, Lacruz and Maude are both based on the taphonomic signatures of hyaenas in general and not arbitrary percentages or measurements of assemblage make up.

Recognizing the importance of taphonomy in elucidating the collecting agent of given assemblages, the archaeological importance of non-human bone collectors is becoming an increasingly significant part of the investigation of archaeological and palaeontological sites as well as a topic of interest to those attempting to determine

the ecological history of a specific region as previous work by Klein (1975) and Klein *et. al.* (1991) have shown. It has been well established that along with extinct forms of accumulator, three of the four species of extant hyaenas, plus porcupines (Brain, 1981), leopards (*Panthera pardus*) (Simons, 1966; Brain, 1981; Le Roux & Skinner, 1989; de Ruiter & Berger, 2000, 2001; Pickering *et. al.* 2004; Skinner & Chimimba, 2005), some raptors (Mundy & Ledger, 1976; Mayhew, 1977; Richardson *et. al.*, 1986; Davies, 1994; Berger & Clarke, 1995; Cruz-Uribe & Klein, 1998; Robert & Vigne, 2002; Sanders *et. al.,* 2003; Berger, 2006; Erlandson *et. al., 2007*) and ravens (*Corvus corax*) (Laudet & Selva, 2005) are responsible for the collection of significant amounts of bone material in both the modern and fossil record. Moreover, limited research has been done on each of the individual hyaena species specifically relating to their accumulating behaviour (Henschel *et. al.,* 1979; Skinner *et al.,* 1980, 1986, 1998; Skinner & van Aarde, 1991; Horwitz & Smith, 1988; Lam, 1992; Leakey, *et. al.*, 1999; Kuhn, 2001, 2005; Lacruz & Maude, 2005). However, to date the majority of published research deals with just one species at a time and comparative research has yet to be published. Cooper *et. al.* (Unpublished) attempt to compare the three species by comparing their extensive fieldwork with *Crocuta* to published material on both *Parahyaena* and *Hyaena*. Furthermore, many authors address only a single aspect of collecting behaviour e.g. Horwitz & Smith (1988) on the effects of striped hyaenas (*Hyaena hyaena*) on collections that include human remains from scavenging. As hyaenas have been suggested to be a major contributing factor to fossil assemblages found in Africa, Europe and Asia (Klein, 1975; Bearder, 1977; Maguire *et. al.,* 1980; Brain, 1980, 1981; Binford, 1988; Klein *et. al.,* 1991; Cruz-Uribe, 1991; Stiner, 1991; Lam, 1992; Kuhn, 2001, 2005; Boaz & Crochon, 2001; Selvaggio & Wilder, 2001; Lacruz & Maude, 2005) and because there are three

extant species within the hyaenidae family in Africa, all of which overlap in the fossil record (L. Berger, pers. com.), this forms an ideal group for an expansive study of accumulations and associated taphonomy.

AIMS AND OBJECTIVES

Faunal assemblages of unknown origin found in the archaeological and palaeontological records need to be identified with as much certainty as possible. The taphonomic signatures left behind by the collector or collectors should be identified to species where possible and not assumed to be that of hyaenids, leopards, or hominins as has been done in the past (Dart, 1956). Since only a certain percentage of faunal remains in a given assemblage will actually display diagnostic taphonomic marks, the entire assemblage must be studied and any species-specific signatures as well as the frequency of said marks should be documented. Complete analysis of the assemblages should identify the collector or possibly collectors. However, several questions need to be answered in order for this to be accomplished. Such as are there observable differences in assemblages of striped hyaenas, brown hyaenas and spotted hyaenas? Do spotted hyaenas create smaller assemblages than either striped hyaenas or brown hyaenas? Are the bone fragments left by spotted hyaenas consistently smaller than those of striped hyaenas or brown hyaenas? Are the striped hyaenas and brown hyaenas truly similar in their collecting behaviours as suggested by independent studies of the two species (Owens & Owens, 1978; Skinner, 1976; Kruuk, 1976); Bearder, 1977; Skinner *et. al.,* 1980; Skinner & van Aarde, 1991; Leakey *et. al.,* 1999; Kuhn, 2001, 2005 and Lacruz & Maude, 2005)? Or will there be distinctive patterns established to differentiate between the two species? Are there noticeable differences in the collecting behaviours and den usage of the three hyaena species in

question? Are there differences between populations of the same species from different environments? Do spotted hyaenas bring back larger faunal remains than either striped hyaenas or brown hyaenas as hypothesised by numerous previous researchers (Kruuk, 1972; Bearder, 1977; Skinner *et. al*, 1986; Cooper *et. al.*, unpublished)? Which species leaves behind more distinctive taphonomic signatures, and which of these signatures is more prevalent? Are there distinguishing taphonomic signatures of hyaenids that separate them from other carnivore collectors such as leopards? These are just a few of the questions that arise when one tries to differentiate between the assemblages of all three species of hyaenas.

This project will examine the associated den accumulations and relative taphonomic signatures of all three hyaenids known to collect faunal remains. Specifically the goal of this research is to determine species-specific taphonomic signatures as well as to determine similarities between the three species in collecting behaviours and taphonomic signatures. Specific aspects of carnivore, particularly hyaena, damage upon faunal remains will be investigated along with the presence of non-carnivore damage and combinations of specific carnivore damage. A by-product of this study will determine the partial diets of hyaenas in various regions, as well as examine behavioural differences between the same species in different habitats. In addition all previously established criteria for hyaena accumulations will be reviewed and new criteria suggested.

MATERIALS AND METHODS

Faunal analysis will consist of material collected from den sites within the home ranges of the various species, in situ examination of dens and previously collected assemblages attributed to one of the specific species in question. Unhindered access to the reference collection housed at PURE (Palaeoanthropology Unit for Research and Exploration), Bernard Price Institute, University of Witwatersrand, was granted for study and use in identification of specimens. Additional identification was done using various manuals and publications. These included *Mrs. Walkers Bone Book: A Guide to Post-Cranial Bones of East African Animals* (Walker, 1985), *Mammal Bones and Teeth* (Hillson, 1992), *A Guide to the Measurement of Animal Bones from Archaeology Sites* (von den Driesch, 1976), *A manual to the skeletal measurements of the seal genera* Halichoerus *and Phoca (Mammalia: Pinnipedia)* (Ericson & Stora, 1999), and Schmid's 1972 *Atlas of Animal Bones. Syncerus caffer* was distinguished from domestic *Bos* using Peters' 1986 paper.

With the exception of material from Namibia and assemblages previously collected, all material was carefully collected, bagged, labelled and then transported to laboratory facilities at the Bernard Price Institute, University of Witwatersrand for identification and analysis. All analysis of samples in Namibia were done in situ at the den sites in order to comply with protocol set by NAMDEB Diamond Company and the Namibian Ministry of Environment and Tourism. In all cases 18 specific data sets were recorded, these are; 1) Context number, (this provides den identification, location, and collection method), 2) Skeletal Element, 3) Species, 4) Proximal Fusion, 5) Distal Fusion, 6) Body Side, 7) Fragmentation patterns of long-bones, 8)

Modification, 9) Butchery, 10) Sex, 11) Length, 12) Punctates/Punctures, 13) Scouring, 14) Acid Etching, 15) Crenulated Edges, 16) Striations, 17) Collector and 18) Weathering. Weathering information is based upon the work by Behrensmeyer in 1978 and is a loose guideline for the time faunal remains have been exposed to the environment. Given that weathering will vary depending upon climate, soil make up, and regional differences, the data collected were only rough estimates for the range in years since death. NISP (number of identified specimens) and MNI (minimum number of individuals) were assessed using Grayson (1984) bearing in mind the quantitative problems as indicated by Gilbert & Singer (1982), Gautier (1984), Marean & Spencer (1991) and de Ruiter (2001).

Data from material examined in laboratory conditions were logged onto an excel spreadsheet on an Apple iBook laptop computer. Data from material examined in situ were logged onto data sheets and later transferred to the laptop. The excel spreadsheet was then converted into a FileMaker Pro 8 database which yielded all relevant data with regards to species scavenged/hunted, age of various species at death, weathering data, and of course all the taphonomic data recorded and combinations of carnivore damage. All dens were logged into a GPS (Garmin IV) to aid in relocating dens and for future work with GIS.

In regions with little knowledge of hyaena activity approximately two months were spent locating and conducting daily observations of dens as well as nocturnal activity in relation to the dens. In other regions local knowledge aided in the location of potential den sites, and in many cases local researchers provided not only den locations but also a history of den usage and occupation.

SYNOPSIS

Chapter two discusses the current ranges of all three species, plus gives a brief behavioural ecology of said species. Regions of species overlap are discussed and how behavioural traits may be influenced by habitat overlap.

Chapter three is a short description of the regions surveyed in southern Africa for this study. Included are yearly rainfall amounts, size of parks, reserves, or private lands surveyed, and species found along with the particular hyaena species of the study. In addition the assemblage previously collected by Skinner and re-examined for this study if briefly described.

Chapter four discusses the dens located in each of the surveyed regions. GPS coordinates as well as den type and numbers of faunal remains associated with said dens are all discussed here. Activities in and around the individual dens are noted, as well as den history where applicable.

Chapter five is the results portion of the thesis. After a brief overview of the fieldwork conducted and the re-examined collections each individual den, by region, is analysed. For every den and previous collection this includes the number of remains analysed, a break down of species identified (NISP and MNI) and skeletal elements identified. Data from each specimen includes relative age (via fusion data of long bones), fragmentation patterns, length, weathering and specific types of carnivore damage.

After introducing and discussing data from previous fieldwork on striped hyaenas in Jordan, chapter six discusses the results of the previous collections and all the dens analyzed during this study. Broken down by species, with a brief overview of species followed by the regions surveyed for said species and a brief summation for the species in question. This is followed by a comparison of all three species of collecting hyaenids. This chapter ends with a discussion on the criteria for distinguishing between hyaenas versus hominids as fossil accumulators of faunal remains.

Chapter seven is the conclusion section of the thesis. Discussed here are trends of hyaenid assemblages with specific questions asked in the introduction revisited and answered. Additionally the criteria for determining hyaenas as fossil collectors are re-evaluated and the need for future research expounded upon.

CHAPTER TWO

ECOLOGY

DISTRIBUTION

The current range of extant brown hyaenas (*Parahyaena brunnea*) is confined to areas of southern Africa including South Africa, Namibia, Botswana and parts of Zimbabwe, Mozambique and Angola. Spotted hyaenas (*Crocuta crocuta*) are found from south of the Sahara to southern Africa, excluding the Congo and today are conservation dependant in South Africa, thus are not as widespread as they once were (Skinner & Chimimba, 2005). Striped hyaenas (*Hyaena hyaena)* range from as far south as northern Tanzania, across all of North Africa through the Middle East, and as far east as the Gulf of Bengal and north into southern Siberia (Kruuk, 1976; Stuart & Stuart, 1997). Thus today the only overlaps in range that exist are between spotted hyaenas and striped hyaenas in northern Sub-Saharan Africa and spotted hyaenas and brown hyaenas in southern Africa (Figure 1). In the past however, there has been an overlap between all three extant species as well as with a number of extinct species of hyaenids in southern Africa and other parts of the world (Hughes, 1954a & b; Ewer, 1955b, 1955c; Sutcliffe, 1969; Klein, 1972; Hendey, 1974, 1978; Howell & Petter, 1976; Galliano & Frailey, 1977; Maguire *et. al.,* 1980; Berta, 1981; Brain, 1981; Scott & Klein, 1981; Binford *et. al.,* 1988; Turner, 1993; Watson, 1993; Boaz & Crochon, 2001; Mutter *et. al.,* 2001; Boshoff, 2003). Additionally, there is evidence of extinct species becoming extinct corresponding with the introduction of extant species (Brain, 1981; L. Berger, pers. com., 2003).

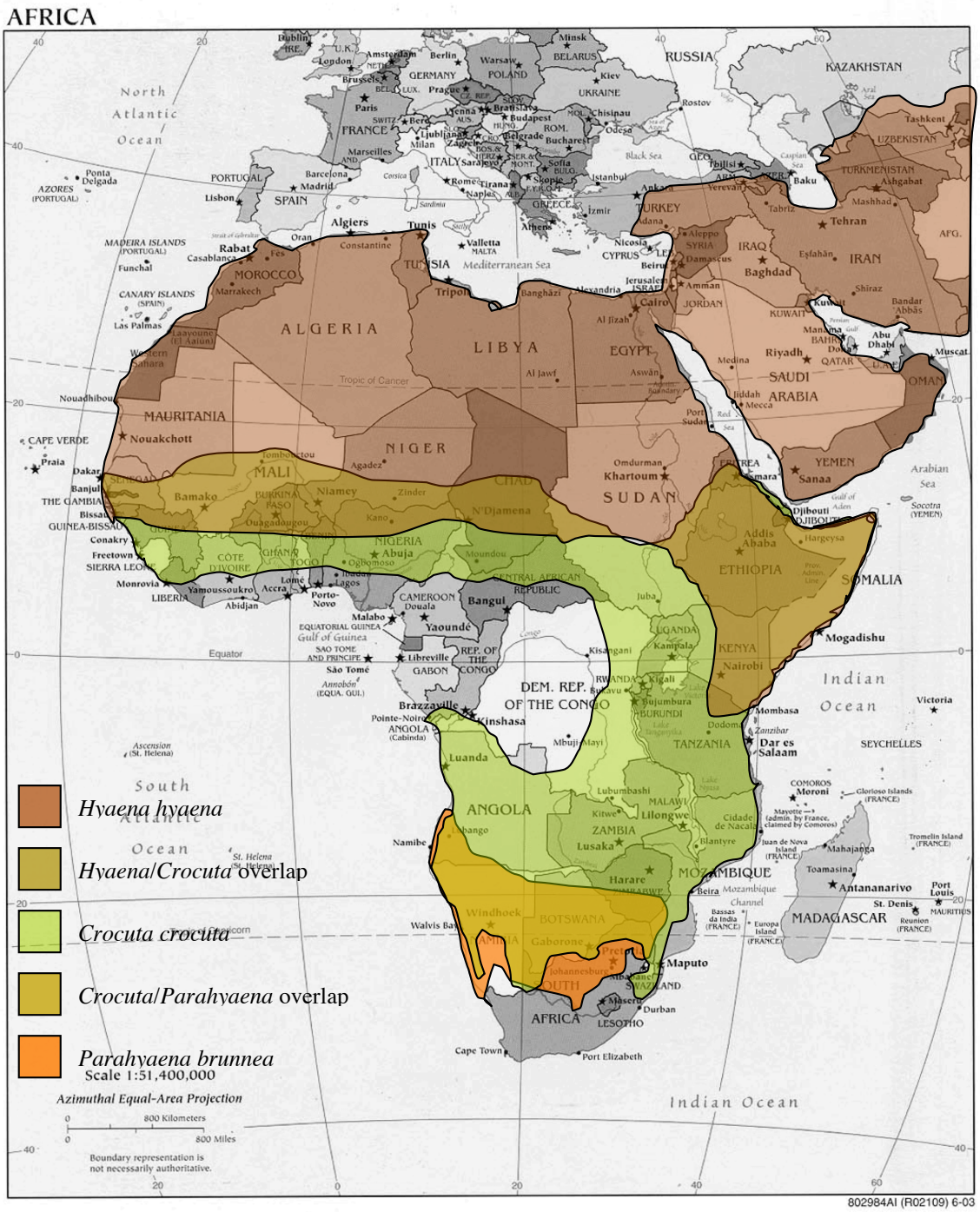

Figure 1: Ranges of *Hyaena*, *Crocuta* and *Parahyaena*

BEHAVIOURAL ECOLOGY

In the family hyaenidae there are four extant species, *Crocuta crocuta, Hyaena hyaena, Parahyaena brunnea* and *Proteles cristatus*. Of these, aardwolves (*Proteles cristatus*) have evolved into an insectivore and are therefore not included in this study. Of the other three species, the spotted hyaenas are the largest (males average ca. 59.0kg and females 70.9kg). Brown hyaenas average 49.0 kg for males and 45.6 kg for females (Skinner, 2006) while striped hyaenas average 33.6kg and 30.7 kg for males and females respectively (Skinner & Ilani, 1979; Yom-Tov & Mendelssohn, 2002). In spotted hyaenas, sexual dimorphism favours the females, while in the brown hyaenas and striped hyaenas males are larger. Brown hyaenas and striped hyaenas are similar, filling the south and north niche separated by the Kunene-Zambezi river dividing line. In appearance, both have shaggy coats, long pointed ears and the typical hyaena build of a stout chest and neck and sloping back. Indeed they are so similar that Skinner & Ilani (1979) conclude that *Parahyaena* is a 'larger edition of *Hyaena*'.

Current studies on their ecology and behaviour indicate that both brown hyaenas and striped hyaenas are quite similar in their feeding/scavenging and bone collecting behaviours, foraging alone (Mills, 1973, 1990; Skinner, 1976; Mills & Mills, 1977; Owens & Owens, 1978; Yom-Tov & Medelssohn, 2002; Maude, 2005; Maude & Mills, 2005; Skinner & Chimimba, 2005; I. Wiesel, 2006; pers. obs.) and both tend to carry large quantities of food back to cubs at their prospective maternity dens (Kruuk, 1976; Bearder, 1977; Owens & Owens, 1978; Skinner *et al.,* 1980; Skinner & van Aarde, 1991; Horwitz & Kerbis, 1991; Leakey *et. al.,* 1999; Kuhn, 2001, 2005; Lacruz & Maude, 2005; Wiesel, 2006). In contrast, this behaviour is not a feature of spotted hyaenas (Kruuk, 1972; Bearder, 1977; Skinner *et. al*, 1986; Cooper *et. al.*,

unpublished), which hunt either alone or in clans that can range in size from five or six to over 100 individuals depending upon the region (Kruuk, 1966; Sutcliffe, 1970; Skinner & Chimimba, 2005; Cooper *et. al.*, unpublished).

It has been shown that *Parahyaena* and *Hyaena* only kill smaller prey species and occasionally domestic stock, if they kill at all (Kruuk, 1976; Skinner, 1976, 2006; Mills, 1990; Yom-Tov & Mendelssohn, 2002). Apart from infrequent reports in Israel that striped hyaenas attack livestock (Yom-Tov & Mendelssohn, 2002) there is little evidence for striped hyaenas making significant kills other than small mammals (Kerbis-Peterhans & Horwitz, 1992). Reports of attacks on livestock by striped hyaenas, although rare, should be viewed with reservation as on more than one occasion the author was told that a Bedouin farmer had captured a young hyaena only to discover a young golden jackal (*Canis aureus*) upon arrival at the farm in question. Current research on brown hyaenas in Namibia indicates that they routinely kill young seals during the pupping season (Wiesel, 2006; pers. obs.). Reports of brown hyaena attacking livestock in South Africa are also rare and occurred on farms where brown hyaena are common and had little or no history of such attacks (Skinner, 1976; Skinner & Chimimba, 2005). On the other hand, both smaller hyaenids are very effective scavengers (Mills, 1973; Skinner 1976; Skinner & Ilani, 1979; Skinner & van Aarde, 1981; Skinner *et. al.,* 1980; Kerbis-Peterhans & Horwitz, 1992; Kuhn, 2001, 2005; Maude, 2005), and are even known to scavenge from human graves in Israel (Skinner *et. al.,* 1980; Horwitz & Smith, 1988; Kerbis-Peterhans & Horwitz, 1992). Recent research on striped hyaenas in eastern Jordan yielded substantial amounts of adult camel bone, among other larger domestic species (Kuhn, 2001, 2005) indicating that striped hyaenas are capable of scavenging from much larger

species as well as smaller prey species. Spotted hyaenas on the other hand are effective hunters and, whether foraging alone or in groups, are capable of catching large prey species (Kruuk, 1966; Sutcliffe, 1970; Bearder, 1977; Skinner & Chimimba, 2005; Cooper *et. al*. unpublished). Up to 95% of consumed meat is obtained via the successful hunting of medium to large ungulates (Cooper *et. al*. unpublished); the remaining diet is made up of scavenged material and smaller mammals (Skinner, 2006).

Previous research indicates that both striped hyaenas and brown hyaenas are nocturnal or at most crepuscular, emerging from their dens to forage at dusk and through the night with occasional activity during the day (Mills, 1973; Skinner, 1976; Yom-Tov & Mendelssohn, 2002; Skinner & Chimimba, 2005). Current research shows that brown hyaenas (at least along the Namibian coast) are both nocturnal and diurnal and kill seal pups (*Arctocephalus pusillus*) amongst their colonies at all hours, day or night (Wiesel, 2006). In contrast, the population of brown hyaenas at the Rietvlei Nature Reserve agrees with previous research as being nocturnal. It is unknown as to why there is such a difference between the two populations as in both cases the brown hyaenas are the largest carnivore present. Spotted hyaenas are principally nocturnal, foraging and hunting at night, but at times are active during the day, although lying up during the hottest portion of the day (Kruuk, 1966, 1972; Sutcliffe, 1970; Skinner & Chimimba, 2005).

Even today there are a number of beliefs, superstitions, and erroneous ‘facts’ surrounding hyaenas in general. For years, and to this day in some circles, it was thought that spotted hyaenas were strictly scavengers, relying entirely upon carrion

for survival. Moreover, they have generated an image of being an unsavoury thief amongst the common people and this image is perpetuated by movies like the Lion King. The Bedouin beliefs regarding striped hyaenas make the animal seem supernatural. One of their many myths says that the urine of the striped hyaena will turn a person into a hyaena. Another is that the striped hyaena can put a person under a spell with its breath and said person will follow the hyaena back to its den where the hyaena will suck out their brains and feed upon the person. It is possibly due to the superstitions surrounding the striped hyaena that whenever a member of the local population sees a golden jackal, wolf (*Canis lupus arabs*), or striped hyaena they assume it is the striped hyaena coming for them. Either way, the Arab world views striped hyaenas with revulsion and fear, and will kill them at every opportunity. This is true in Jordan (pers. obs.), Lebanon (A. Garrard, pers. comm.) and Saudi Arabia (H. Bertschinger, pers. comm.) and evident in the United Arab Emirates where the striped hyaena has been eradicated as a result (ArabianWildlife.com).

CHAPTER THREE

REGIONS SURVEYED AND PREVIOUS COLLECTIONS

REGIONS SURVEYED

Faunal remains were either collected from or had been previously collected from five distinct regions to increase a database for all three extant hyaenid species (Figure 2). Prey remains from spotted hyaenas were collected from one active and three inactive den sites in the Mashatu Game Reserve, Botswana, and two inactive dens in the Namib-Naukluft Park, near Gobabeb, Namibia. Brown hyaena prey remains were collected from three dens at Rietvlei Nature Reserve, South Africa and nine dens in Diamond Area No. 1 and adjacent Luderitz peninsula, Namibia. A collection housed at the University of Witwatersrand previously collected in Diamond Area No. 1 of Namibia by Skinner & van Aarde (1991) and Skinner *et. al.* (1998) was also analysed in this study. Data for striped hyaenas is included for comparison and comes from a previous collection by the author of five extant den sites in three regions of eastern Jordan (Kuhn, 2001, 2005). This collection is currently stored at the Council for British Research in the Levant (CBRL) facility in Amman, Jordan.

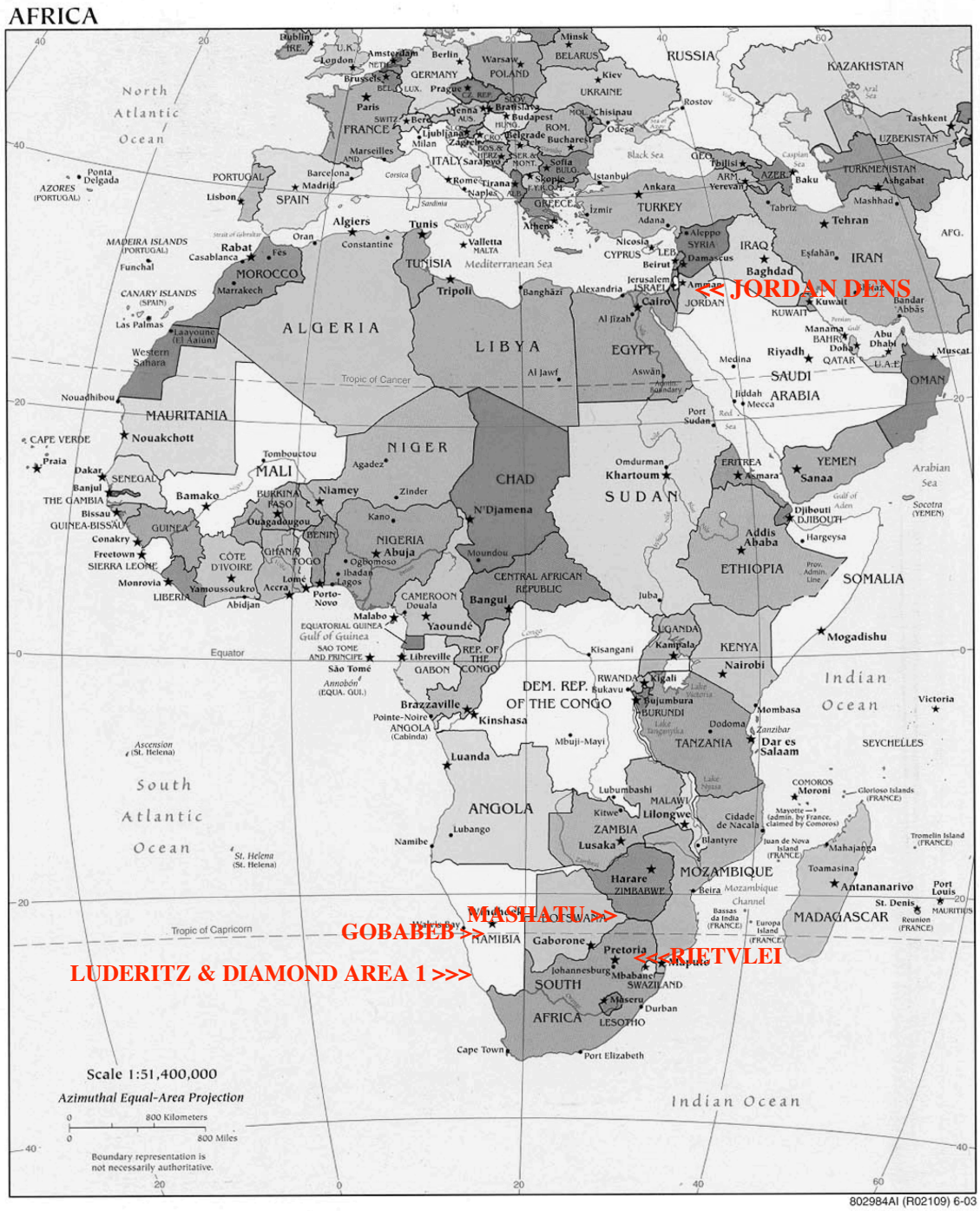

Figure 2: Map showing den localities

Rietvlei Nature Reserve, South Africa

Rietvlei Nature Reserve is situated on the eastern edge of greater Pretoria adjacent to the R21 highway and Irene road (Figure 3). The reserve is adjacent to the Rietvlei dam built in 1934 and covers an area of 3800 ha. The reserve is 1525 m above sea-level and can accommodate up to 2000 head of large ungulate species, which include buffaloes (*Syncerus caffer*), eland (*Tragelaphus oryx*), black wildebeest (*Connochaetes gnou*), springbok (*Antidorcas marsupialis*), plains zebras (*Equus burchelli*) and white rhinoceroses (*Ceratotherium simum*) to name a few. In addition, the Reserve is also home to numerous small mammals, reptiles, amphibians, birds and three larger carnivores, black-backed jackals (*Canis mesomelas*), a pair of cheetahs (*Acinonyx jubatus*), and brown hyaenas. The reserve has 30km of road that break it into 31 specific blocks. It has a typical Highveld climate, with an average summer rainfall of 724 mm and a dry and cold winter. The veld type is mostly Bankenveld and the landscape consists of rolling hills and grasslands, with a small area of wetlands as well.

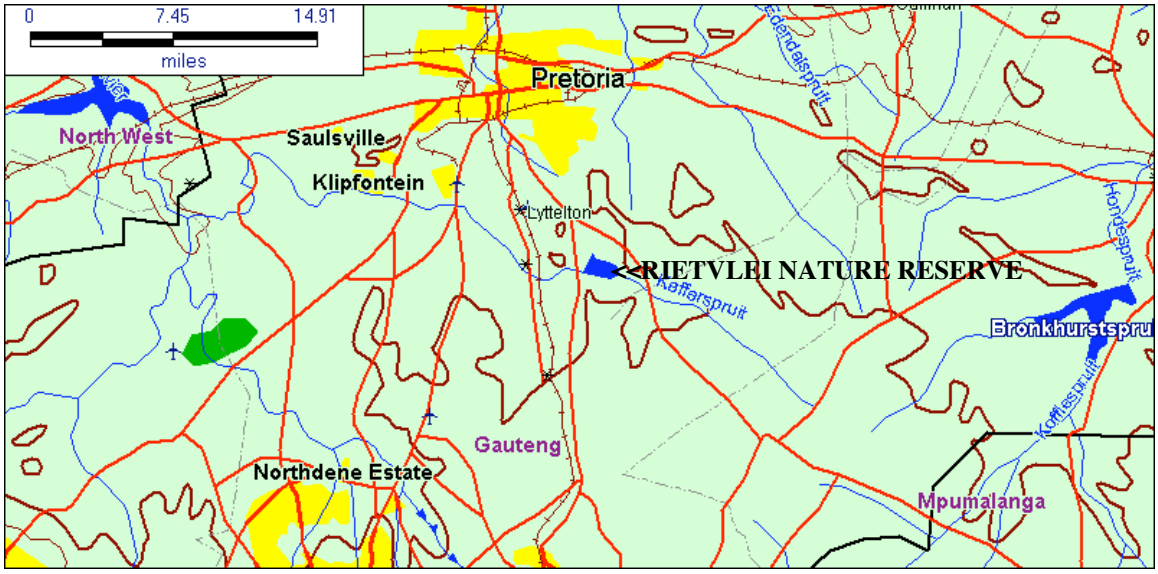

Figure 3: Map showing location of Rietvlei Nature Reserve

Mashatu Game Reserve, Botswana

The Mashatu Game Reserve lies in the Tuli Block of southeastern Botswana (Figure 4). The reserve covers 30,000 ha of bushveld at the confluence of the Shashe and Limpopo rivers. Approximately 177 mm of rain falls over the reserve during summer. The region surveyed for this study is located at the southwest corner of the reserve near the Motloutse River and Motloutse Archaeology site. The region supports a variety of wildlife, including a large population of elephants (*Loxodonta Africana)* in addition to numerous game species including zebras, eland, blue wildebeest (*Connochaetes taurinus*), impala (*Aepyceros melampus*) and kudus (*Tragelaphus strepsiceros*) as well as large carnivores like lions (*Panthera leo*), leopards (*P. pardus*) and spotted hyaenas (statistical information from the website, www.mashatu.com).

Figure 4: Map showing location of Mashatu Game Reserve

Diamond Area No. 1 and Luderitz peninsula, Namibia

Luderitz and Diamond Area No. 1 are located in the southwest of Namibia, the Diamond Area, or Sperrgebiet, extends over 100 km to the South African Border at Alexander Bay covering 26,000 km^2 (Figure 5). To the north of Luderitz is the southern edge of the Namib-Naukluft Park, thus aside from the town and small areas to the north and the peninsula (which has over 65 km of road by itself) the area consists largely of protected or prohibited land. The region is coastal desert and only receives 2-20 mm of rainfall annually. Despite the arid conditions the region supports a variety of wildlife such as gemsbok (*Oryx gazella*), springbok, black-backed jackals and numerous small mammals including the recently identified African wildcat (*Felis sylvestris*) (I. Wiesel, pers. comm.), birds and reptiles. In addition to the terrestrial wildlife there is an abundance of marine life, both birds and mammals that occupy the shorelines. These include Cape fur seals (*Arctocephalus pusillus*) and jackass penguins (*Spheniscus demersus*). The fact that the majority of lands around Luderitz are protected in some way (be they parks or diamond areas) has benefited the local wildlife, but does not limit the wildlife to said areas as all the species can be found on the peninsula and public beaches and brown hyaenas are routinely sighted with in the town itself (Goss, 1986).

Gobabeb, Namib-Naukluft Park, Namibia

The Namib-Naukluft Park covers over 50,000 km^2 along the western edge of Namibia, from Luderitz in the south to Walvis Bay and Swakopmund in the north (Figure 5). Gobabeb lies in the northwest portion of the park, 55 km from the coast and 70 km from Walvis Bay (120 km via the road) at the intersection of three major ecosystems. These ecosystems are the Namib Sand Sea, the gravel plains of the Central Namib and the Kuiseb River. The region around Gobabeb receives 0-50 mm of rainfall per annum, but is able to collect its moisture from the advective fogs that arise from the cold Benguela Current and are swept inland from the coastal regions (Louw & Seely, 1982). The region around Gobabeb supports a diversity of wildlife from Hartmann's mountain zebras (*Equus zebra hartmannae*), gemsbok, springbok, leopards, black-backed jackals and spotted hyaenas to numerous small mammals, birds and reptiles. Additionally there are resident herded populations of domestic goats (*Capra hircus*) and cattle (*Bos spp*) that forage along the Kuiseb River.

Figure 5: Map showing locations of Luderitz, Diamond Area 1 and Gobabeb

SKINNER COLLECTION

The Skinner collection housed at the University of Witwatersrand is actually the combination of two collections that were collected in Namibian Diamond Area No. 1 south of Luderitz (Skinner & van Aarde, 1991; Skinner *et. al.*, 1998) (Figures 5 & 9).

In addition to the regions surveyed, there are 17 specimens from a preliminary investigation of one brown hyaena den near the Gladysvale palaeontology site located on the John Nash private reserve in the Cradle of Humankind, South Africa. Due to time constraints and filming in the region, the Gladysvale dens were not included in the extensive survey portion of the study

CHAPTER FOUR

RESULTS OF SURVEYED REGIONS

Rietvlei Nature Reserve, South Africa

Initial fieldwork was carried out at the Rietvlei Nature Reserve, South Africa, from 18 February to 30 March 2004. Three brown hyaena dens were identified on the initial day with the aid of local ranger Karin Coetzee (Figure 6). An additional den was later located but was not included in the study as it was newly dug out with few faunal remains associated with it and the fact that it was discovered in late March when the permit for research was due to expire. The three dens examined were identified as Den R01, Den R02, and Den R03. All of the dens are modified aardvark (*Orycteropus afer*) burrows (A. Taylor, pers. comm.) located in both the open veld (R01 and R03) or in proximity to dense scrub (R02). Den R01 is located at coordinates S25º 53.370' EO 28º 18.207' in the open grasslands and yielded just 27 specimens. The den consists of three modified aardvark burrows connected by well-worn trails (Plate 1), and had gnawed faunal material and a latrine area in association. During daytime observations it appeared that this den was inactive as no new faunal remains were deposited at the dens and there was no evidence of disturbance to the dens themselves. Night observations of the den area were done on foot with handheld spotlights at which time three adult brown hyaenas were identified at the den. At the time of the fieldwork it was thought that this particular den was used as a resting site by the resident hyaenas and not a feeding or maternity den. Den R02 was the most active den during the three-month period of observations. This particular den is located in heavy scrub near a stand of trees at 25º 56.669' EO 28º 18.207' (Plates 2 &

3). When initially located den R02 was an older complex made up of a series of modified aardvark holes that had recently collapsed. During the period of observation a new series of holes were dug adjacent to the collapsed complex. Over a period of two weeks this den went from an older collapsed complex to a new complex with no less than four entrances and new 'trails' of fresh earth connecting the entrances as well as moving off into the adjoining stand of trees. New faunal remains were located daily and sounds of movement could be heard coming form the den on more than one occasion. Despite all of the activity, this site had only 12 specimens associated with it at the time of collection. Den R03 is another dug out aardvark burrow that had been dug extensively thus it had an opening a metre wide and two metres deep (Plates 4 & 5) with a tunnel extending deep into the earth beyond the means of the investigator to penetrate. Faunal evidence suggests that the den is currently being inhabited by porcupines, but had been used by brown hyaenas in the past. The fact that hyaenas had indeed been resident in this den in the past was confirmed by Riaan Marais, the reserve manager, but it yielded a mere seven specimens.

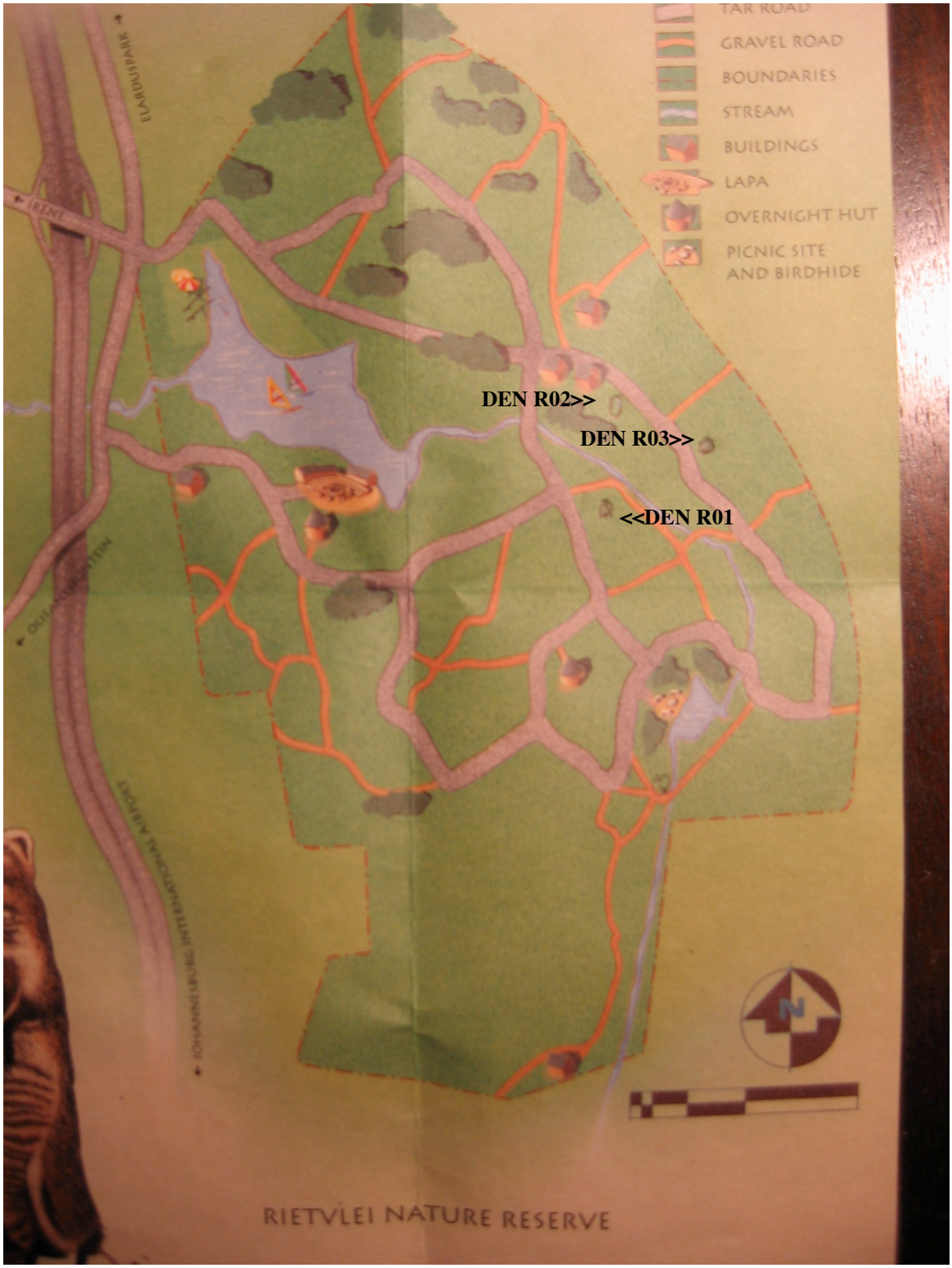

Figure 6: Rietvlei den locations

Mashatu Game Reserve, Botswana

After meetings with the staff of Mashatu Game Reserve, Botswana, in July of 2004, it was agreed that the researcher could set up camp at the boma camp, or kgothla, near the Motloutse Archaeological site and conduct research on the resident spotted hyaenas. During the two days in July the investigator was shown the region for the study, at which time a ranger identified three spotted hyaena dens, one of which was active and had cubs present. From 30 October to 23 December 2004 the researcher conducted surveys and observations of the previously established three dens as well as locating numerous other dens of both spotted hyaenas and leopards within the study area (Figure 7). Three additional active dens, and two inactive hyaena dens were located during the survey portion of the study. Included with the three dens located by the Mashatu Rangers, this gave a total of eight dens from which to work. Of these two were modified aardvark burrows (one active and one inactive) of which one appeared to be a resting place, while spotted hyaenas were found here on a regular basis there were no faunal remains present. The second series of dug out aardvark burrows had latrines associated with them but no current activity and no faunal remains. All of the remaining dens were in natural caves associated with the escarpment around the archaeological site. Two of these dens, one active and the other inactive, were located approximately 15 km from the archaeology site (where the vehicle was left) and 100-120 m above the valley floor. Due to the location of these dens and the nature of the den entrances on the cliff face, it was deemed to be unsafe for the researcher to collect material from them. Four dens were collected from; these included the three inactive dens (one of which had cubs present in July, but had no activity during the study period) located by the Mashatu staff and one

active den located during the survey portion of this study. These dens were given simple numerical identifications, Mashatu Den 1, Mashatu Den 2, Mashatu Den 3 (previously located by Mashatu rangers) and Mashatu Den 4. Mashatu Den 1 is a small cave at the base of the northern slope of the escarpment at S 22º 12.775' EO 28º 59.944' (Plates 6 & 7). The bone scatter associated with the den yielded 214 remains, ranging from one-centimetre fragments to an entire kudu bull skull. Mashatu Dens 2 and 3 are caves located along the base of the escarpment just south of the Motloutse Archaeology site on the south side of the dry river bed at S22º 12.962' EO 28º 59.816' and S22º 13.027' EO 29º 00.017' respectively (Plates 8 & 9). Combined these dens had 151 faunal remains, 58 from Den 2 and 93 from Den 3. Mashatu Den 4 is an active den about 8-10 km south of Dens 2 and 3 and is reached by hiking atop the escarpment and along the second westward 'finger' of said escarpment. This particular den is a large natural cave formation located just below the edge of the escarpment (Plates 10 & 11). Faunal remains associated with this den were found scattered down the slope below the den as well as the area above the den on top of the escarpment and consisted of 611 bones and bone fragments. Two adult animals and one juvenile were in residence during the entire period of the study, and continued to occupy the den after the collections were completed. All of the material was bagged in accordance with procedures previously laid out and transported back to laboratory facilities at the University of Witwatersrand, Johannesburg, South Africa for identification and analysis.

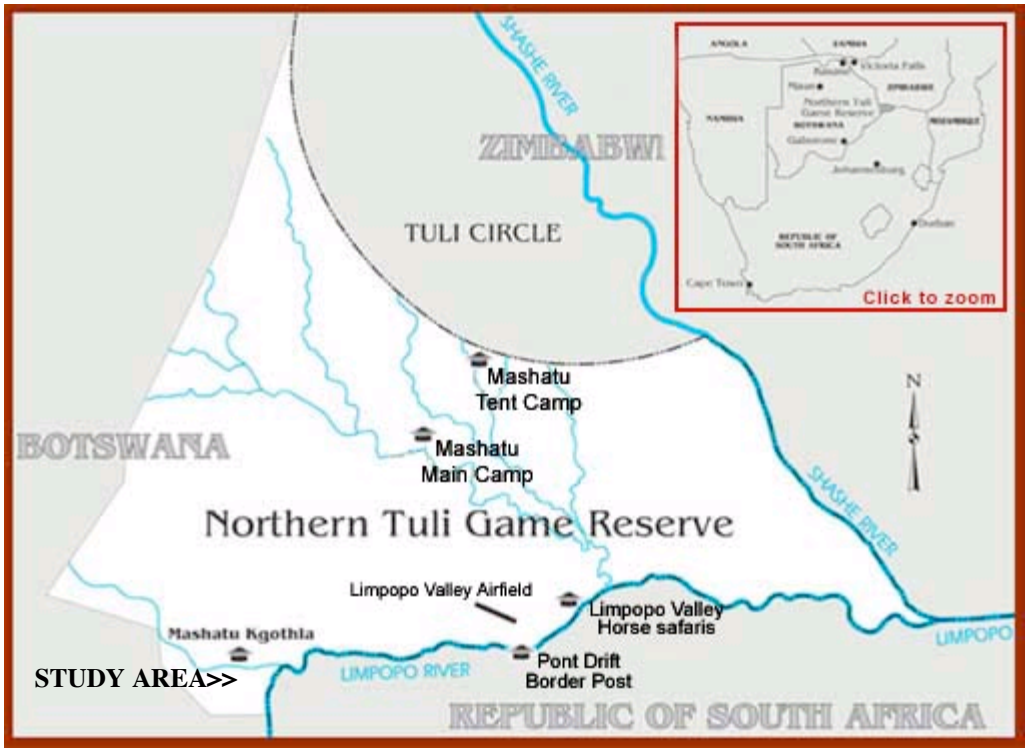

Figure 7: Map of Mashatu Game Reserve showing study area

Diamond Area No. 1 and Luderitz Peninsula, Namibia

Fieldwork completed in cooperation with the Brown Hyaena Project based in Luderitz, Namibia, took place from 22 August to 10 September 2005 and again from 13 October to 13 November 2005. All dens were located with the assistance of Ingrid Wiesel of the Brown Hyaena Project and all den designations used in this study are the same designations that she has given each den (Figures 8, 9 & 10). Three areas were covered in the region with the designations identifying the regions as well as the dens. All den designations with D-P followed by a number indicate dens located on the Luderitz Peninsula, designations D-SPG followed by a number indicate dens located in the Sperrgebiet area of Diamond Area 1, and designations with D-BB followed by a number indicate dens located near Bakers Bay, deep inside the Diamond Area. No observations were required for this portion of the study as the

Brown Hyaena Project has all the necessary recent tenant histories of the given den sites. All of the dens studied were not active during the time that faunal assemblages were examined and were natural caves formed by wind and erosion. Only a single den (one not collected from), den D-SPG 4, was an excavated den amongst heavy scrub approximately 10-12 m from the ocean surf. All other dens and resting sites located were natural caves and crevices.

During the first phase of the study, from 22 August to 10 September, four dens and their prospective assemblages were examined in situ and all data recorded onto data sheets. Dens D-P 1 and D-P 2 (Plates 12 & 13) are within sight of one another and located at coordinates S 20º 41.696' EO 15º 09.329' and S 26º 41.801' EO 15º 09.423' respectively (Figure 8). D-P 1 has a recorded occupation from 1-7 August 1995 and D-P 2 has documented occupation from 20-28 August 1995 (Wiesel, 2006). These dens yielded 497 specimens, 241 from D-P 1 and 256 from D-P 2. These dens, as well as dens D-P 4 and D-P 16, are accessed via the Luderitz Peninsula, and are inside the diamond area and as such right of entry for the local population is restricted. Den D-P 4 is another natural cave site (Plate 14) situated high upon a hilltop above a very steep slope at S 26º 42.685 EO 15º 09.469 (Figure 8) and was occupied briefly in October of 2006 (Wiesel, 2006), after faunal examinations were completed. The slope was covered with 1,865 bones and bone fragments covering a distance of 20 m. The final den that was examined during the initial phase of cooperation with the Brown Hyaena Project was Den D-P 9, located at S 26º 40.404' EO 15º 07.605' (Figure 8) on the public area of the Luderitz Peninsula adjacent to Griffith Bay (Plate 15). Recorded occupation of this den was from 21 January to 16

February 2000, 8 April to 2 June 2000 and 23 July to 8 August 2000 (Wiesel, 2006). The bone scatter for this den yielded 5,955 specimens.

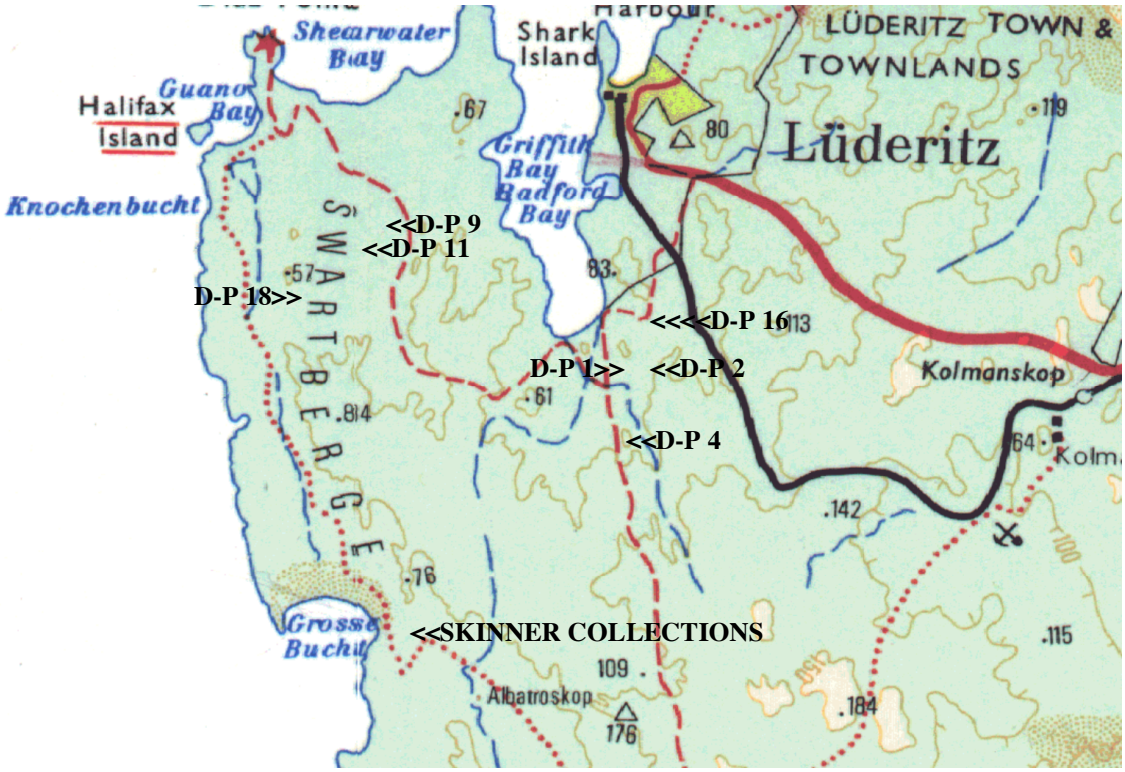

Figure 8: Peninsula and Skinner Dens

Five dens were examined during the second phase of fieldwork in association with the Brown Hyaena Project from 13 October to 13 November. Two of these dens, D-P 11 and D-P 18 are located on public land on the Luderitz Peninsula. One, D-P 16, is located in the diamond area adjacent to the public region of the Luderitz Peninsula (Figure 8). Upon returning to the Luderitz Peninsula Den D-P 18 was the first den to be examined. D-P 18 is situated at S 26º 40.179' EO 15º 07.331'(Figure 8) near the top of the rocky hills adjacent to Griffith Bay (Plate 16). Documented times of occupation were from 10 September to 9 December 1997, 8 January to 13 January 2000, 13 July to 15 July 2000, 10 October to 15 October 2001 and 17 October 2001 to 31 March 2002 (Wiesel, 2006). In addition to 1,811-recorded specimens there were 14 desiccated carcasses of Cape fur seal pups (*Arctocephalus pusillus*) that had their

skullcaps bitten through (Plate 17). Den D-P 11 is located at S26º 40.505' EO 15º 07.499' (Figure 8) and only a few hundred metres up the wash from D-P 9. Like most of the other dens in the region, it is in a small cave at the base of a rocky outcrop (Plate 18). There has not been any documented occupation of this den since its discovery by the Brown Hyaena Project (Wiesel, 2006). This particular den yielded the least amount of material from this particular region, with only 117 specimens recovered from the den. The last den accessed via the peninsula (but on restricted diamond company land) was Den D-P 16. D-P 16 (Plate 19) is positioned on a ridgeline at S 26º 40.834' EO 15º 09.706' (Figure 8) just off of the main road leading to the public areas on the peninsula. A week old jackal (*Canis mesomelas*) carcass was at this den when it was examined, but considering a many horned adder (*Bitis cornuta*) was in residence at the opening of the den for two of the three days it took to log the 1,287 bones, it is doubtful that the hyaenas were present at the time. Recorded occupations of this den were from 10 October to at least 14 October 1995 (researcher left region after the 14th) and from 22 July to 15 September 2001 (Wiesel, 2006). D-SPG 1 (Plate 20) is located in the Sperrgebiet region of Diamond Area 1 near Atlas Bay at coordinates S 26º 50.036' EO 15º 08.551' (Figure 9). Located less than 150 m from the bay, this den, like D-P 18 is characterised by the presence of numerous desiccated seal pup carcasses with atypical damage to the skull as seen in Plate 17. There is no documented occupation of this den since its discovery (Wiesel, 2006). After a week's work 3,252 bones and bone fragments were logged from this site. The last den examined, D-BB 1, is located 120 km south of Luderitz (S 27º 41.222' EO 15º 32.347') in Diamond Area No. 1 at Bakers Bay (Figure 10). The den is situated high up on the east side of the ridge that runs parallel with Bakers Bay (Plate 21) and is protected from the strong winds frequently experienced in the area. The den opens

up onto a step slope that has a bone scatter running all the way to the base of the ridge. There is no documented occupation of this den since its discovery (Wiesel, 2006). The top one-third of the scatter, from the den to approximately 75 m down the slope was examined and produced 1,351 specimens. The den also has easy access to the top of the ridge, and from the ridge access to the extensive seal colony at Bakers Bay. Brown hyaenas were seen foraging at the seal colony every day for the week spent in the area at all times of the day. At one time a total of eight individuals were seen foraging amongst the seal colony, along with over 30 jackals. One kill by a brown hyaena of a seal pup was observed, and a second kill of a seal pup, this time by a jackal, was videoed.

Figure 9: Atlas Bay Den, D-SPG 1

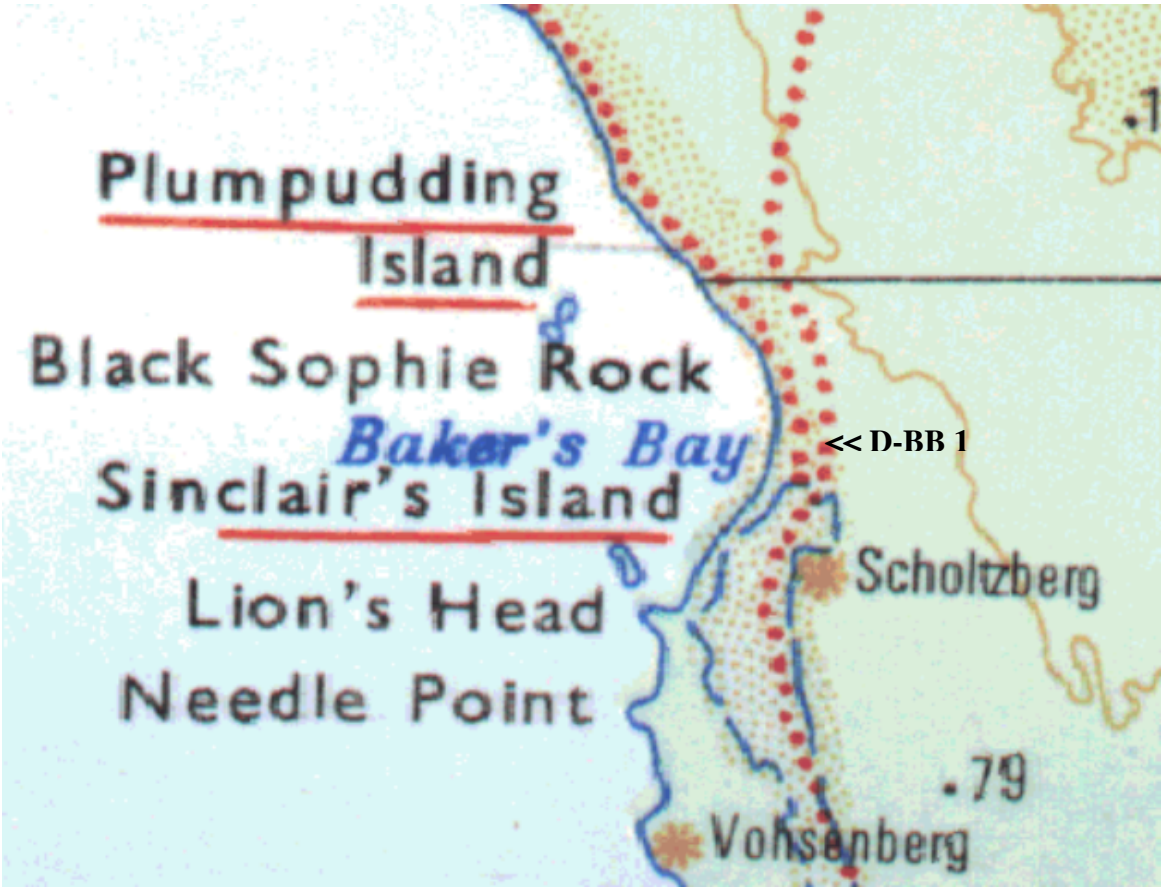

Figure 10: Bakers Bay Den, D-BB 1

Gobabeb, Namib-Naukluft Park, Namibia

From 11 September to 12 October 2005 fieldwork was conducted in the Namib-Naukluft Park near Gobabeb, Namibia in conjunction with the Gobabeb Training and Research Centre to try and locate the dens of spotted hyaenas. Long transects were conducted along the rocky ridges and washes above the Kuiseb River bed, as well as the ridges bordering Zebra Pans and the old copper mining areas. In all only two dens were located and examined, one of which was a known den, the location of which was shown to the researcher by the staff at Gobabeb. The two dens were given the

designations NN-1 and NN-2 (Plates 22 & 23) and were on the eastern edge of the Kuiseb river just south of Gobabeb (refer to Figure 5). Den NN-1 is situated in a wash at S 23º 37.055' EO 15º 06.955'. This den was previously collected from in the 70's by Henschel *et. al.* (1979) when it had 296 collected remains; the current accumulation yielded 685 specimens, the bulk of which were unidentified bone fragments. The second den located is in the upper regions of the same wash as den NN-1 at S 23º 37.012' EO 15º 07.009' and contained a single gemsbok humerus in its interior and no faunal remains outside. The number of spotted hyaenas in the region has been drastically reduced since the early 80's due to the large herds of gemsbok moving out of the area as a result of drought conditions (J. Henschel, pers. comm.).

CHAPTER 5

RESULTS

Overview

From July 2003 to January 2005 23,498 specimens were logged into a database. Included in the early analysis of the Skinner collection were 73 porcupine (*Hystrix africaeaustralis*) quills, 46 fragments from eggshells, a single feather and 42 seashell fragments. These, along with five hooves and five claw sheaths from the subsequent collections were removed from the database for analysis of the skeletal elements, leaving a total of 23,324 specimens (for breakdown of specimens per den see Chart 1). Although removed for the analysis, porcupine quills and porcupine gnawing were noted at Rietvlei Den 03, Rietvlei Den 02, Mashatu Den 4, Brown Hyaena Project dens D-P 1, D-P 2, D-P 4, D-P 9, D-P 16, D-BB 1 as well as the Skinner collection. While porcupines are known collectors of faunal remains in their own right there is little evidence that any of the studied assemblages could be solely from porcupine collecting behaviour. In addition, other carnivores inhabit the 'hyaena dens' from time to time as was observed in Brown Hyaena Project D-P 10. This den was originally scheduled for collection during the initial surveys and collections on the Luderitz Peninsula but, upon return during the second survey period, the den was in use by a pair of black-backed jackals (*Canis mesomelas*) and their three pups.

Of the 23,324 specimens 39.4% have been identified to species or class size (Brain, 1974) (Table 1), 86.8% to skeletal element and 36% have evidence of carnivore gnawing activity of some sort upon the bones. Chart 1 illustrates specimens per den and Chart 2 illustrates the breakdown of skeletal elements that have been identified,

with ribs, vertebrae, metapodials and skull fragments removed due to large numbers of each (5020 ribs, 1573 vertebrae, 1076 metapodials and 2314 skull fragments).

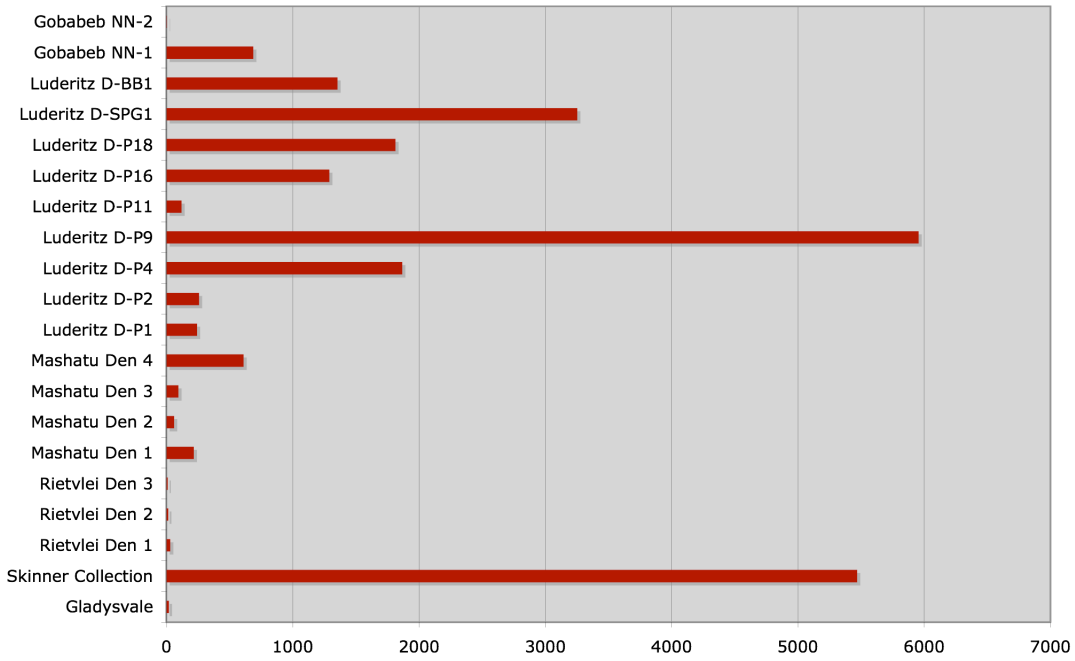

Chart 1: Specimen per den

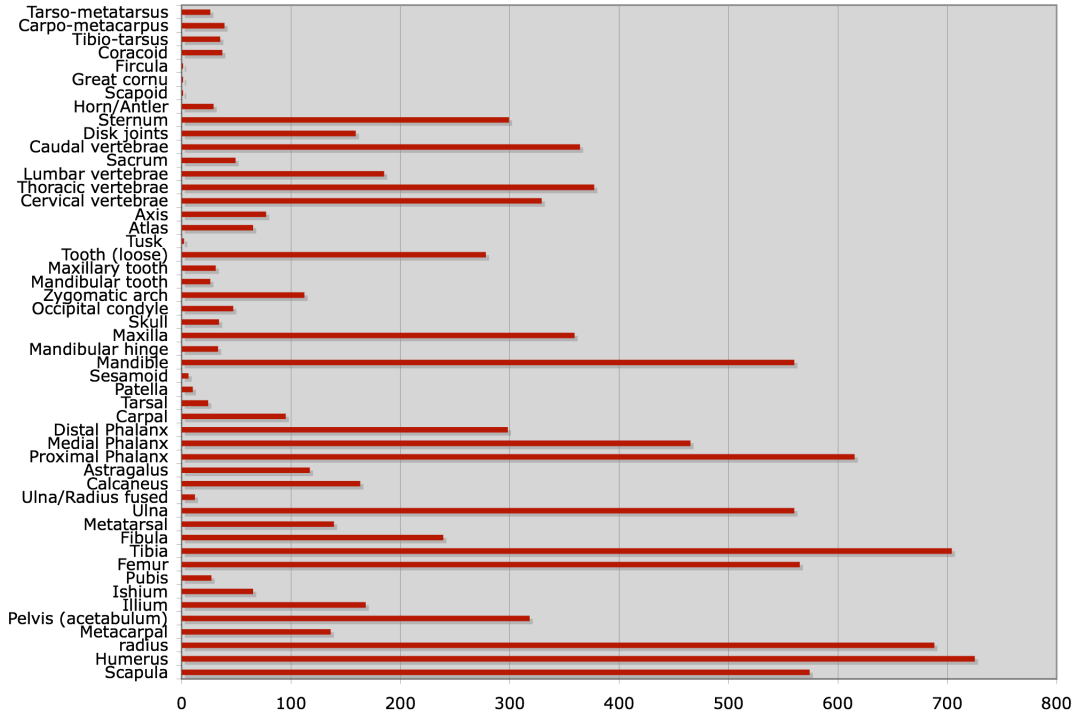

Chart 2: Skeletal Elements

The data set includes material collected from *Crocuta* and *Parahyaena* dens across southern Africa. Material from spotted hyaenas comprised 7.1% (1660 specimens) of the total database, while material collected from brown hyaena dens yielded 69.4% (16,198 specimens) of the data. The remaining 23.5% of the data comes from the previously established Skinner collection. (See previous chapter for details of specific dens and regions collected from). Each den was analysed individually and species collected, NISP (Number of Identified Specimens), MNI (Minimum Number of Individuals), skeletal elements, relative age (using fusion data), weathering and specific patterns of fragmentation and carnivore gnawing broken down. Fragmentation patterns for all the collections are illustrated in Chart 3.

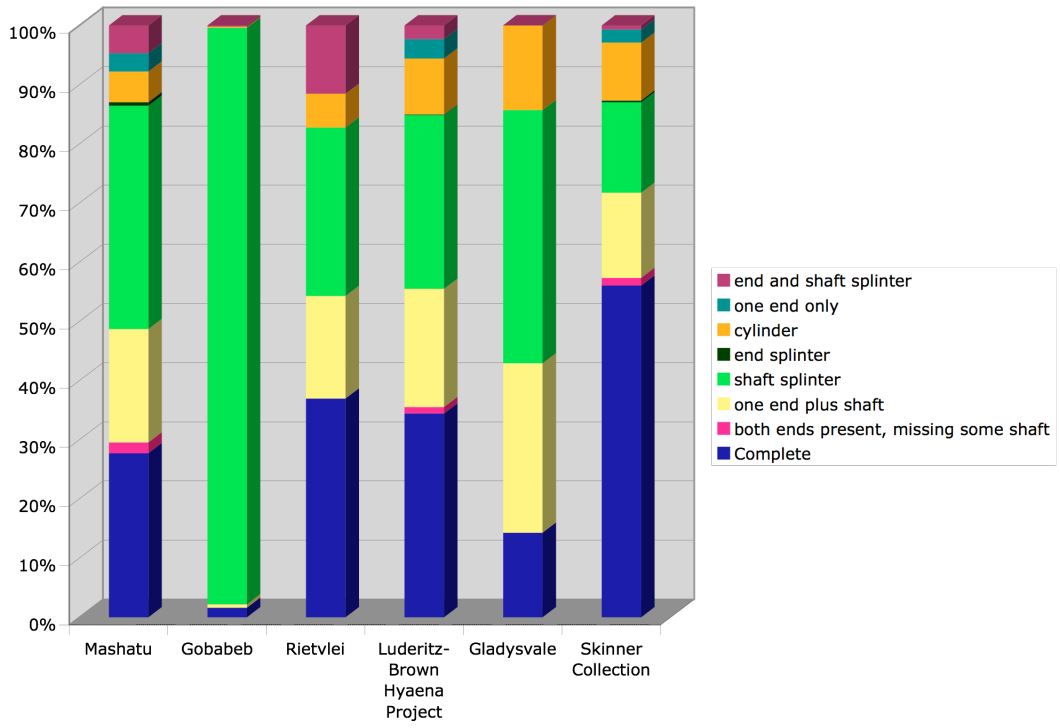

Chart 3: Fragmentation Patterns, Regions & Collections

SPECIES	NISP	SPECIES	NISP
Aepyceros melampus	160	*Hystrix africaeaustralis*	1
Alcelaphus buselaphus	3	*Leporidae*	11
Amphibian	1	*Loxodonta africana*	1
Antidorcas marsupialis	100	Mustelidae/Viverirdae/Herpestidae	8
Arctocephalus pusillus	6493	*Oreotragus oreotragus*	18
Avian (large)	431	*Oryx gazella*	153
Avian (medium)	100	*Panthera pardus*	1
Avian (small)	7	*Papio cynocephalus*	8
Bos (domestic)	3	*Parahyaena brunnea*	59
Bovid size I	10	*Phacochoerus africanus*	31
Bovid size II	39	*Procavia capensis*	11
Bovid size III	91	*Raphicerus campestris*	10
Bovid size IV	1	*Redunca fulvorufula*	1
Canis familiaris	548	Reptilian (med-lg)	5
Canis mesomelas	244	*Small mammal*	18
Capra hircus	31	*Spheniscus demersus*	125
Cetacea	30	*Struthio camelus*	89
Connochaetes taurinus	13	*Sylvicapra grimmia*	4
Connochaetes gnou	3	*Syncerus caffer*	4
Crocuta crocuta	2	*Taurotragus oryx*	1
Damaliscus dorcas phillipsi	13	*Tragelaphus scriptus*	2
Equus burchellii	35	*Tragelaphus strepsiceros*	71
Equus caballus	6	*Vulpes chama*	33
Felis (domestic size)	129	Fish	19
Homo sapien	1	TOTAL	9178

Table 1: All species

In addition to recording general carnivore activity upon faunal remains, specific types of carnivore gnawing were also recorded (See Chart 4). These include punctates and punctate depressions (See Plate 24), acid etching, crenulated edges (See Plate 25), scouring (See Plate 26), striations and any combinations thereof (See Plate 27). Location of the damage upon the faunal remains as well as which skeletal element is damaged was also documented.

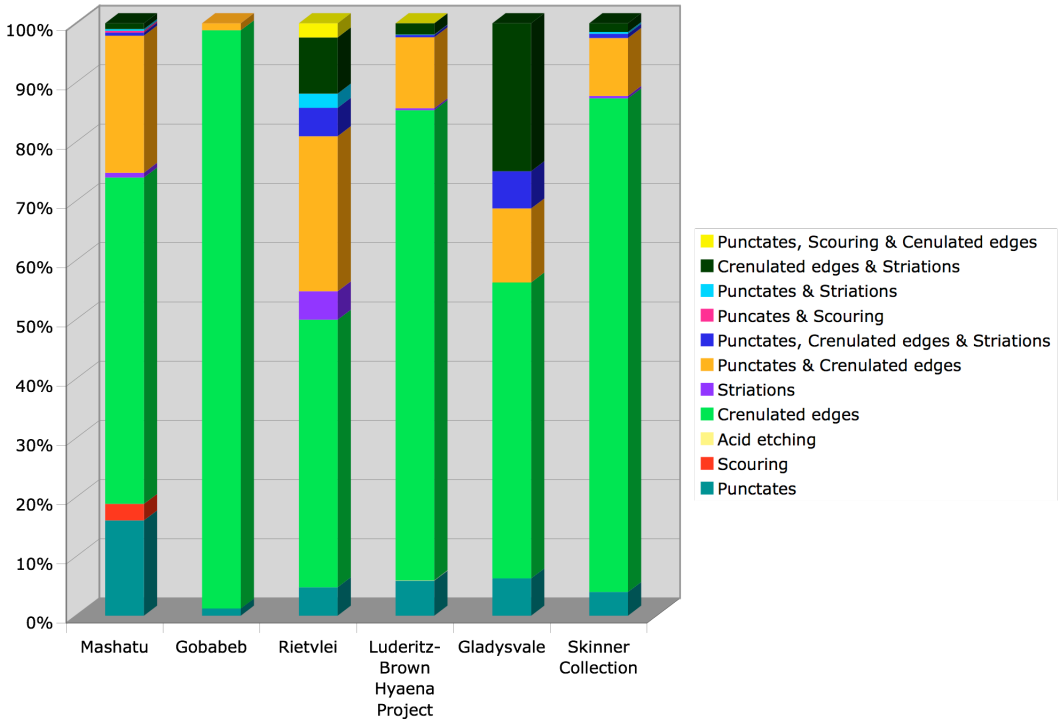

Chart 4: Carnivore Damage, Regions & Collections

Crocuta crocuta assemblages

Mashatu Den 1

Mashatu Den 1 consisted of 214 specimens, of which 64.5% were identified to species or class size. The majority of the identified remains belong to kudu (*Tragelaphus strepsiceros*) (34.1%), followed by bovid size III (31.2%), impala (*Aepyceros melampus*) (15.2%), bovid size II (10.9%), zebras (*Equus burchellii*) (2.9%), bovid size I (2.2%), hyrax (*Procavia capensis*)(1.5%), duikers (*Silvicapra grimmia*) (1.5%) and medium to large reptiles (0.7%) (See Table 2). With the exception of two hyraxes and the single reptile all of the other identified specimens were bovidae. There was a complete lack of hyaena remains as well as remains of other carnivore species.

Species	NISP	MNI
Aepyceros melampus	21	3 (skulls)
Bovid Size I	3	1 (right Ulna)
Bovid Size II	15	1 (left mandible)
Bovid Size III	43	1 (right astragalus)
Equus burchellii	4	1 (left femur)
Procavia capensis	2	1 (right tibia)
Reptilian (med-lg)	1	1 (complete mandible)
Sylvicapra grimmia	2	1 (left tibia)
Tragelaphus strepsiceros	47	4 (left tibia)
Total	138	14

Table 2: Species NISP & MNI Mashatu Den 1

Of the 214 specimens collected, 74.3% were identified to skeletal element. Breakdown of elements and species can been seen in Table 3, while a graphic representation of elements is illustrated with Chart 5. All of the long bones were represented in the collection as well as all types of vertebrae, ribs and skull bones. Skull bones include not only complete skulls and skull fragments, but mandibles, maxillae and mandibular hinges as well. Ribs and skull fragments were the most abundant (16 and 15 respectively), while tibia made up the largest grouping of long bones with ten specimens identified. Fusion data for this den indicate that all of the specimens but one unfused tibia have come from adult animals.

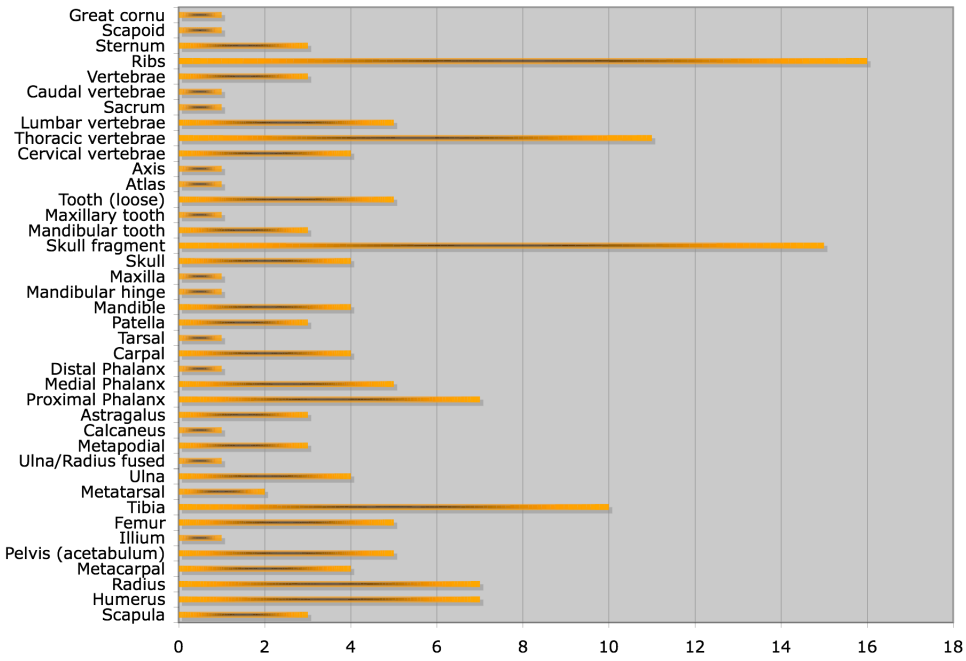

Chart 5: Elements, Mashatu Den

SKELETAL ELEMENT	NUMBER	SPECIES BREAKDOWN
Scapula	3	2 Kudu; 1 unknown
Humerus	7	4 Impala; 3 Kudu
Radius	7	3 Kudu; 3 bovid size II; 1 bovid size I
Metacarpal	4	2 Kudu; 1 Impala; 1 bovid size II
Pelvis (acetabulum)	5	2 Kudu; 2 Zebra; 1 Hyrax
Illium	1	bovid size II
Femur	5	2 Kudu; 2 bovid size II; 1 Zebra
Tibia	10	4 Impala; 3 Kudu; 1 Duiker; 1 Hyrax; 1 bovid size II
Metatarsal	2	2 Kudu
Ulna	4	3 Kudu; 1 bovid size I
Ulna/Radius fused	1	Impala
Metapodial	3	2 bovid size III, 1 bovid size II
Calcaneus	1	bovid size III
Astragalus	3	2 Kudu; 1 bovid size III
Proximal Phalanx	7	6 Kudu; 1 Impala
Medial Phalanx	5	2 Impala; 2 bovid size III; 1 Kudu
Distal Phalanx	1	Impala
Carpal	4	2 Impala; 2 unknown
Tarsal	1	bovid size III
Patella	3	1 Kudu; 1 Duiker; 1 bovid size III
Mandible	4	2 bovid size II; 1 Kudu; 1 reptile (med-lg)
Mandibular hinge	1	Kudu
Maxilla	1	bovid size II
Skull	4	3 Impala; 1 Kudu
Skull fragment	15	14 unknown; 1 bovid size III
Mandibular tooth	3	2 Kudu; 1 bovid size II
Maxillary tooth	1	bovid size III
Tooth (loose)	5	unknown
Atlas	1	Kudu
Axis	1	Kudu
Cervical vertebrae	4	3 Kudu; 1 Impala
Thoracic vertebrae	11	6 bovid size III; 4 kudu; 1 bovid size I
Lumbar vertebrae	5	bovid size III
Sacrum	1	Kudu
Caudal vertebrae	1	bovid size III
Vertebrae	3	2 unknown; 1bovid size II
Ribs	16	14 bovid size III; 2 unknown
Sternum	3	bovid size III
Scaphoid	1	Zebra
Great cornu	1	Kudu
TOTAL	159	

Table 3: Elements with species breakdown, Mashatu Den 1

The length of 75 specimens recorded ranged from 0.5 to 44cm, a tibia from a kudu. Of these, 28 (37.3%) were complete bones; 23 (30.7%) were shaft splinters; 12 (16%) were comprised of one end plus some shaft; five (6.7%) were one end only; four (5.3%) had both ends present while missing a portion of the shaft; two (2.7%) were cylinders and one (1.3%) was an end and shaft splinter. There were no examples of end splinters (see Chart 6).

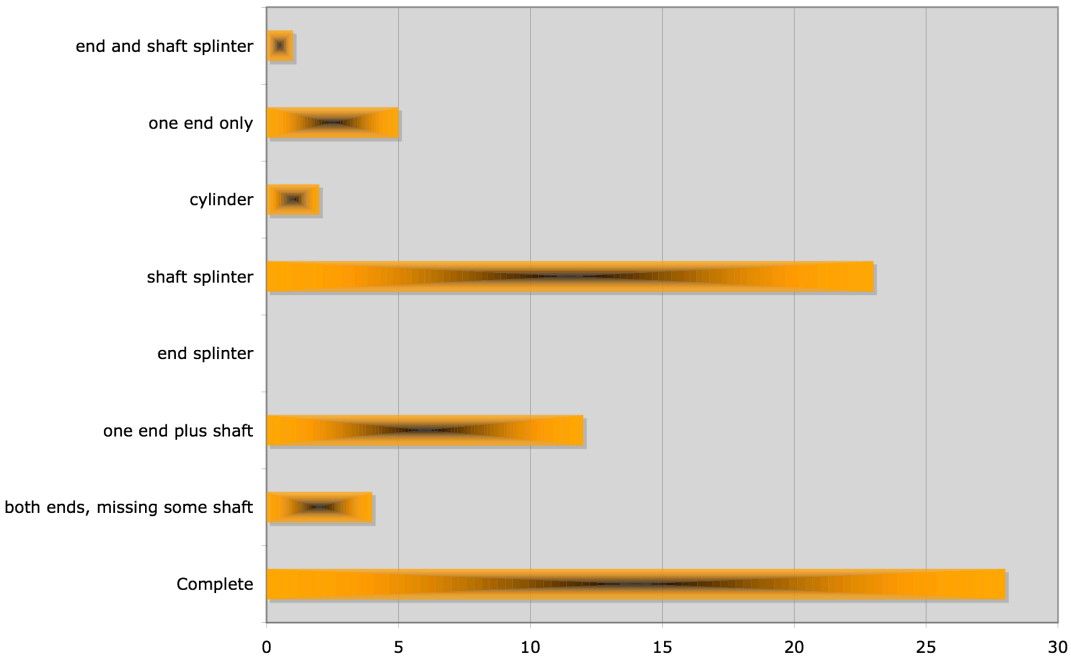

Chart 6: Fragmentation, Mashatu Den 1

Weathering data were collected from 188 (87.9%) of the specimens (see Chart 7). Weathering information from the majority of the assemblage suggests a range of 2-6 yrs since death. The 0-3 yr range are the next most abundant, followed by 4-15 yrs. Two samples appear to have been in the environment for 6-15 yrs and one specimen falls under the 0-1 yr category.

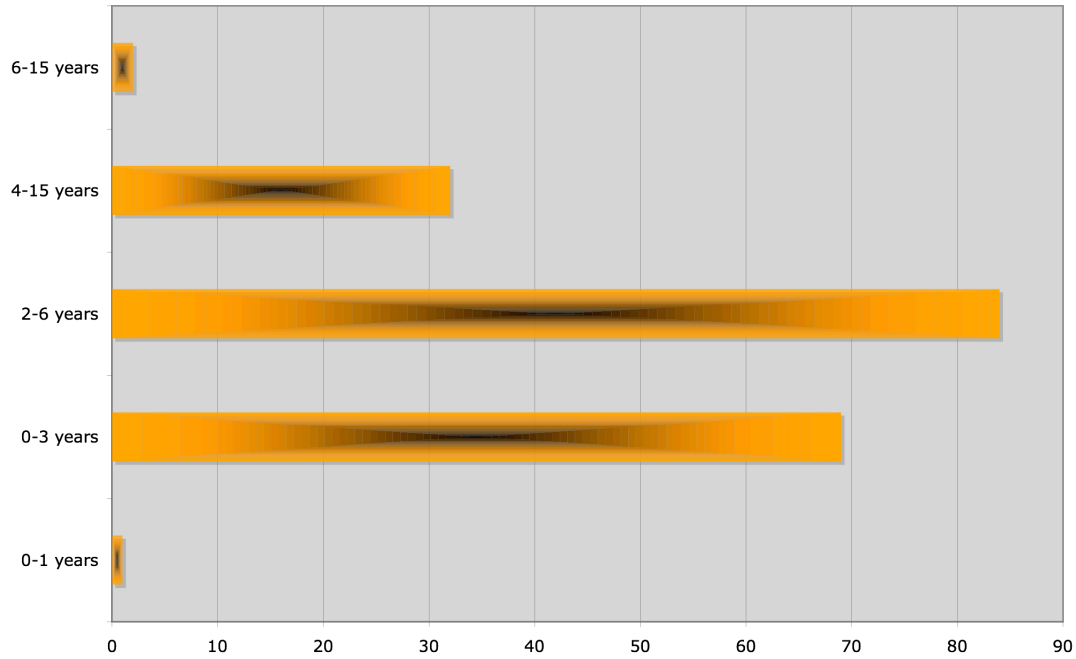

Chart 7: Weathering, Mashatu Den 1

Of the 214 faunal remains, 32.2% yielded carnivore-gnawing damage of some kind upon the bone surface. Of this crenulated edges made up 46.4%, punctate depressions 11.6%, acid etching 8.7%, striations 2.9%, scouring 0%. The combinations of punctate depressions & crenulated edges 26.1%, crenulated edges & striations 2.9% and punctate depressions, crenulated edges & striations 1.5% (see Chart 8 & Appendix A for complete breakdown of elements and specific carnivore damage and location of damage).

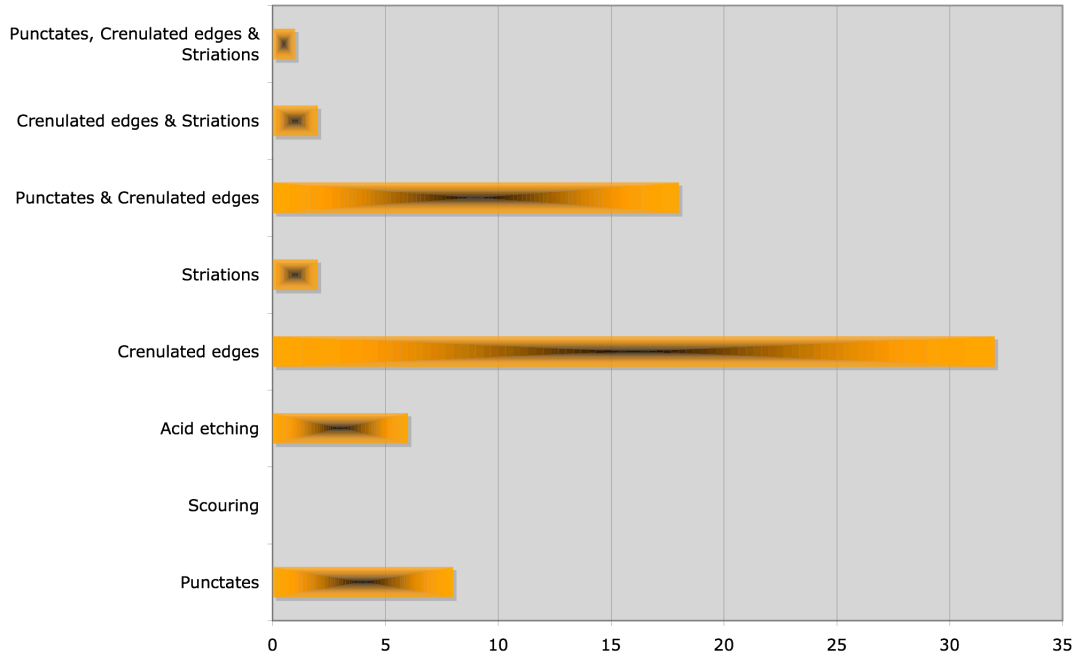

Chart 8: Carnivore Damage, Mashatu Den 1

Mashatu Den 2

Mashatu Den 2 yielded 58 samples, of which 65.5% were identified to species or class size. The majority of identified remains belong to impala (35.1%), followed by bovid class size III (21.6%), wildebeest, warthogs and hyrax, all with three specimens (8.1%), baboons (*Papio cynocephalus*), spotted hyaenas and bovid size II with two specimens each (5.4%) and a single zebra specimen (Table 4).

SPECIES	NISP	MNI
Aepyceros melampus	13	3 (right humerus)
Bovid size II	2	1 (right femur)
Bovid size III	8	1 (right humerus)
Connochaetes taurinus	3	1 (right radius)
Crocuta crocuta	2	1 (right ulna)
Equus burchellii	1	1 (right femur)
Papio cynocephalus	2	1 (right femur)
Phacochoerus africanus	3	1 (complete mandible)
Procavia capensis	3	1 (complete skull)
TOTAL	37	11

Table 4: Species NISP & MNI Mashatu Den 2

Of the 58 specimens collected, 67.2% were identified to skeletal element. Table 5 shows the breakdown of elements and elements per species, while Chart 9 illustrates the graphic representation of elements for this den. Of note is the absence of scapulas in the den while the remaining long bones were present. Humerus and femurs made up the majority of the assemblage, with humerus being 15.4% of the identified remains and femurs 12.8%. Mandibles and skull fragments made up 10.3% respectively, while proximal phalanges, cervical vertebrae and metapodials each represented 5.1% of the identified remains and the remaining identified elements each made up 2.6% of the assemblage. Fusion data for this den indicated at least one juvenile baboon due to the presence of an unfused proximal femur and unfused distal metatarsal. The remaining material with fusion data indicated adult individuals.

SKELETAL ELEMENT	NUMBER	SPECIES BREAKDOWN
Humerus	6	3 Impala; 2 bovid size III; 1 Wildebeest
Radius	1	Wildebeest
Metacarpal	1	Impala
Femur	5	2 Impala; 1 Zebra; 1 bovid size II; 1 Baboon
Tibia	1	bovid size III
Metatarsal	1	Baboon
Ulna	1	Spotted Hyaena
Metapodial	2	1 bovid size III; I bovid size II
Proximal Phalanx	2	Impala
Medial Phalanx	1	Impala
Distal Phalanx	1	Impala
Mandible	4	2 Impala; 1 Warthog; 1 Spotted Hyaena
Maxilla	1	Impala
Skull	1	Hyrax
Skull fragment	4	2 bovid class III; 1 Hyrax; 1 unknown
Tooth (loose)	1	Wildebeest
Atlas	1	Warthog
Axis	1	Hyrax
Cervical vertebrae	2	1 Warthog; 1bovid size III
Thoracic vertebrae	1	bovid
Lumbar vertebrae	1	bovid size III
TOTAL	39	

Table 5: Elements with species breakdown, Mashatu Den 2

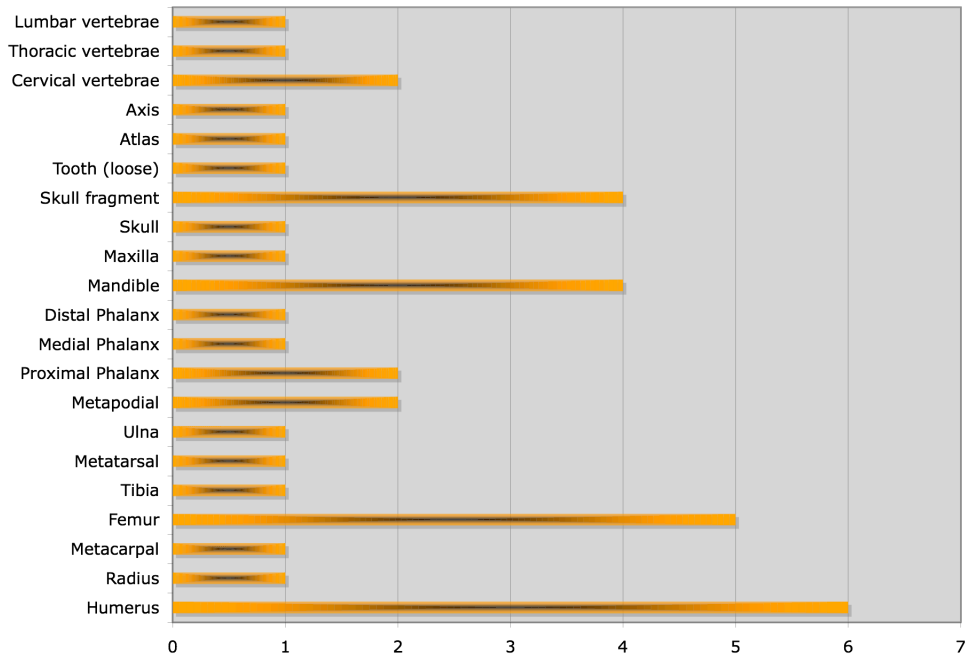

Chart 9: Elements, Mashatu Den 2

The 18 long bones measured from 2-36 cm. Of these five were one end and shaft (27.8%); there were four each complete bone, cylinders and end and shaft splinters (22.2% respectively), a single specimen made up of one end only (5.6%) and no examples of either end splinter or shaft splinter (See Chart 10).

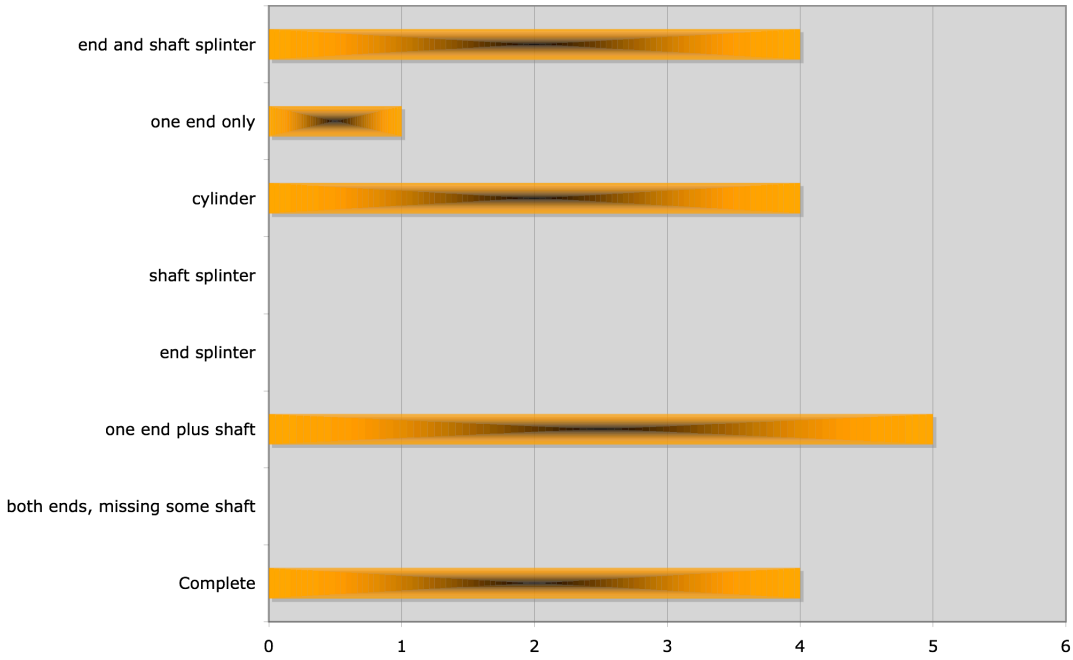

Chart 10: Fragmentation, Mashatu Den 2

Weathering data were collected from 98.3% of the specimens. The majority of the samples suggested a range since the specific animal died between 0-3 yrs. This is followed by 12 specimens indicating a range of 2-6 yrs since death and four in the range of 4-15 yrs (See Chart 11).

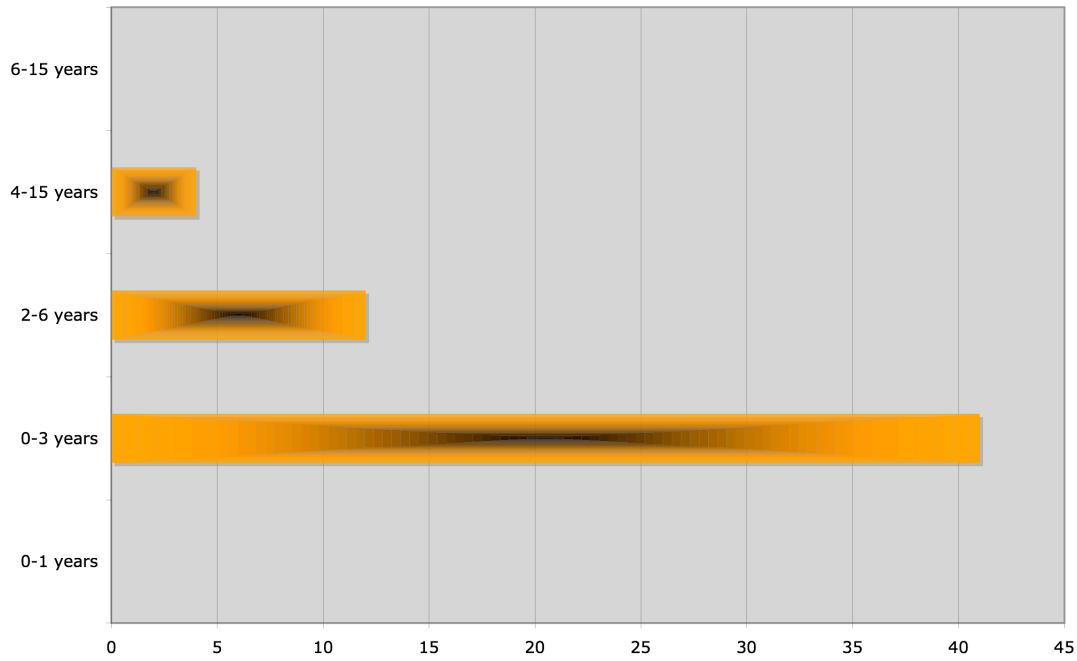

Chart 11: Weathering, Mashatu Den 2

Carnivore gnawing was recorded from 31 of the 58 samples (53.5%). Crenulated edges made up 87.1%, punctate depressions 29%, striations 9.7%, acid etching and scouring 0%. The combinations of punctate depressions & crenulated edges 19.4% and crenulated edges & striations 6.5%. (See Chart 12 & Appendix B for complete breakdown of elements and specific carnivore damage and location of damage).

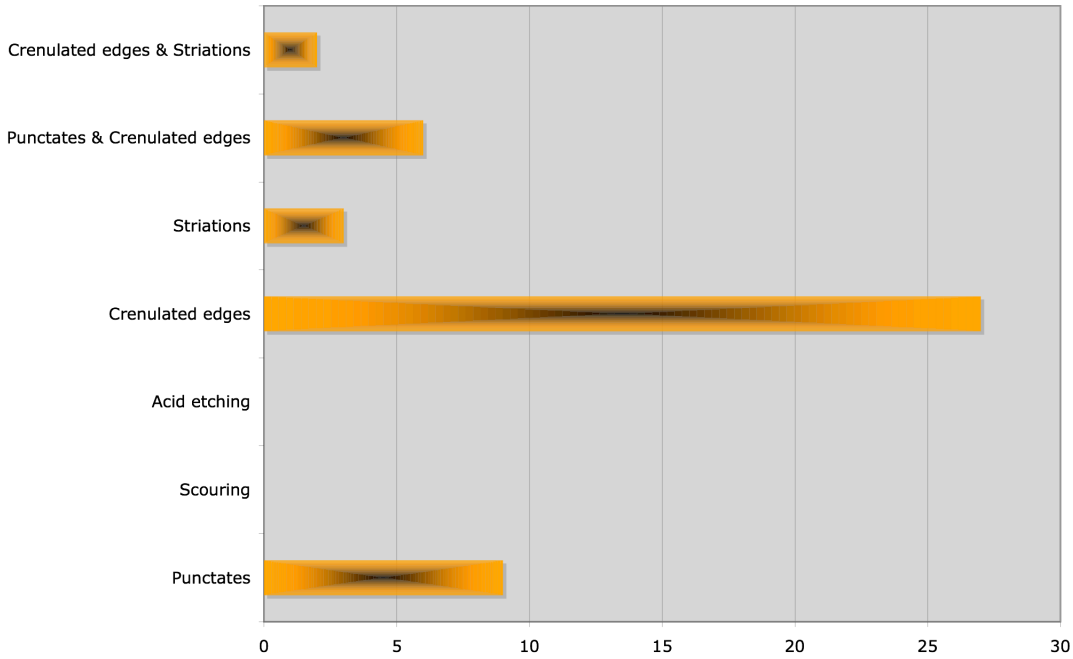

Chart 12: Carnivore Damage, Mashatu Den 2

Mashatu Den 3

Of the 93 samples collected from Mashatu Den 3, 59.1% were identified to species or class size. The majority of the remains belong to class III bovids (25.5%), followed by impala (18.2%), equids (13%), zebras (11%), warthogs (9.1%), class size II bovids (7.3%), wildebeest (3.6%), baboons (3.6%), hyraxes (3.6%), small birds, kudus and elephants (*Loxodonta africana*) (1.8% each) (See Table 6).

SPECIES	NISP	MNI
Aepyceros melampus	10	1 (right humerus)
Avian (small)	1	1 (carpo-metacarpus)
Bovid size II	4	1 (right humerus)
Bovid size III	14	2 (left scapula)
Connochaetes taurinus	2	1 (skull)
Equus burchellii	6	1 (right radius)
Equid	7	2 (left tibia)
Loxodonta africana	1	1 (right femur)
Papio cynocephalus	2	1 (left humerus)
Phacochoerus africanus	5	1 (right mandible)
Procavia capensis	2	1 (right radius)
Tragelaphus strepsiceros	1	1 (cervical vertebrae)
TOTAL	55	14

Table 6: Species NISP & MNI Mashatu Den 3

Of the faunal remains, 72% have been identified to skeletal elements; Table 7 shows the breakdown of elements by species while Chart 13 indicates the relative abundance of the elements in Mashatu Den 3. The only long bone missing from the assemblage is ulna, with humerus being the most abundant (10.5%), followed by tibia, femur and metacarpal (6% each), then scapula and radius (4.5% each), and finally illium, metatarsal and metapodials (3% each). Of the non-long bones, skull fragments and thoracic vertebrae made up 7.5% of the assemblage respectively, followed by loose teeth (6%), proximal phalanges (4.5%), mandibles, vertebrae, and cervical vertebrae (3%). The remaining identified elements that made up 1.5% of the assemblage respectively were the medial and distal phalanges, carpals, patellae, mandibular hinges, maxilla mandibular teeth, skulls, sacrums, caudal vertebrae, ribs and tarso-metatarsus. With the exception of a single unfused elephant femur, all other fusion data indicated adult animals in the assemblage.

SKELETAL ELEMENT	NUMBER	SPECIES BREAKDOWN
Scapula	3	2 bovid size III; 1 Zebra
Humerus	6	2 Zebra; 1 Impala; 1 Baboon; 1 Equid; 1 bovid size II
Radius	3	1 Zebra; 1 Impala; 1 Hyrax
Metacarpal	4	2 Zebra; 1 bovid size II; 1 bovid size III
Illium	2	Impala
Femur	4	2 bovid size III; 1 Elephant; 1 Hyrax
Tibia	4	2 Equid; 2 bovid size III
Metatarsal	2	1 Zebra; 1 bovid size III
Metapodial	2	2 bovid size II
Proximal Phalanx	3	Impala
Medial Phalanx	1	Impala
Distal Phalanx	1	Impala
Carpal	1	Equid
Patella	1	bovid size III
Mandible	2	Warthog
Mandibular hinge	1	Warthog
Maxilla	1	bovid size II
Skull	1	Wildebeest
Skull fragment	5	4 unknown; 1 bovid size III
Mandibular tooth	1	Wildebeest
Maxillary tooth	1	bovid size III
Tooth (loose)	4	2 Warthog; 1 Equid; 1 unknown
Cervical vertebrae	2	1 Kudu; I Equid
Thoracic vertebrae	5	3 bovid size III; 1 Equid; 1 unknown bovid
Sacrum	1	Impala
Caudal vertebrae	1	Baboon
Vertebrae	2	unknown
Ribs	1	unknown
Taros-metatarsus	1	small bird
TOTAL	67	

Table 7: Elements with species breakdown, Mashatu Den 3

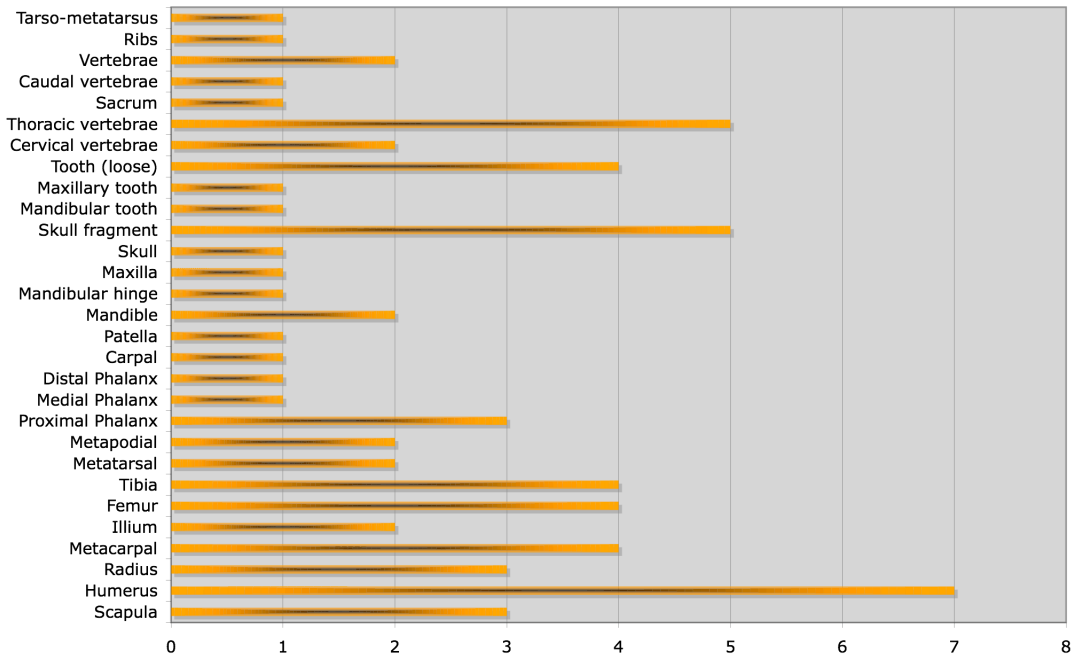

Chart 13: Elements, Mashatu Den 3

The length of the fragments ranged from 3-35 cm, a femur from a size III bovid. Shaft splinters made up 58.2% of the fragmented remains. Complete specimens at 25.5%, one end plus shaft at 9.1% follow this and cylinder fragments made up 1.8%. There were no examples of one end only, end splinter or both ends present, some shaft missing fragmentation patterns in the assemblage (See Chart 14).

Weathering data were collected from 88 of the 93 specimens and indicate that 53.4% of the specimens have been dead for 0-3 yrs The range of 2-6 yrs since time of death is indicated by 28.4% of the remains, while 4-15 yrs is represented by 17.1% of the specimens and the 6-15 yr range was represented by a single specimen (See Chart 15).

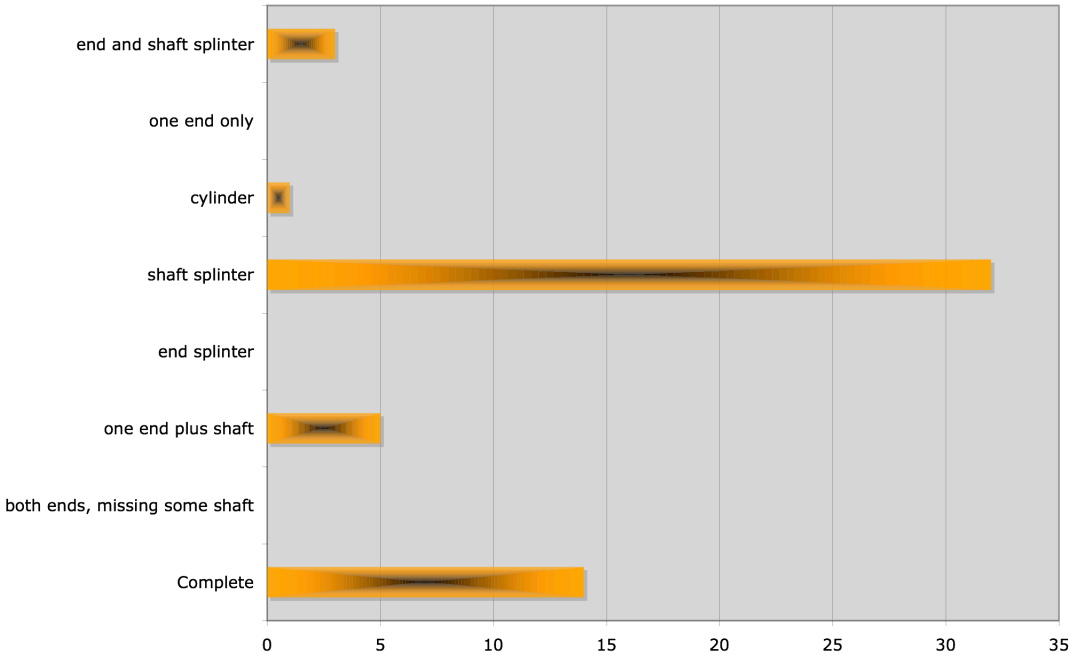

Chart 14: Fragmentation, Mashatu Den 3

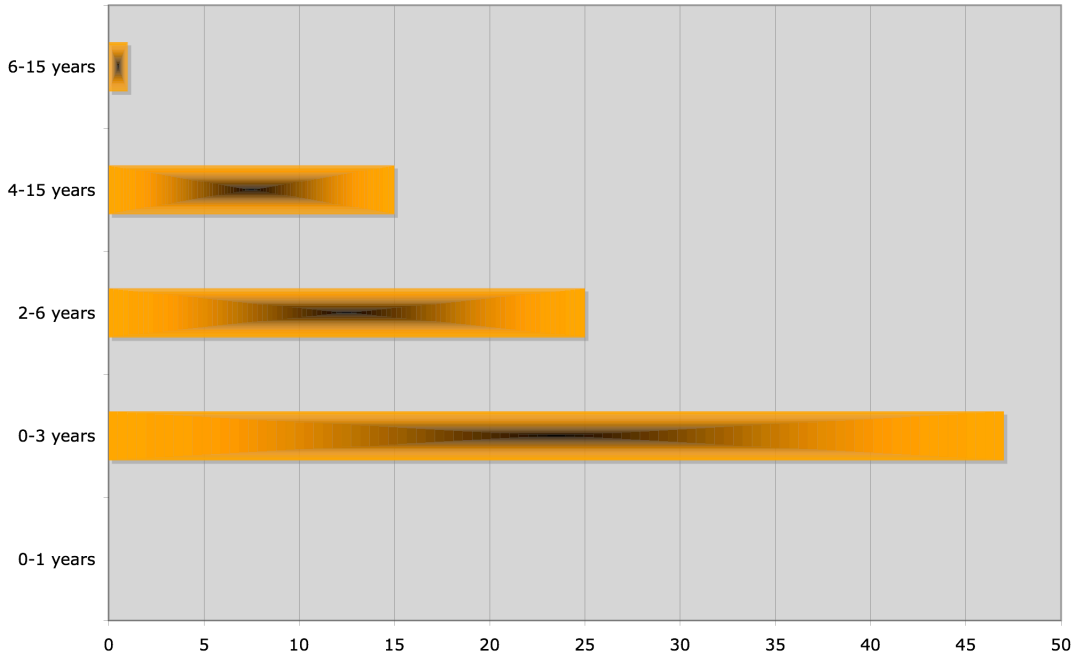

Chart 15: Weathering, Mashatu den 3

Of the 93 collected specimens, 39 (42%) of them had evidence of carnivore gnawing. In addition a single specimen, a left mandible from a warthog, had evidence of carnivore gnawing (crenulated edges at one end of the bone) and porcupine gnawing upon it. Crenulated edges were the most common type of carnivore damage present, making up 51.3% of the damage; this is followed by scouring (28.2%) and punctates (20.5%). There were no examples of either acid etching or striations (on their own) in the assemblage. However there is one example of striations with punctates on a specimen (2.5%). There is also a single specimen with both scouring and punctates upon it (2.5%) and nine examples with both punctates and crenulated edges (23.1%) (See Chart 16). Appendix C has a complete breakdown of placement of carnivore damage per element.

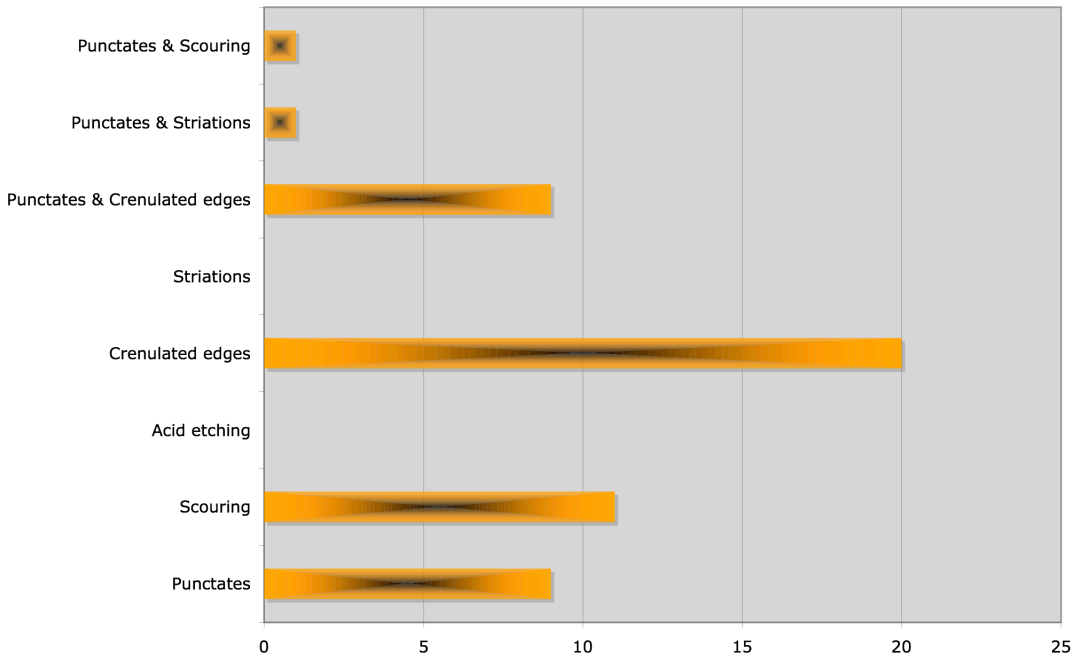

Chart 16: Carnivore Damage, Mashatu Den 3

Mashatu Den 4

Mashatu Den 4 yielded a total of 611 specimens, 51.1% of which were identified to species or class size. Impala made up the bulk of the faunal remains with 114 identified specimens and an MNI of seven (36.5%). Impala were followed in abundance by ostrich (18.3%), bovid size III (7.7%), warthogs and kudus (7.4% each), zebras (5.5%), domestic goats (3.9%), bovid size II (3.5%), wildebeest (1.9%), steenbok (1.6%), hyrax (1.3%), baboons, domestic cattle and large bird (1.0% each), klipspringers and duikers (0.6% each) and leopard, bovid size I and porcupine (0.3%) (See Table 8).

SPECIES	NISP	MNI
Aepyceros melampus	114	7 (right femur)
Avian (large)	3	1 (unidentified fragments)
Bos (domestic)	3	1 (left radius)
Bovid size I	1	1 (acetabulum)
Bovid size II	11	1 (right tibia)
Bovid size III	24	4 (left humerus)
Capra hircus	12	5 (4 right mandible, 1 complete mandible)
Connochaetes taurinus	6	3 (right humerus)
Equus burchellii	17	3 (right humerus)
Hystrix africaeaustralis	1	1 (right scapula)
Oreotragus oreotragus	2	1 (proximal phalanx)
Panthera pardus	1	1 (complete skull)
Papio cynocephalus	3	1 (right femur)
Phacochoerus africanus	23	3 (complete skulls)
Procavia capensis	4	1 (right femur)
Raphicerus campestris	5	2 (left femur)
Struthio camelus	57	4 (left femur)
Sylvicapra grimmia	2	2 (complete skulls)
Tragelaphus strepsiceros	23	2 (left tibia)
TOTAL	312	44

Table 8: Species NISP & MNI Mashatu Den 4

Of the 611 specimens collected, 67.8% have been identified to skeletal elements. Table 9 shows the breakdown of elements by species. All of the long bones were present in the assemblage and Chart 17 illustrates the relative abundance of each.

SKELETAL ELEMENT	NUMBER	SPECIES BREAKDOWN
Scapula	15	8 Impala; 2 Kudu; 1 Goat; 1 Wildebeest; 1 porcupine; 2 unknown
Humerus	28	11 Impala; 6 bovid size III; 3 Zebra; 3 Wildebeest; 1 Hyrax; 1 Steenbok; 1 Kudu; 1 Goat; 1 Cow
Radius	17	7 Impala; 2 Kudu; 2 Zebra; 2 Warthog; 2 bovid size III; 1 Steenbok; 1 bovid size II
Metacarpal	18	5 Impala; 4 Kudu; 4 Zebra; 2 Warthog; 2 bovid size II; 1 Goat; 1 Equid
Pelvis (acetabulum)	10	3 Impala; 1 Zebra; 1 Ostrich; 1 Bovid size I; 4 unknown
Illium	4	Ostrich
Femur	29	12 Impala; 6 Ostrich; 2 Steenbok; 2 bovid size II; 2 bovid size III; 1 Kudu; 1 Zebra; 1 Baboon; 1 Hyrax; 1 Warthog
Tibia	24	8 Impala; 3 Kudu; 2 Ostrich; 2 Warthog; 2 Zebra; 2 unknown; 1 Wildebeest; 1 Steenbok; 1 bovid size III
Metatarsal	15	8 Impala; 4 Kudu; 1 Warthog; 1 Wildebeest; 1 Cow
Ulna	10	3 Impala; 2 Kudu; 2 bovid size III; 2 unknown; 1 bovid size II
Ulna/Radius fused	1	Impala
Metapodial	5	2 bovid; 1 Impala; 1 Equid; 1 unknown
Calcaneus	8	3 Impala; 3 bovid size III, 1 bovid size II; 1 Goat
Astragalus	4	2 Impala; 1 Kudu; 1 bovid size III
Proximal Phalanx	24	14 Impala; 3 Equid; 2 Zebra; 1 Ostrich; 1 Klipspringer; 1 Kudu; 1 Goat; 1 Cow
Medial Phalanx	12	6 Impala; 2 Ostrich; 2 Equid; 1 bovid size III; 1 bovid size II
Distal Phalanx	8	4 Impala; 1 Kudu; 1 Zebra; 1 bovid size III; 1 unknown
Tarsal	5	2 Impala; 2 bovid size III; 1 carnivore
Mandible	15	8 Goat; 3 Warthog; 1 Kudu; 1 Zebra; 1 Hyrax; 1 bovid size II
Mandibular hinge	1	Kudu
Maxilla	1	Baboon
Skull	6	3 Warthog; 2 Duiker; 1 Leopard
Skull fragment	40	1 impala; 1 Klipspringer; 1 Warthog; 37 unknown
Maxillary tooth	1	Baboon
Tooth (loose)	5	2 Warthog; 2 bovid
Tooth Fragments	8	4 Warthog; 3 Equid; 1 bovid
Axis	1	Hyrax
Cervical vertebrae	3	2 Warthog, 1 Impala
Lumbar vertebrae	12	Impala
Sacrum	1	Impala
Vertebrae	61	35 Ostrich; 25 unknown; 1 bovid size III
Ribs	19	3 Ostrich; 2 bovid size III; 14 unknown
Horn/Antler	1	Impala
Tarso-metatarsus	2	Ostrich
TOTAL	414	

Table 9: Elements with species breakdown, Mashatu Den 4

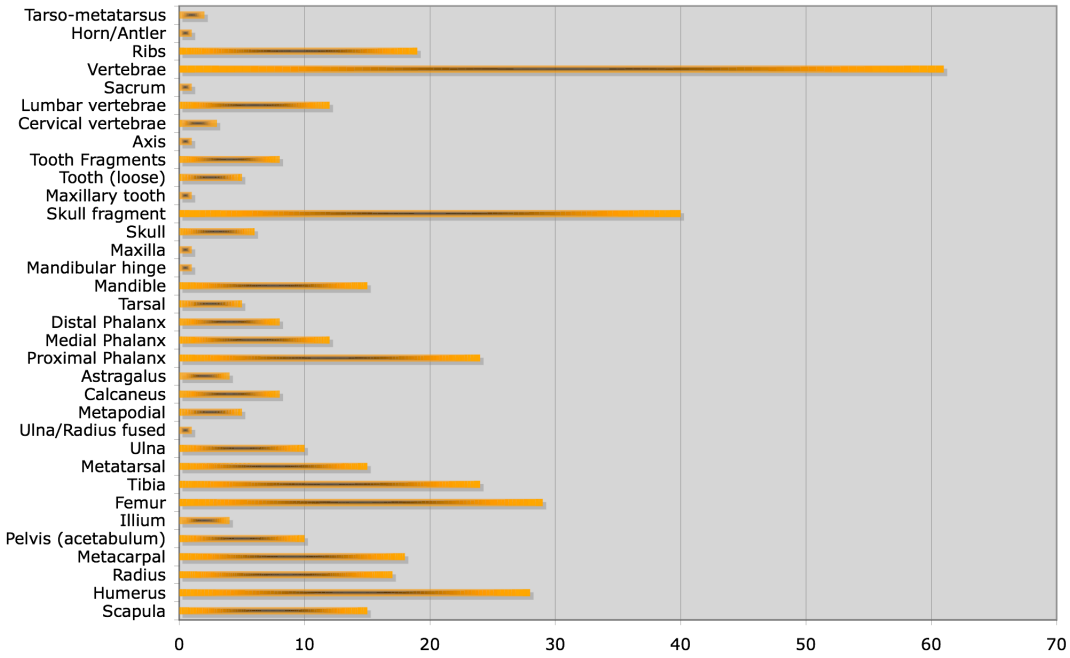

Chart 17: Elements, Mashatu Den 4

Femurs were the most prominent long bone, making up just 7% of the entire assemblage, with humerus next at 6.8%. Tibias follow with 5.8%, than metacarpal with 4.4%, radius (4.1%), scapula and metatarsal (3.6%) and pelvis (2.4%). Of the non-long bones vertebrae made up 18.1%, with skull fragments next at 9.6%. The remaining elements made up less than 15% of the assemblage when combined. Fusion data indicated that while the majority of remains come from adult animals, there were ten specific samples that came from young animals. These include four impala femurs and one kudu femur that are unfused at both proximal and distal ends, one each unfused distal radius of impala and bovid size III, two warthog radius that were unfused at both proximal and distal ends and a single warthog tibia unfused at the proximal end.

Fragments from the 343 long bones ranged in length from < 1.0-46 cm. Of these shaft splinters made up 38% of the assemblage. This was followed by complete bones (26.2%), one end plus shaft (21%), cylinder (5.3%), end and shaft splinter (4.6%), one end only (2.6%), both ends present and some shaft missing (1.5%) and end splinter (0.9%) (See Chart 18).

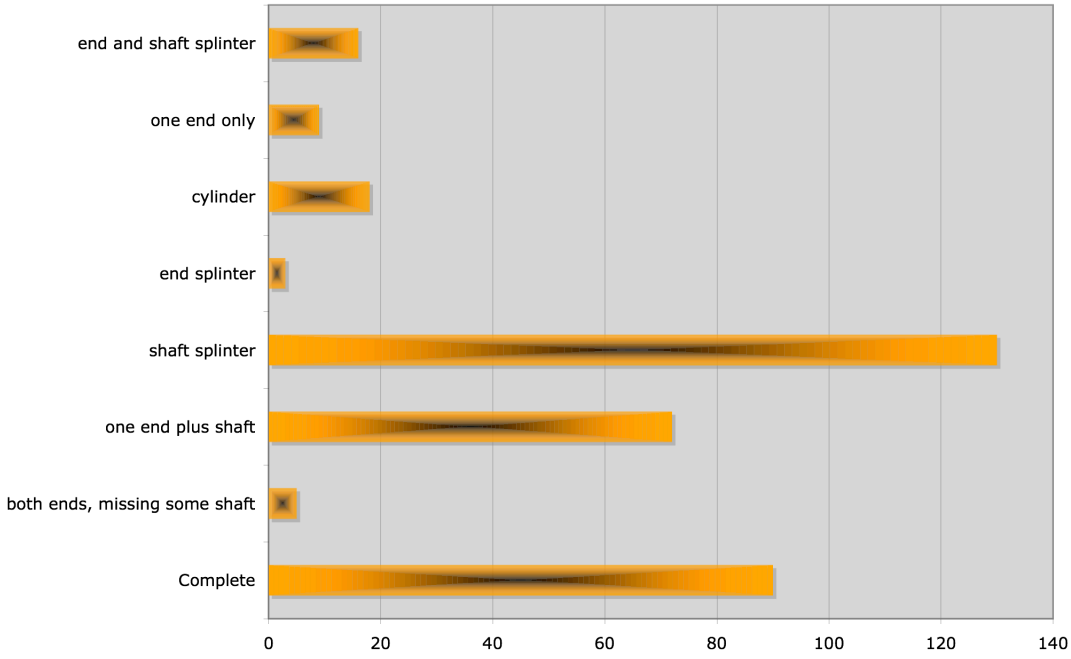

Chart 18: Fragmentation, Mashatu Den 4

Weathering data were collected from 525 of the 611 specimens, of which 52.2% indicate a time range since death of 2-6 yrs. There are no samples that yielded a time line of 0-1 yr, while 38.3% of the remains suggest a time of 0-3 yrs since death. The 4-15 yr range was found on 8.4% of the remains and the range of 6-15 yrs occurred on only 1.1% of the collected remains (See Chart 19).

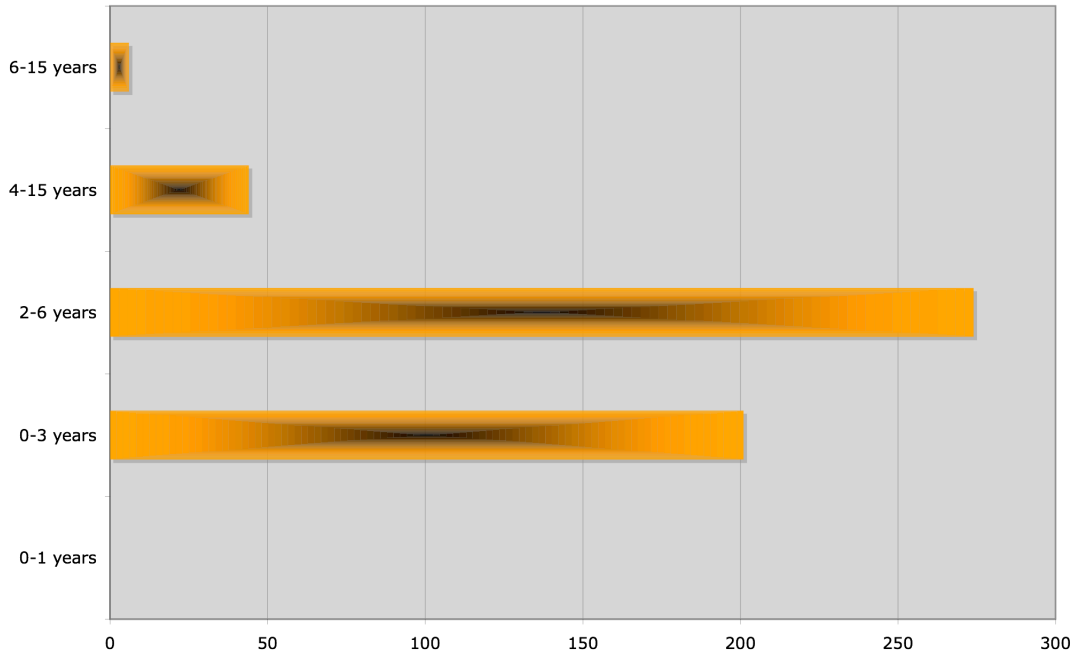

Chart 19: Weathering, Mashatu Den 4

Carnivore damage was noted on 239 of the 611 specimens collected (39.1%), with crenulated edges making up 58.6% of all the noted damage and punctates yielding 16%. There were no examples of scouring or acid etching in this assemblage, and only one example of striations. The combination of punctates and crenulated edges occurred on 25% of the faunal remains and the combination of punctates, crenulated edges and striations was identified on a single specimen (See Chart 20). For a complete breakdown of damage by element and location of damage on specific bones see Appendix D.

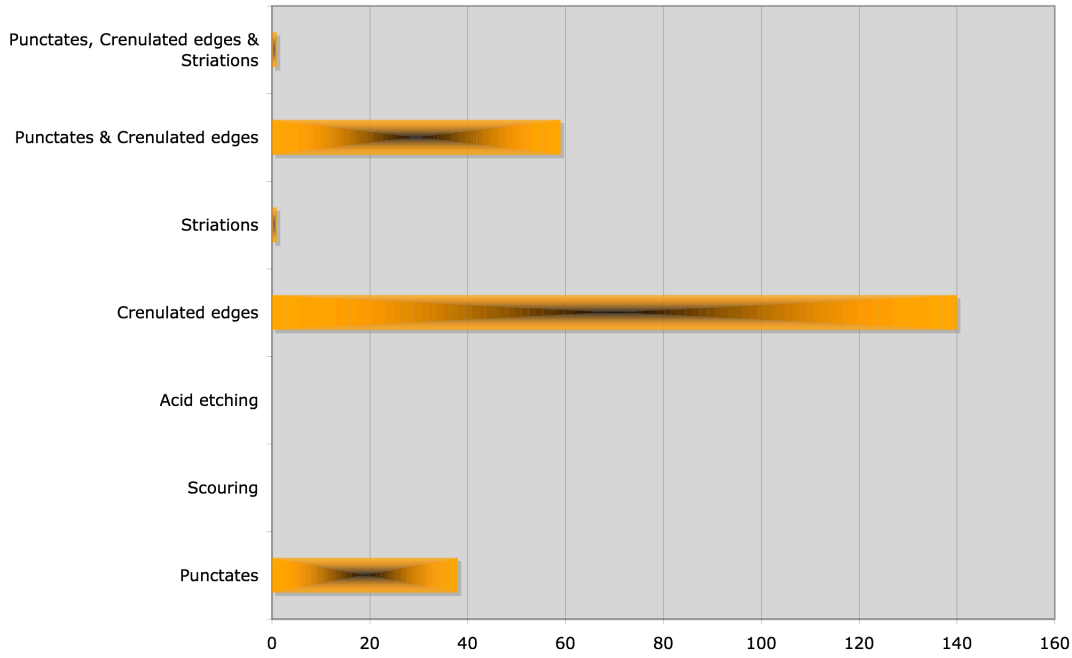

Chart 20: Carnivore Damage, Mashatu Den 4

Gobabeb Den NN-1

While previously collected (See Henschel *et. al.* 1979) Gobabeb Den NN-1 still yielded 685 specimens. Only two species were identified from this den, they are domestic goat (*Capra hircus*) and gemsbok (*Oryx gazella*) with 18 and 22 specimens respectively (See Table 10). The remaining 94.2% were either unidentified or only identified as unknown bovids.

SPECIES	NISP	MNI
Capra hircus	18	1 (right radius)
Oryx gazella	22	1 (right maxilla)
TOTAL	40	2

Table 10: Species NISP & MNI Gobabeb Den NN-1

Of the 685 specimens, only 128 (18.7%) were identified to skeletal element as seen on Table 11 and Chart 21.

SKELETAL ELEMENT	NUMBER	SPECIES BREAKDOWN
Radius	1	Goat
Metacarpal	1	Goat
Metapodial	2	Goat
Proximal Phalanx	2	Goat
Medial Phalanx	2	Goat
Distal Phalanx	3	Goat
Carpal	11	7 Gemsbok; 4 Goat
Mandible	2	Goat
Mandibular hinge	1	Gemsbok
Skull	2	Goat
Skull fragment	69	unknown
Axis	1	Gemsbok
Vertebrae	29	10 Gemsbok; 19 unknown
Horn/antler	2	Gemsbok
TOTAL	128	

Table 11: Elements with species breakdown, Gobabeb Den NN-1

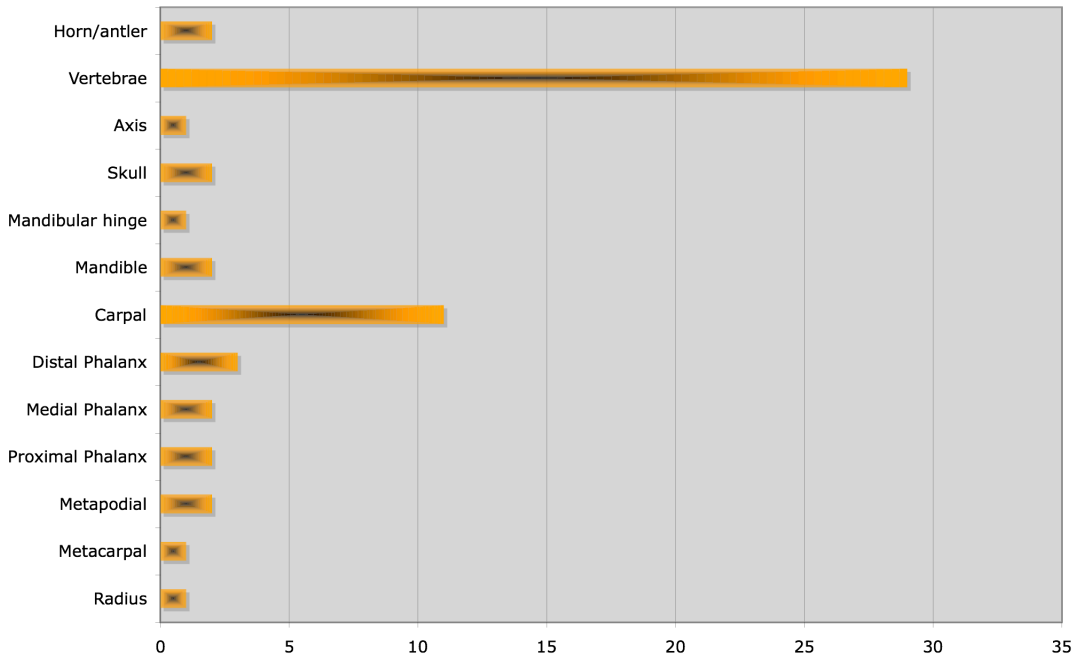

Chart 21: Elements, Gobabeb Den NN-1

The only long bone in the assemblage was the radius of a goat. The bulk of the assemblage was made up of unidentified fragments (72.9%), skull fragments (10.1%), and tooth fragments (8.3%). Fusion data from the lone radius indicated that it was from a sub-adult animal, as the distal epiphysis was not completely fused. Suggesting an age of approximately 36 months (Sliver, 1969).

Fragments measured from <1.0-7 cm, with two gemsbok horns measuring 57 cm and 74 cm. Shaft splinters made up the bulk of the assemblage with 73%. There were only eight complete bones, all of which were phalanges, two samples of one end plus shaft and one each cylinder and end and shaft splinter (See Chart 22).

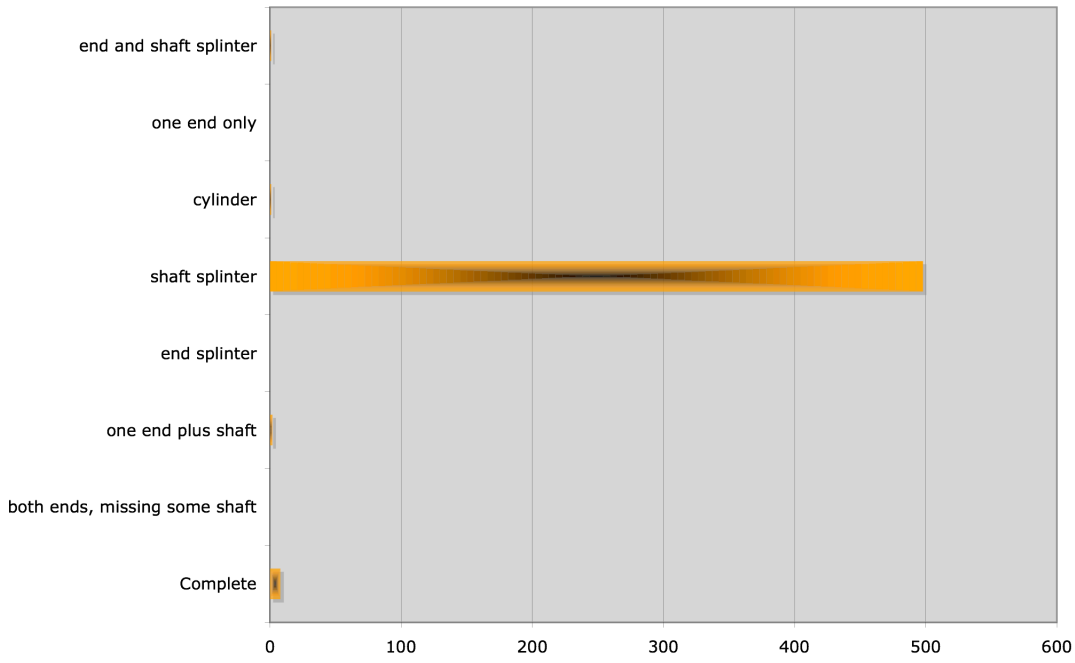

Chart 22: Fragmentation, Gobabeb Den NN-1

Weathering information was recorded from 613 specimens, 85% of which fall into the 2-6 yr and 4-15 yr ranges. There are no specimens that are less than two years old and only four in the 6-15 yr range (See Chart 23).

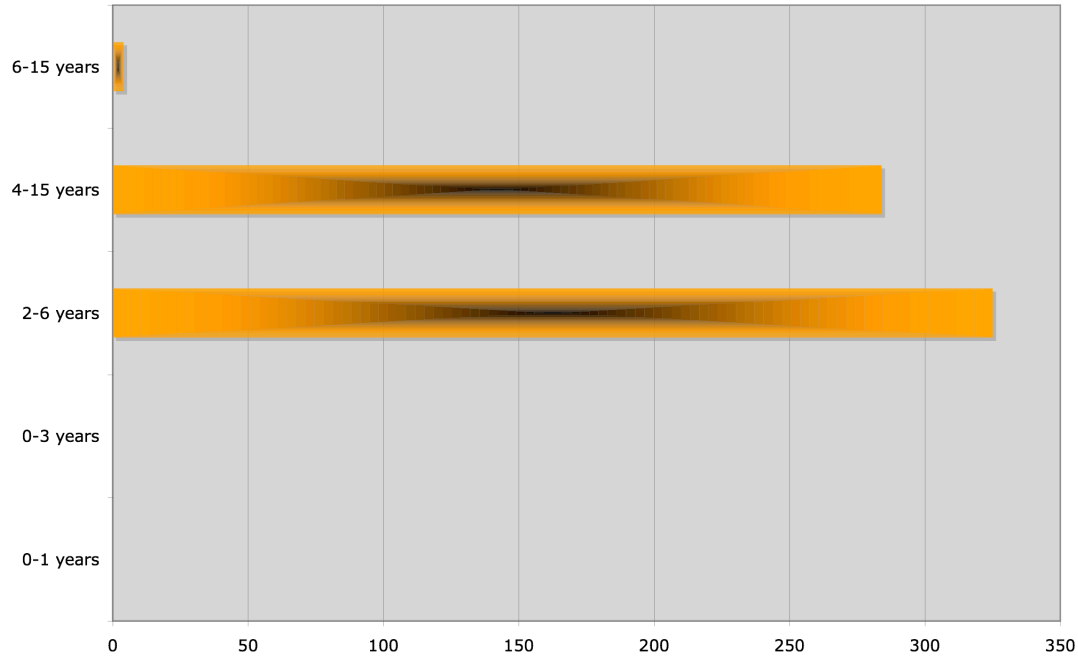

Chart 23: Weathering, Gobabeb Den NN-1

Damage due to carnivore gnawing was noted on 21% of the specimens, of which there were 79 examples of crenulated edges and a single example of punctate depressions. There were no examples of scouring, acid etching, striations or any combinations of specific damage types.

Gobabeb Den NN-2

Gobabeb Den NN-2 consisted of a single gemsbok left humerus 23 cm in length. The humerus consisted of the fused distal end plus some shaft. Weathering data puts the range since time of death at approximately 6-15 yrs. The single specimen had evidence of carnivore gnawing with punctates on the distal end and crenulated edges along the distal shaft.

Parahyaena brunnea assemblages

Note: In the Brown Hyaena Project dens, all specimens identified as *Canis mesomelas* were positively identified using manuals previously mentioned, all other canid remains are listed as dog (*C. familiaris*) (the presence of dog collars in the dens indicated that domestic dogs (pets as well as feral) are part of the assemblage). All remains identified as cat could possibly be African Wildcat, as *Felis sylvestris lybica* was recently identified in the region, unfortunately there was no domestic material with which to compare the felid remains.

Rietvlei Den R01

Twenty-seven remains were recovered from Rietvlei Den R01, of which 74.1% were identified to species or class size. As seen in Table 12 there are six specimens each for both blesbok (*Damaliscus dorcas phillipsi*) and zebras, combined they make up 44% of the assemblage. There are four samples of bovid size II, two buffaloes (*Syncerus caffer)* and one each hartebeest (*Alcelaphus buselaphus*) and brown hyaena.

SPECIES	NISP	MNI
Alcelaphus buselaphus	1	1 (left radius)
Bovid size II	4	1 (metapodial)
Damaliscus dorcas phillipsi	6	1 (right ulna)
Equus burchellii	6	1 (left scapula)
Parahyaena brunnea	1	1 (right ulna)
Syncerus caffer	2	1 (right tibia)
TOTAL	20	6

Table 12: Species NISP & MNI Rietvlei Den R01

Of the 27 specimens collected, 81.5% of them have been identified to species or bovid class size. Chart 24 and Table 13 illustrate the breakdown of identified

elements; of note is the lack of any one element standing out numerically over the rest. With the exception of a complete radius of a hartebeest that is unfused at the distal end, all fusion data indicated adult animals in the assemblage.

SKELETAL ELEMENT	NUMBER	SPECIES BREAKDOWN
Scapula	1	Zebra
Radius	1	Hartebeest
Metacarpal	3	2 Blesbok; 1 Zebra
Femur	1	Zebra
Tibia	3	1 Buffalo; 2 bovid
Ulna	2	1 Blesbok; 1 Brown Hyaena
Ulna/Radius fused	2	1 Buffalo; 1 Zebra
Metapodial	2	bovid size II
Mandible	1	Blesbok
Skull	1	Zebra
Atlas	2	1 Zebra; 1 bovid size II
Cervical vertebrae	1	bovid size II
Horn/antler	2	Blesbok
TOTAL	22	

Table 13: Elements with species breakdown, Rietvlei Den R01

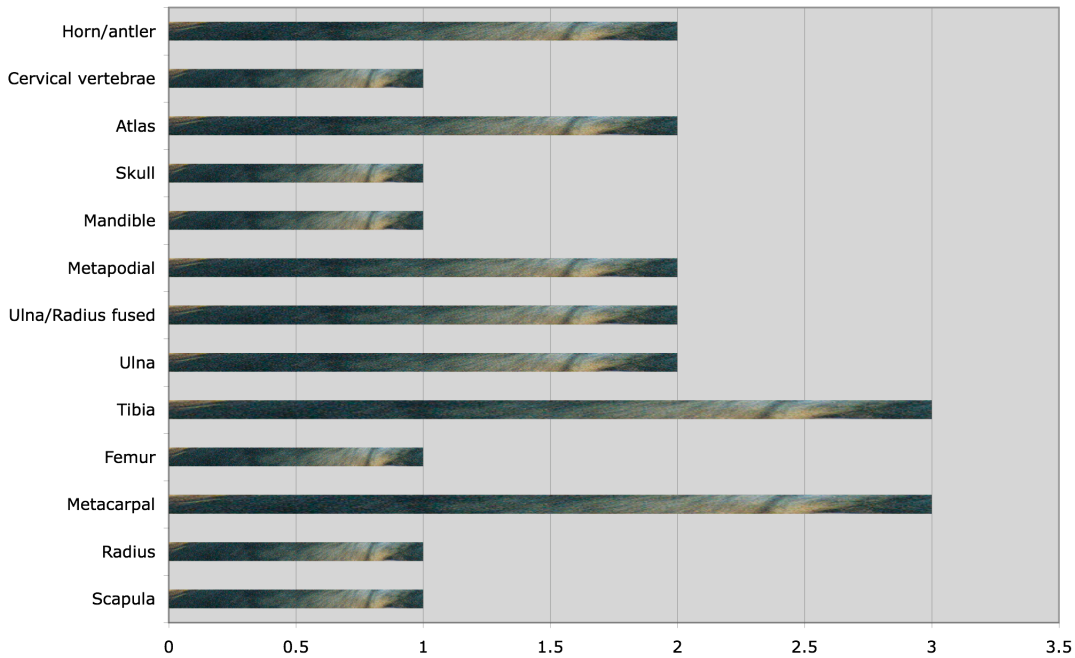

Chart 24: Elements, Rietvlei Den R01

The remains ranged in size from 4 to 47 cm, a skull of a zebra. Patterns of fragmentation are illustrated in Chart 25, where is can be seen that shaft splinters made up 36.4% of the assemblage. Complete bones were the next most prominent with 32%, followed by one end and shaft and end shaft splinter at 13.6% each. There was only a single example of a cylinder fragment and no specimens with one end only or end splinter.

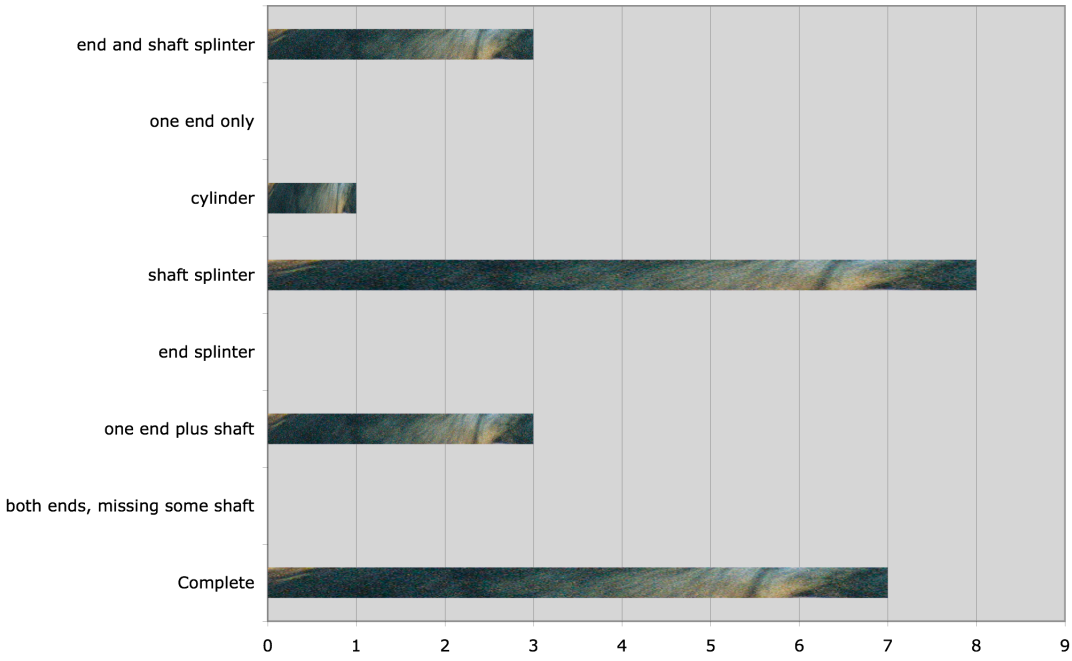

Chart 25: Fragmentation, Rietvlei Den R01

All 27 specimens yielded weathering data, all of which fall into ranges of less than six years since death. Two specimens fall into the range of 2-6 yrs, while the remaining specimens fall into the 0-3 yr range (48.2%) and the 0-1 yr range since death (44.4%) (See Chart 26).

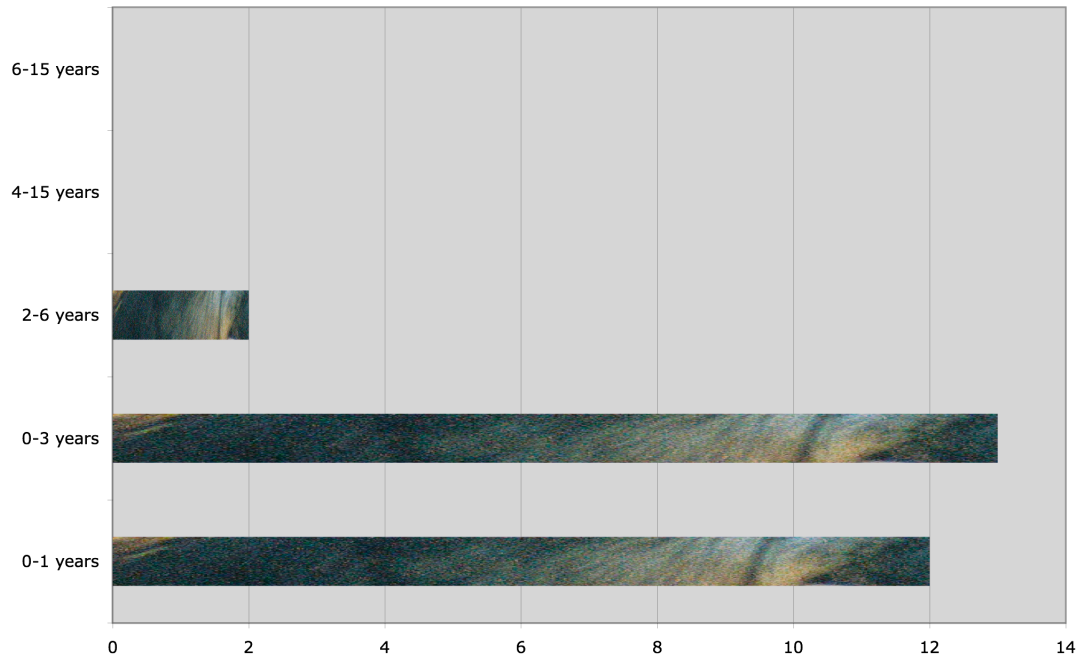

Chart 26: Weathering, Rietvlei Den R01

Twenty-four of the 27 remains (88.9%) had evidence of carnivore damage. Crenulated edges made up the majority of noted damage (46%) with only a single example of punctates depressions and striations (on their own). There were no examples of acid etching or scouring, but there were combinations of punctates and crenulated edges (21%), crenulated edges and striations (12.5%), punctates, crenulated edges & striations (8.3%) and punctates, crenulated edges, striations & scouring (4.2%). See Chart 27 for the relative abundance of each type of damage and Appendix E for a complete breakdown of damage by element and location.

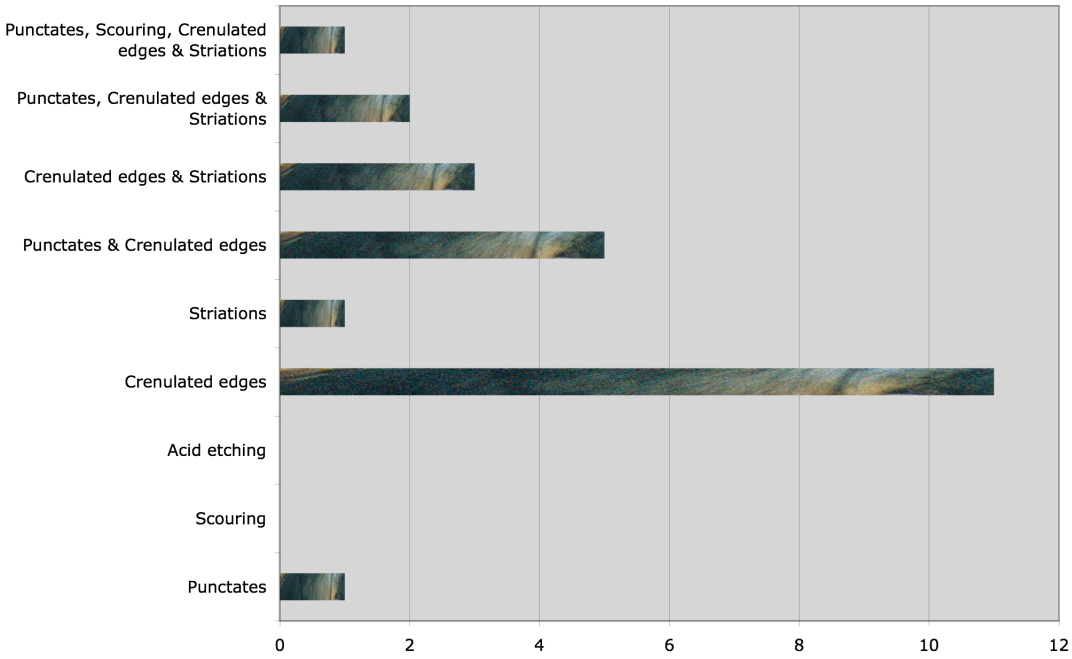

Chart 27: Carnivore Damage, Rietvlei Den R01

Rietvlei Den R02

Rietvlei Den R02 was comprised of 12 specimens, all but two of which were identified to species. As Table 14 indicates, blesbok account for 30% of the assemblage, buffaloes and black-backed jackals 20% each, and hartebeest, zebras and size III bovids 10%.

SPECIES	NISP	MNI
Alcelaphus buselaphus	1	1 (Complete set of horns)
Syncerus caffer	2	1(left calcaneus)
Bovid size III	1	1 (left scapula)
Canis mesomelas	2	1 (left mandible)
Damaliscus dorcas phillipsi	3	1 (left mandible)
Equus burchellii	1	1 (left radius)
TOTAL	10	6

Table 14: Species NISP & MNI Rietvlei Den R02

Ten of the twelve (83.3%) specimens were also identified to skeletal element. Table 15 gives the breakdown of elements by species and Chart 28 illustrates the abundance of each element.

SKELETAL ELEMENT	NUMBER	SPECIES BREAKDOWN
Scapula	1	bovid size III
Humerus	2	1 Blesbok; 1 bovid
Radius	1	Zebra
Calcaneus	1	Buffalo
Mandible	2	1 Blesbok; 1 Black-backed Jackal
Cervical vertebrae	2	1 Blesbok; 1 Buffalo
Horn/antler	1	Hartebeest
TOTAL	10	

Table 15: Elements with species breakdown, Rietvlei Den R02

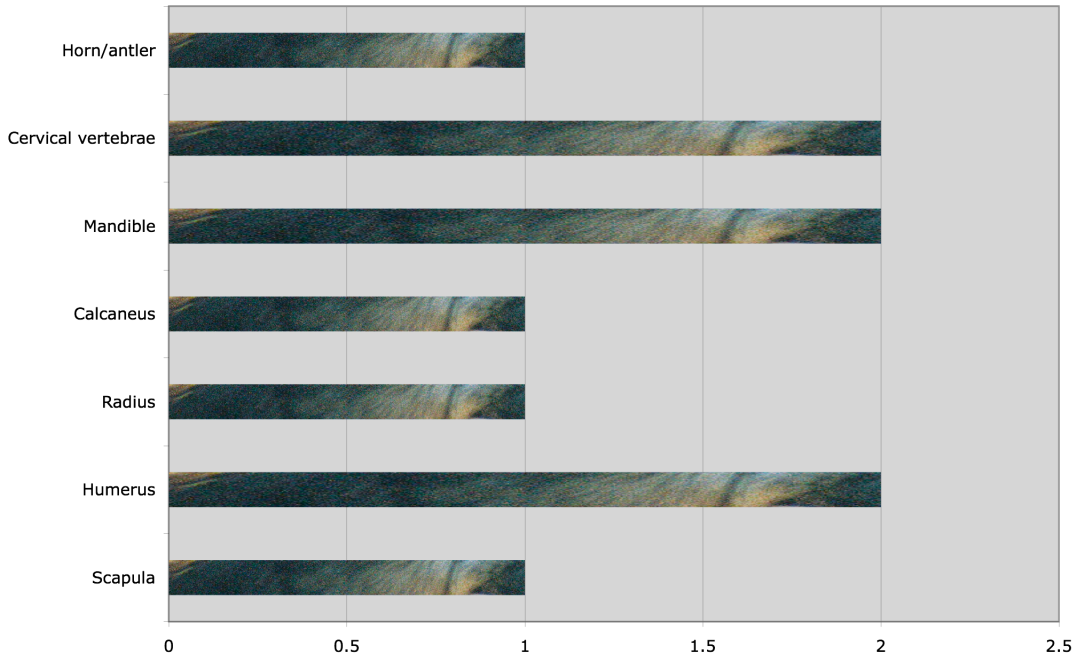

Chart 28: Elements, Rietvlei Den R02

Of the seven elements identified none are more prominent than the others, as seen in Chart 28, there were just one or two samples of each element present. Fusion data indicated that all of the animals in the assemblage were adults at the time of death.

The remains range in length from 4-35 cm, a set of hartebeest horns. Fragmentation data from nine specimens show that complete bones dominate the assemblage (55.6%), with shaft splinters making up 22.2%, cylinder and one end plus shaft yielding 11.1% each and no examples of end and shaft splinter, end splinter or both ends present some shaft missing (See Chart 29).

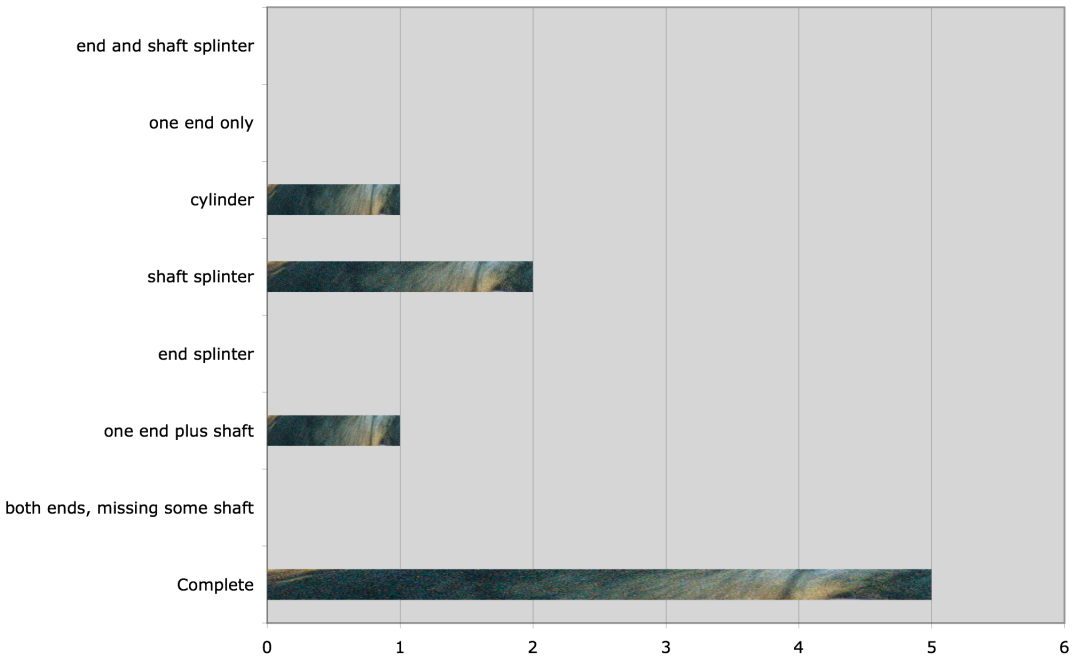

Chart 29: Fragmentation, Rietvlei Den R02

Weathering data logged from ten of the specimens indicated that all of the remains range in time since death from 0-3 yrs. Specifically six specimens fall into the 0-1 yr range and four into the 0-3 yr range (See Chart 30).

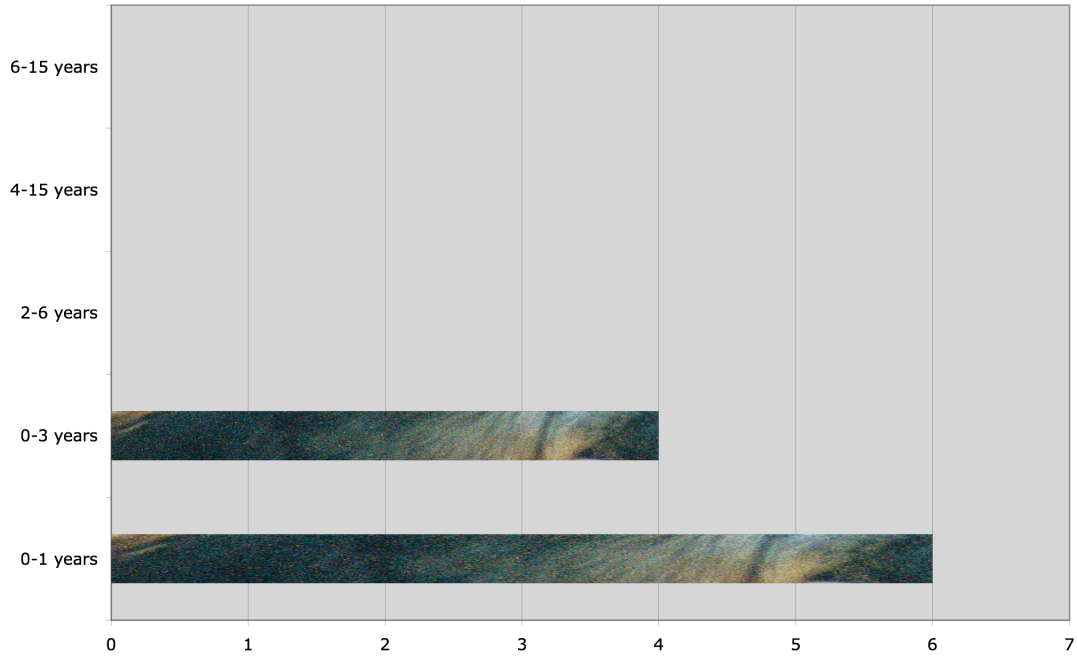

Chart 30: Weathering, Rietvlei Den R02

Eleven of the twelve specimens had evidence of carnivore gnawing upon them. One of these had evidence of both insect damage and carnivore damage and another one had both porcupine and carnivore gnawing on it. Crenulated edges were the most prominent type of damage identified (55%). Striations made up 9% of the assemblage, while there were no examples of punctates, scouring or acid etching. The combination of punctates and crenulated edges made up 18% of the assemblage while the combinations of crenulated edges and striations as well as punctates and striations each made up 9% of the assemblage (See Chart 31). Appendix F gives a complete breakdown of carnivore damage and location of said damage upon the faunal remains.

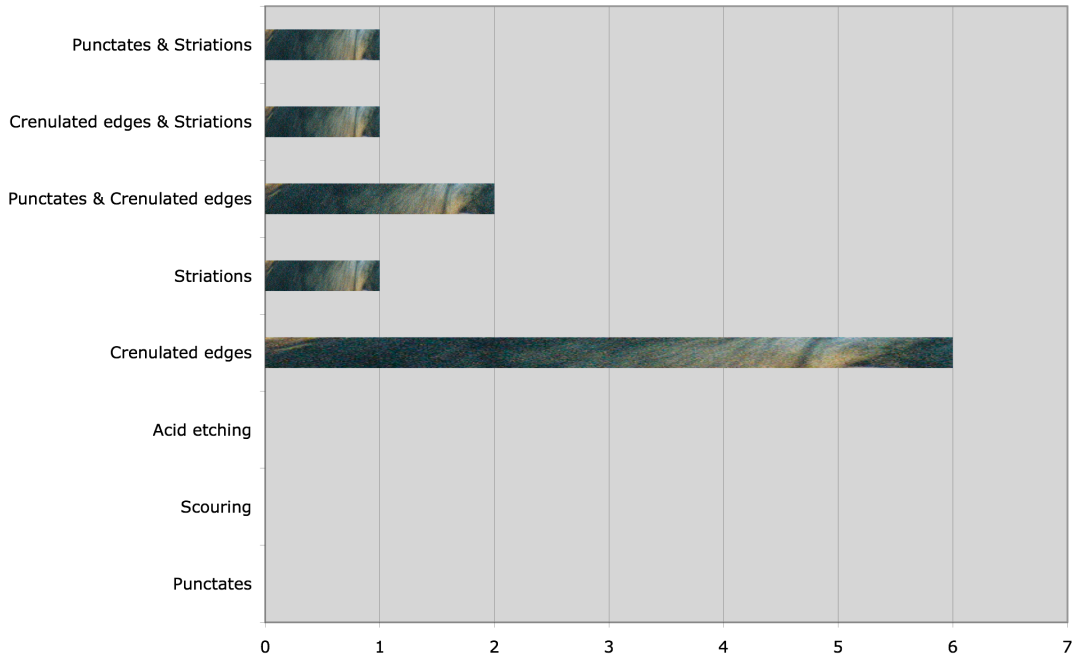

Chart 31: Carnivore Damage, Rietvlei Den R02

Rietvlei Den R03

Seven specimens were collected from Rietvlei Den R03, all of which have been identified to species. There was only one specimen each for hartebeest, blesbok, bovid size II, bovid size III and three specimens of wildebeest (See Table 16).

SPECIES	NISP	MNI
Alcelaphus buselaphus	1	1 (right pelvis)
Bovid size II	1	1 (right pelvis)
Bovid size III	1	1 (left radius)
Connochaetes gnou	3	1 (left pelvis)
Damaliscus dorcas phillipsi	1	1 (left humerus)
TOTAL	7	5

Table 16: Species NISP & MNI Rietvlei Den R03

All seven of the specimens have been identified to skeletal element, aside from three acetabulum there was one each humerus, radius, metacarpal and tibia (See Table 17). Fusion data for all of the specimens except the tibia from a size II bovid indicated adult animals. The lone tibia is unfused at the distal end.

SKELETAL ELEMENT	NUMBER	SPECIES BREAKDOWN
Humerus	1	Blesbok
Radius	1	bovid size III
Metacarpal	1	Wildebeest
Pelvis (acetabulum)	3	2 Wildebeest; 1 Hartebeest
Tibia	1	bovid size II
TOTAL	7	

Table 17: Elements with species breakdown, Rietvlei Den R03

The length of the specimens ranged in size from 14 -26 cm. Of the fragmentation data recorded there were two one end plus shaft, one complete and one end and shaft splinter.

Weathering data were collected from all seven specimens and indicated a range since death of 0-3 yrs, with six of the seven specimens falling in the 0-1 yr range and the seventh specimen in the 0-3 yr range.

All of the faunal remains had indications of carnivore damage, with one specimen having both carnivore and porcupine gnawing upon it. There was one example of just punctate depressions, two of crenulated edges and four with the combination of punctate depressions and crenulated edges. There were no other types of damage, or combinations of said damage identified from this assemblage. Appendix G illustrates all of the damage types and location of damage by element.

Brown Hyaena Project D-P 1

Of the 241 specimens analysed from D-P 1, 31.1% were identified to species or class size (see Table 18). At 38.7% and an MNI of 3, seal remains made up the majority of the identified assemblage. Seal remains were followed in abundance by jackals (14.7%), dog (12%), large bird (10.7%), cat (8%), gemsbok (5.3%), brown hyaenas (5.3%), springbok (4%), and size IV bovids (1.3%).

SPECIES	NISP	MNI
Antidorcas marsupialis	3	1 (left & right tibia)
Arctocephalus pusillus	29	3 (right radius)
Avian (large)	8	1 (right femur)
Bovid size IV	1	1 (lumbar vertebrae)
Canis familiaris	9	1 (right ulna)
Canis mesomelas	11	2 (left radius)
Felis (domestic size)	6	2 (left femur)
Oryx gazella	4	1 (left femur)
Parahyaena brunnea	4	1 (right tibia)
TOTAL	75	13

Table 18: Species NISP & MNI Brown Hyaena Project D-P 1

SKELETAL ELEMENT	NUMBER	SPECIES BREAKDOWN
Scapula	3	1 Seal; 1 bovid; 1 unknown
Humerus	5	Seal
Radius	8	5 Seal; 2 Jackal; 1 unknown
Pelvis (acetabulum)	2	Jackal
Illium	2	1 Seal; 1 large bird
Femur	14	2 Seal; 2 Cat: 1 Jackal; 1 Lg. bird; 1 Gemsbok; 1 Brown Hyaena; 2 bovid; 4 unknown
Tibia	8	3 Seal; 2 Springbok; 1 Brown Hyaena; 1 bovid; 1 unknown
Metatarsal	5	3 Dog; 2 Brown Hyaena
Ulna	3	1 Jackal; 1 Dog; 1 carnivore
Ulna/Radius fused	1	carnivore
Metapodial	1	unknown
Astragalus	2	Jackal
Proximal Phalanx	6	3 Cat; 2 Dog; 1 carnivore
Medial Phalanx	2	1 Seal; 1 Dog
Fibula	1	carnivore
Tarsal	1	unknown
Mandible	9	3 Seal; 2 Dog; 1 Jackal; 1 Cat; 1 Springbok; 1 Gemsbok
Maxilla	8	6 Seal; 1 Jackal; 1 Gemsbok
Skull	1	Jackal
Skull fragment	21	1 Seal; 20 unknown
Mandibular tooth	1	carnivore
Axis	1	unknown
Cervical vertebrae	8	1 Gemsbok; 7 unknown
Thoracic vertebrae	8	unknown
Lumbar vertebrae	1	bovid size IV
Caudal vertebrae	5	unknown
Vertebrae	1	unknown
Ribs	86	unknown
Tibio-tarsus	1	large bird
TOTAL	215	

Table 19: Elements with species breakdown, Brown Hyaena Project D-P 1

Of the 241 faunal remains 89.2% of the specimens were identified to skeletal element. Table 19 gives a breakdown of the elements by species. The most prevalent elements were ribs, with four times that of any other element with a total of 86 specimens. Removing the ribs and skull fragments (21 specimens) from Chart 32 illustrates the abundance of the rest of the elements in the assemblage.

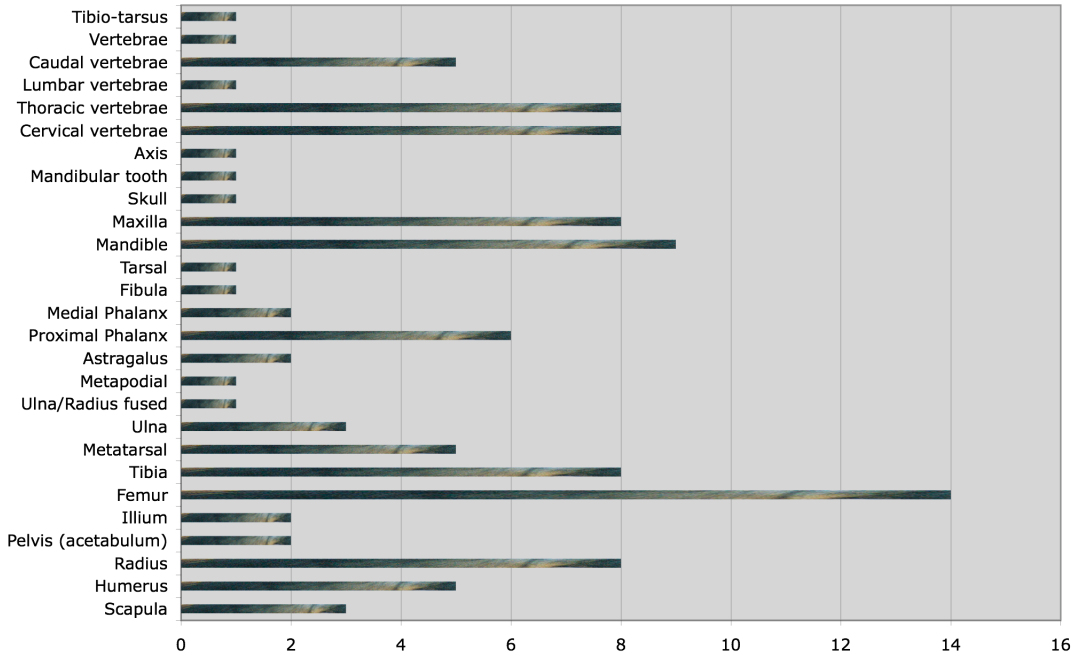

Chart 32: Elements, Brown Hyaena Project D-P 1

Aside from the ribs and skull fragments, femurs were the most abundant of the long bones with 14 specimens. Mandibles follow with nine specimens, radius, tibia and maxilla with eight, proximal phalanx with six, humerus and metatarsal with five each, scapula and ulna each with three, acetabulum, illium, astragalus and medial phalanx with two, down to single fibula, metapodial and ulna/radius fused. Fusion data from 47 of the specimens indicated that 27.7% of the remains came from young animals. Specifically 11 of the unfused elements came from seal pups, while one came from a gemsbok femur (unfused at proximal end) and one from a brown hyaena tibia (unfused at both proximal and distal ends).

The lengths of the 86 measured fragments ranged in size from < 1.0-17 cm. Of these fragments 30% were complete bones, 25.6% shaft splinters, 23.3% one end plus shaft,

16.3% cylinders, and 1.2% one end only and end shaft splinter respectively. There were no examples of both ends present, some shaft missing in the assemblage (See Chart 33).

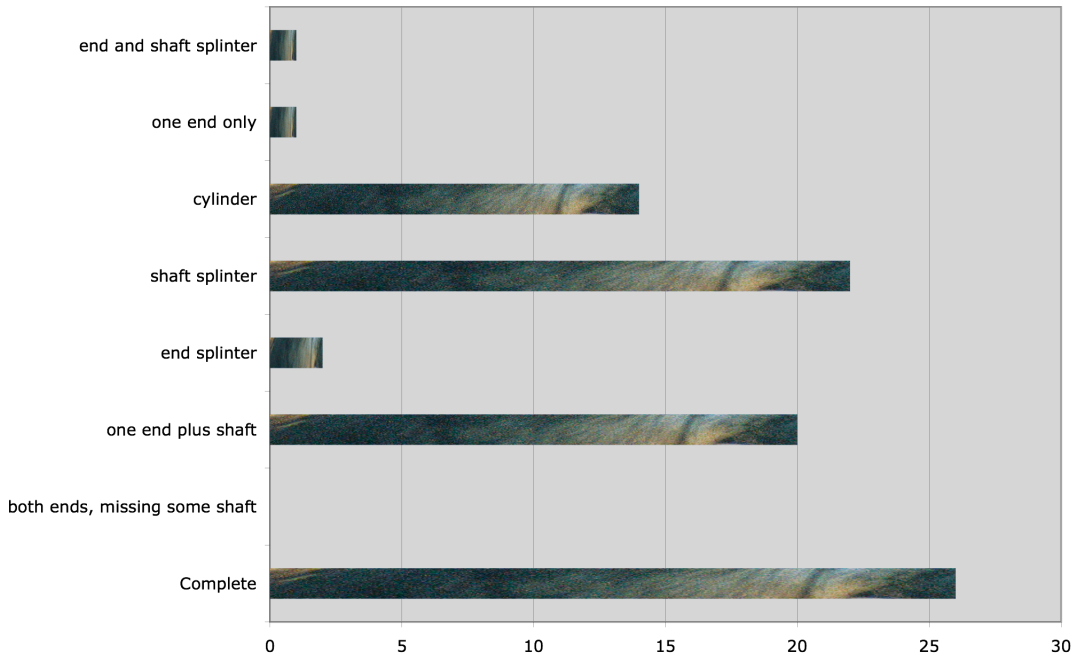

Chart 33: Fragmentation, Brown Hyaena Project D-P 1

Weathering data were collected from 229 of the specimens analysed. The majority of faunal remains are within the 2-6 yr range (74%), followed by 0-3 yrs (19.2%) and 4-15 yrs (7%) since death. There were no specimens within the ranges of 0-1 yr or 6-15 yrs (See Chart 34).

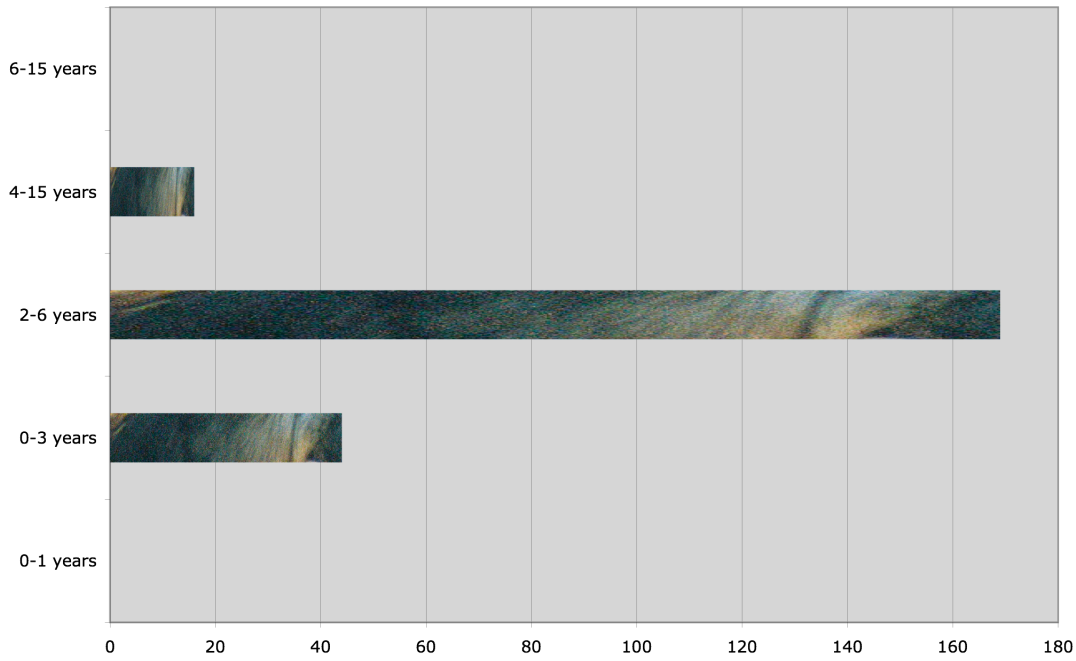

Chart 34: Weathering, Brown Hyaena Project D-P 1

Carnivore damage was found on 76 of the 241 specimens (31.5%). Of these one had both carnivore gnawing and porcupine gnawing. The element in question is a left mandible of a dog with punctate depressions on the mandibular heal and crenulated edges at both ends of the bone. The most prominent type of damage on the 75 other carnivore gnawed remains was crenulated edges (66.7%). Striations comprised 5.3% and punctates 2.7%. There was no evidence of scouring or acid etching. The combination of punctates and crenulated edges constituted 20% of the assemblage, crenulated edges and striations (2.7%) and punctates, crenulated edges and striations 1.3% (See Chart 35). For a complete breakdown of damage by element and location of damage on specific bones see Appendix H.

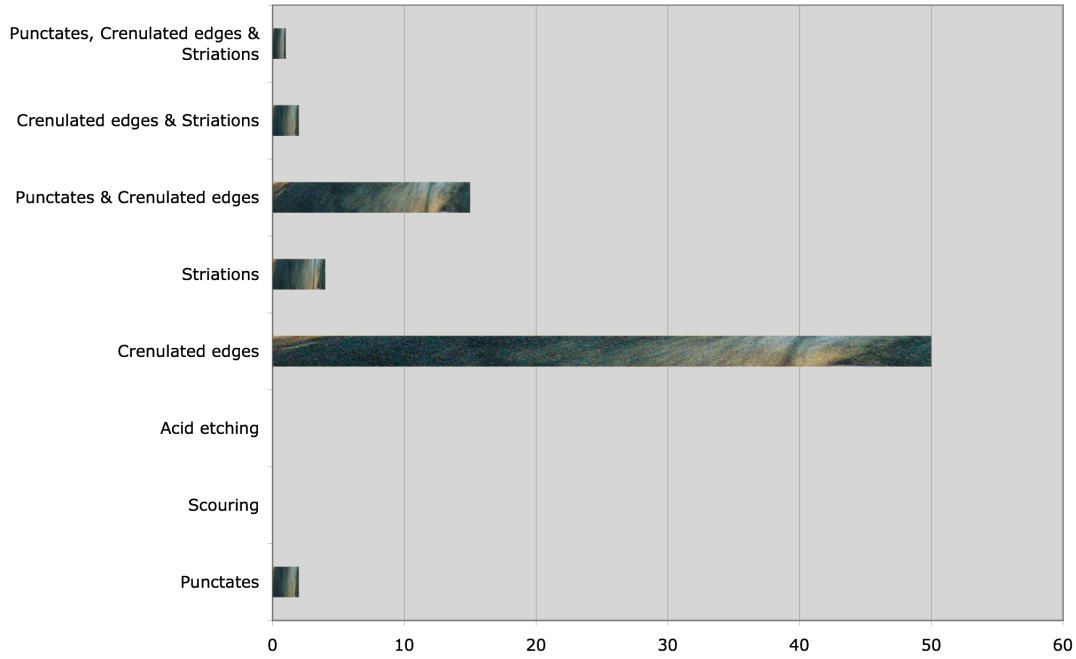

Chart 35: Carnivore Damage, Brown Hyaena Project D-P 1

Brown Hyaena Project D-P 2

A total of 256 specimens were analysed from den D-P 2 on the Luderitz Peninsula. Of this 26.2% have been identified to species or class size. The majority of remains came from seals (52.2%), followed by dog (16.4%), springbok (12%), cat (10.5%), gemsbok (6%) and large bird (2.9%) (See Table 20).

SPECIES	NISP	MNI
Antidorcas marsupialis	8	1 (left femur)
Arctocephalus pusillus	35	2 (right scapula)
Avian (large)	2	1 (unknown)
Canis familiaris	11	1 (right tibia)
Felis (domestic size)	7	1 (right tibia)
Oryx gazella	4	1 (right mandible)
TOTAL	67	7

Table 20: Species NISP & MNI Brown Hyaena Project D-P 2

Table 21 shows the breakdown of the 74.2% of the skeletal elements that were identified. Ribs, skull fragments and thoracic vertebrae were the most abundant identified elements, with 48, 30 and 20 specimens respectively. Chart 36 illustrates the relative abundance of the remaining elements.

SKELETAL ELEMENT	NUMBER	SPECIES BREAKDOWN
Scapula	3	3 Seal
Humerus	7	1 Seal; 1 Springbok; 5 unknown
Radius	7	2 Seal; 1 Dog; 1 Cat; 2 bovid; 1 carnivore
Metacarpal	1	Cat
Pelvis (acetabulum)	3	2 Cat; 1 Dog
Femur	8	5 unknown; 1 Cat, 1 Seal; 1 Gemsbok
Tibia	8	3 Seal; 2 unknown; 1 Springbok; 1 Dog; 1 Cat
Metatarsal	3	2 Dog; 1 Springbok
Ulna	6	5 carnivore; 1 unknown
Ulna/Radius fused	1	bovid
Metapodial	7	4 bovid; 2 Springbok; 1 Seal
Calcaneus	1	Dog
Proximal Phalanx	3	1 Seal; 1 Cat; 1 Gemsbok
Medial Phalanx	5	2 Seal; 1 Cat; 1 Gemsbok; 1 Dog
Carpal	1	unknown
Mandible	11	8 Seal; 1 Dog; 1 Gemsbok; 1 carnivore
Mandibular hinge	2	1 Seal; 1 unknown
Maxilla	8	4 Seal; 2 Dog; 1 Springbok; 1 carnivore
Skull fragment	30	1 Gemsbok; 1 Seal; 28 unknown
Mandibular tooth	1	Seal
Thoracic vertebrae	20	unknown
Lumbar vertebrae	2	unknown
Vertebrae	3	unknown
Ribs	48	unknown
Horn/antler	1	Springbok
TOTAL	190	

Table 21: Elements with species breakdown, Brown Hyaena Project D-P 2

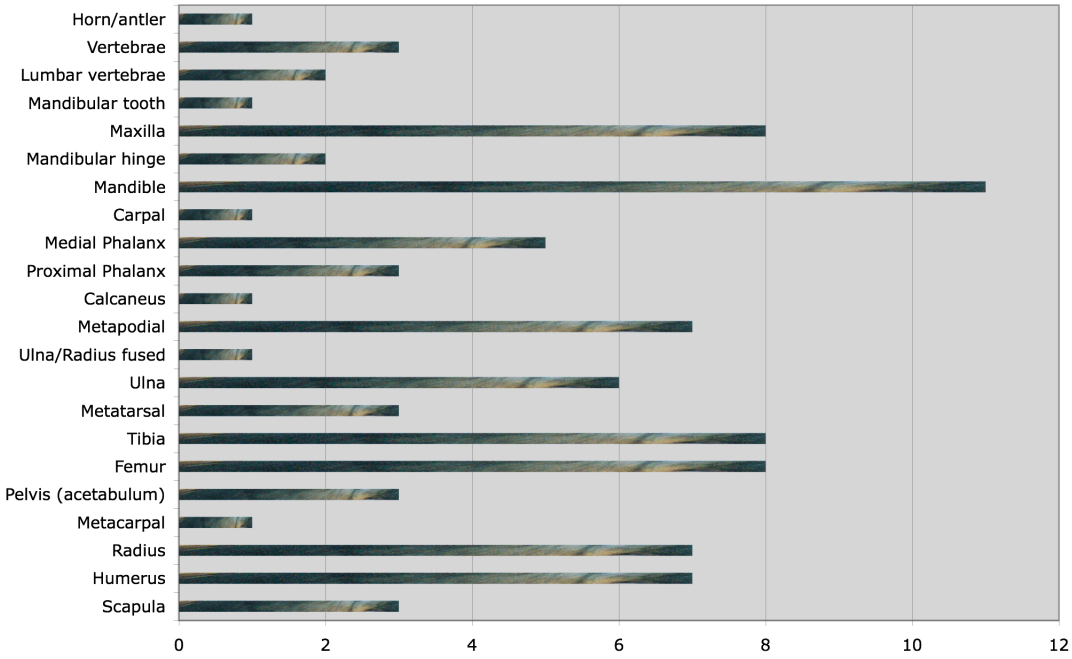

Chart 36: Elements, Brown Hyaena Project D-P 2

All long bones were represented in the assemblage, with femur and tibia contributing to 8.4% of the total. Humerus and radius combined to form 7.4% and scapula contributed 1.6% towards the total. Fusion data were recorded from 60 specimens and indicated that 15% of these specimens were from young seals. All of the remains in question were unfused tibia (3, 2 of which are unfused both distally and proximally and the other unfused proximally), scapula (2), radius (1 unfused proximally), femur (1 unfused both proximally and distally) and a single medial phalanx unfused at the proximal end.

Measured remains ranged in size from < 1.0-15 cm, a horn from a springbok. Of these the fragmentation of 122 faunal remains were recorded. As Chart 37 illustrates, there were no examples of end and shaft splinter, one end only, end splinter or both ends

present some shaft missing. The most abundant fragmentation type was shaft splinter, with 70 examples documented (54.7%). This was followed by complete (18%), cylinder (14%), and one end plus shaft (11%).

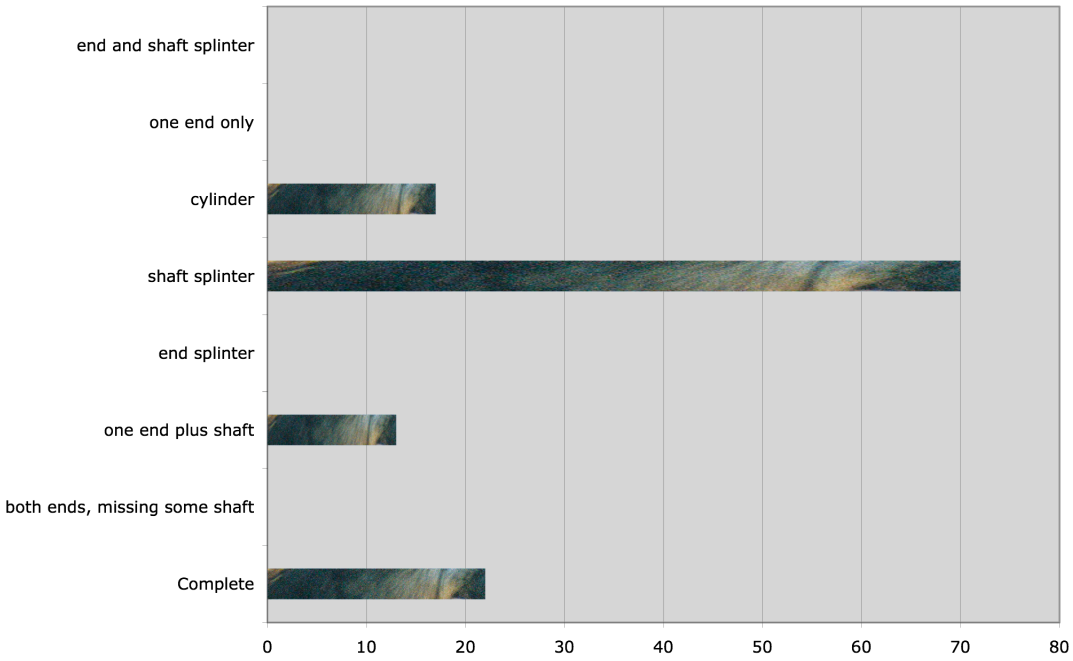

Chart 37: Fragmentation, Brown Hyaena Project D-P 2

Data from weathering were collected from 233 specimens. Of these 70% indicate an age since death of 2-6 yrs. The range from 0-3 yrs forms 24% of the collected data while the 4-15 yr range constitutes 6%. There was no evidence for the 0-1 yr range or the 6-15 yr range in the assemblage (See Chart 38).

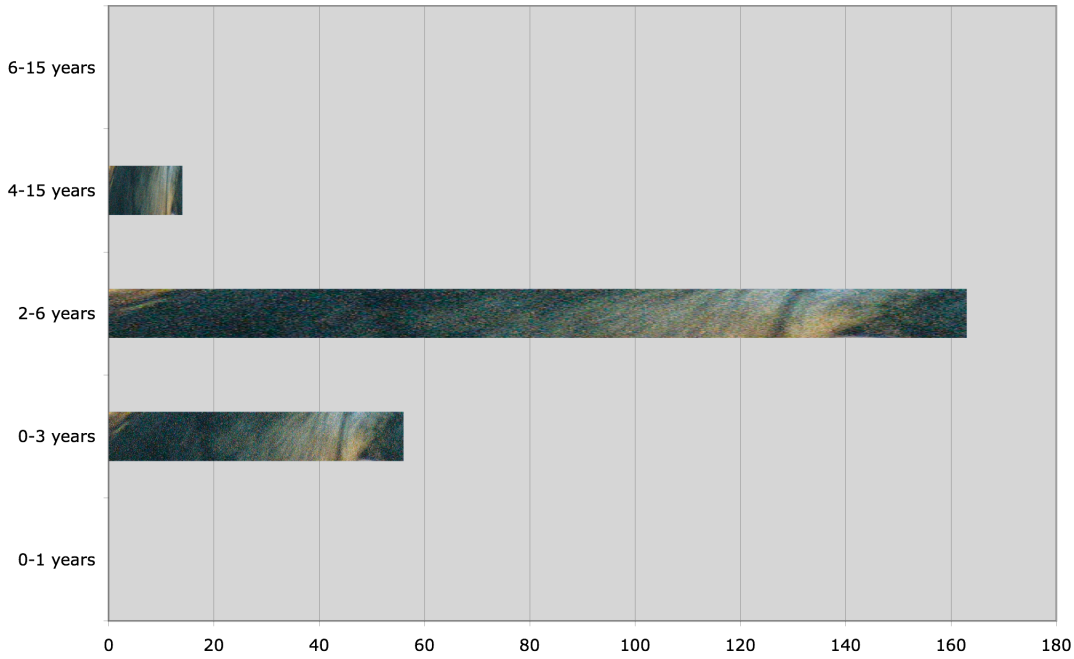

Chart 38: Weathering, Brown Hyaena Project D-P 2

Damage due to carnivore gnawing was documented on 39.5% of the 256 faunal remains. Crenulated edges were the most prominent form of damage with 68.3% of the documented damage. Punctates made up 6.9% and acid etching just 0.9%, there were no examples of scouring or striations in the assemblage. The combination of punctates and crenulated edges formed 14.8% of the total recorded damage while crenulated edges and striations made up 4.9% and punctates, crenulated edges and striations combined made up 3.9% (See Chart 39). For a complete break down of damage by element and location see Appendix I.

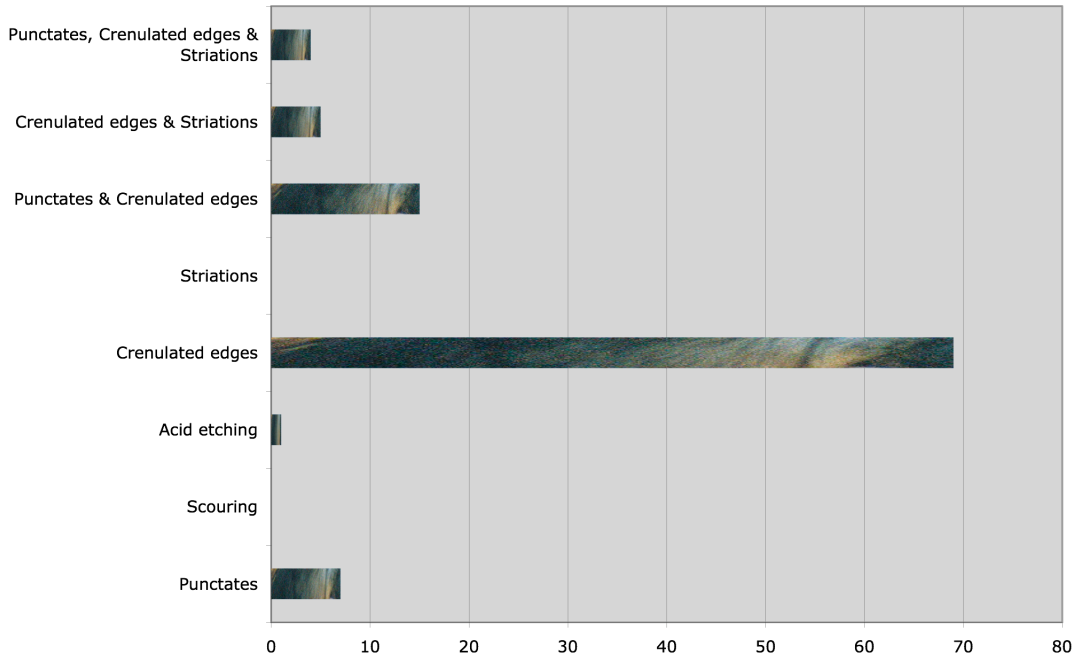

Chart 39: Carnivore Damage, Brown Hyaena Project D-P 2

Brown Hyaena Project D-P 4

D-P 4 yielded 1,865 specimens, of which 377 (20.2%) were identified down to species or class size. Seal remains, at 56%, were the most prolific species recorded from this den. Dogs were the next commonest at 16.2 %, then gemsbok (4.5%), springbok (4.2%), black-backed jackals (4.0%), ostriches (3.5%), large birds and cats (3.2% respectively), klipspringer and mustelids (1.6%), brown hyaenas (1.1%) and medium birds and Cape foxes (0.2%).

SPECIES	NISP	MNI
Antidorcas marsupialis	16	3 (left femur)
Arctocephalus pusillus	211	13 (right tibia)
Avian (large)	12	1 (right femur)
Avian (medium)	1	1 (tibio-tarsus)
Canis familiaris	61	8 (left tibia)
Canis mesomelas	15	5 (left radius)
Felis (domestic size)	12	4 (left acetabulum)
Vulpes chama	1	1 (left humerus)
Mustelidae/Viverirdae/Herpestidae	6	1 (right scapula)
Oreotragus oreotragus	6	2 (right acetabulum)
Oryx gazella	17	3 (left radius)
Parahyaena brunnea	4	1 (right ulna)
Reptilian (med-lg)	1	1 (unknown)
Small mammal	1	1 (complete maxilla)
Struthio camelus	13	2 (left femur)
TOTAL	377	47

Table 22: Species NISP & MNI Brown Hyaena Project D-P 4

Upon examination 81.2% of the specimens were identified down to skeletal element (See Table 23). The most commonly identified elements were ribs (476 specimens), skull fragments (188 specimens), vertebrae (152 specimens) and cervical vertebrae (110 specimens). In order to illustrate the relative abundance of the remaining elements, the above-mentioned ribs, skull fragments, vertebrae and cervical vertebrae were removed from Chart 40 below. All long bones and major skeletal elements are represented in the assemblage with femur being the most abundant of the long bones at 3.2% of the identified remains. Tibias are the next most abundant long bone with 2.8%, followed by humerus (2.6%), ulna (2.5%), radius (2.3%), scapula (2.2%) and pelvic bones (2.1%). Fusion data from long bones implied that 7.4% of the faunal remains are from young animals, 75.2% of which were young unfused seal bones.

SKELETAL ELEMENT	NUMBER	SPECIES BREAKDOWN
Scapula	33	15 Seal; 8 unknown; 3 Springbok; 3 Ostrich; 2 Mustelidae; 1 Jackal; 1 bovid
Humerus	39	15 unknown; 11 Seal; 4 carnivore; 3 Dog; 3 Gemsbok; 2 Jackal; 1 Cape Fox
Radius	35	11 Seal; 6 carnivore; 5 Jackal; 5 unknown; 3 Gemsbok; 3 Springbok; 2 Dogs; 1 bovid
Metacarpal	7	4 Dog; 1 Gemsbok; 1 Springbok; 1 Seal
Pelvis (acetabulum)	20	5 Dog; 4 Cat; 3 Seal; 2 Klipspringer; 2 bovid; 1 Jackal; 1 Mustelidae; 1 Brown Hyaena; 1 unknown
Illium	7	6 Seal; 1 Dog
Ishium	3	1 Seal; 1 large bird; 1 unknown
Pubis	1	Seal
Femur	48	19 unknown; 13 Seal; 5 Springbok; 4 Ostrich; 2 carnivore; 1 Dog; 1 Klipspringer; 1 large bird
Tibia	43	19 Seal; 12 Dog; 8 unknown; 1 Ostrich; 1 Gemsbok; 1 Springbok; 1 bovid
Fibula	8	Seal
Metatarsal	13	9 Dog; 3 Seal; 1 Gemsbok
Ulna	38	20 Seal; 7 Dog; 7 unknown; 1 Brown Hyaena; 1 Springbok; 1 Gemsbok; 1 unknown
Metapodial	31	19 Seal; 5 bovid; 3 Gemsbok; 3 carnivore; 1 Springbok
Calcaneus	1	Cat
Astragalus	8	5 Seal; 2 carnivore unknown; 1 Jackal
Proximal Phalanx	44	34 Seal; 4 Dog; 2 Klipspringer; 1 Cat; 1 Jackal; 1 Ostrich; 1 large bird
Medial Phalanx	6	2 Seal; 2 Cat; 1 Klipspringer; 1 Springbok
Distal Phalanx	3	2 Jackal; 1 Springbok
Tarsal	2	unknown
Mandible	59	59 Seal; 9 Dog; 8 carnivore; 5 unknown; 2 bovid; 1 Cat; 1 Jackal; 1 Brown Hyaena
Mandibular hinge	3	2 unknown; 1 Mustelidae
Maxilla	28	10 carnivore; 7 Seal; 3 Dog; 3 bovid; 1 small mammal; 1 Mustelidae; 1 Jackal; 1 Brown Hyaena
Skull fragment	188	184 unknown; 2 Gemsbok; 1 Dog; 1 bovid
Zygomatic arch	12	unknown
Atlas	5	unknown
Axis	14	unknown
Cervical vertebrae	110	unknown
Thoracic vertebrae	55	53 unknown; 2 Gemsbok
Lumbar vertebrae	4	unknown
Sacrum	1	Ostrich
Caudal vertebrae	5	unknown
Vertebrae	152	151 unknown; 1 mustelidae
Ribs	476	475 unknown; 1 Ostrich
Disk Joints	8	unknown
Sternum	4	unknown
Tibio-tarsus	2	1 medium bird; 1 large bird
Coracoid	2	1 Ostrich; 1 large bird
Carpo-metacarpus	1	large bird
TOTAL	1514	

Table 23: Elements with species breakdown, Brown Hyaena Project D-P 4

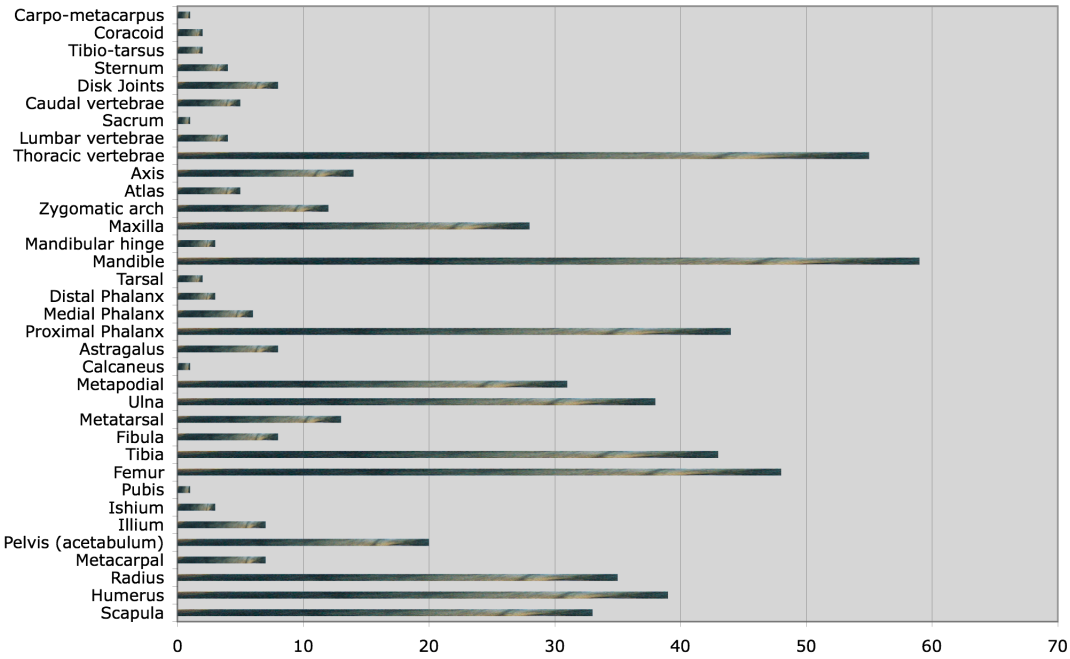

Chart 40: Elements, Brown Hyaena Project D-P 4

In total 654 specimens were measured to length and fragment type recorded. Fragment size ranged from < 1.0-23 cm, with shaft splinters being the most common type of fragmentation (50.2%). Complete bones were 23.6% of the examined remains, followed by one end plus shaft (16.7%), cylinder (8.3%), one end only (0.8%), end and shaft splinter (0.6%) and both ends present, missing some shaft (0.2%). There were no examples of end splinter in the assemblage (See Chart 41).

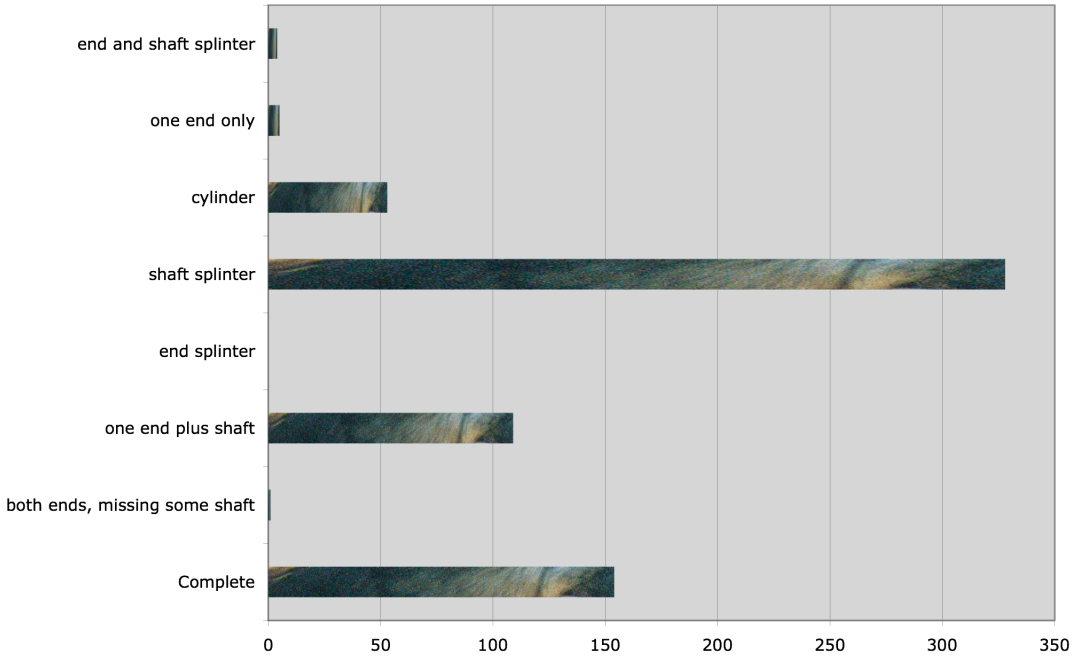

Chart 41: Fragmentation, Brown Hyaena Project D-P 4

Weathering data were documented from 1,781 specimens in the assemblage with the majority of remains indicative of the 2-6 yr range since death (82.1%). The range of 0-3 yrs consisted of 12.6% of the examined remains, with 4-15 yrs being 4.6%, 6-15 yrs at 0.6% and 0-1 yr being 0.1% of the remains (See Chart 42).

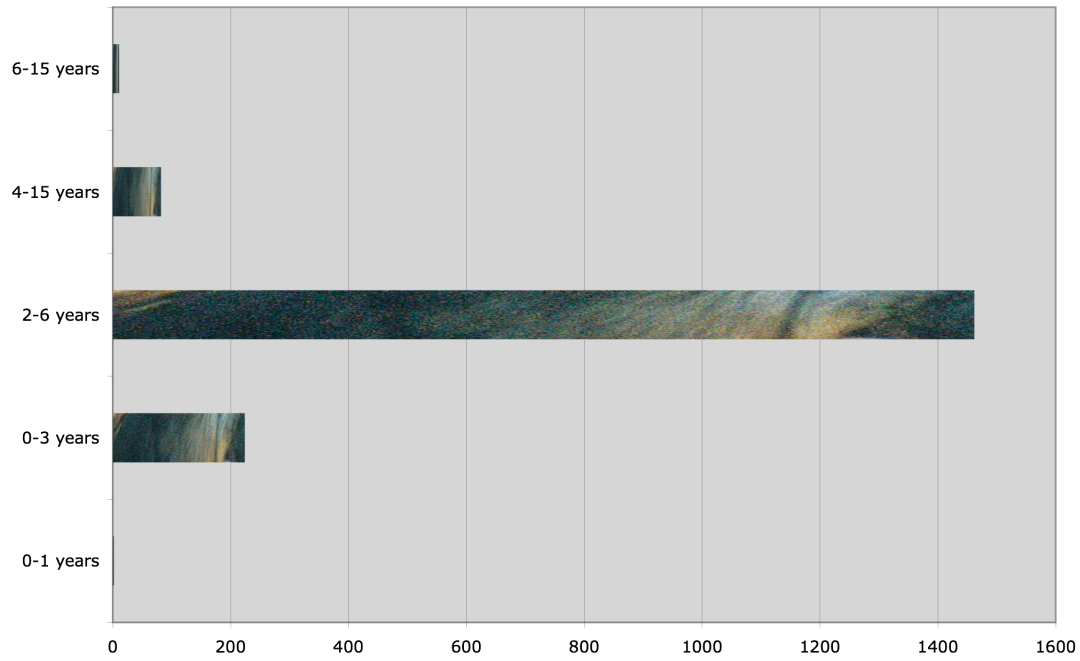

Chart 42: Weathering, Brown Hyaena Project D-P 4

Damage due to carnivore gnawing was documented on 485 of the 1865 faunal remains (26%). Porcupine gnawing was noted on three of the specimens along with carnivore gnawing. All three of these specimens were remains from gemsbok, two metapodials and one humerus. One of the metapodials had crenulated edges at the distal end while the second metapodial as well as the humerus had both crenulated edges and striations at one end of the bone. Of the remains with only carnivore gnawing upon them crenulated edges were noted on 73.6% of the carnivore gnawed assemblage. Punctate depressions comprised 7.3%, acid etching 0.6%, striations 0.4% and scouring 0.2%. The combination of punctates and crenulated edges made up 14%, while crenulated edges and striations were 2.9%, punctates, crenulated edges and striations were 0.8% and the combination of punctates, scouring, crenulated edges and striations was 0.2% (See Chart 43). See Appendix J for complete breakdown.

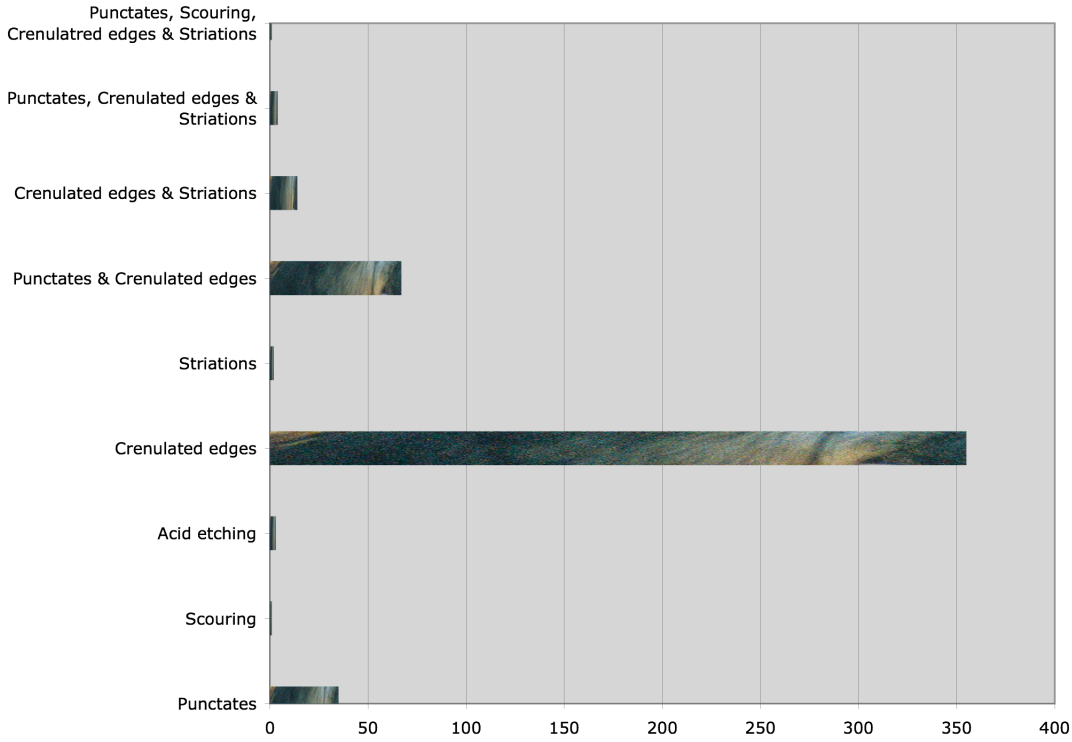

Chart 43: Carnivore Damage, Brown Hyaena Project D-P 4

Brown Hyaena Project D-P 9

A total of 5,955 specimens were analysed from den D-P 9, of which 40% were identified to 17 species. Seal remains formed the majority of identified remains with 68% of the total. Dogs followed with 13.1% of the identified remains, then large birds (8.1%), cats (3.2%), gemsbok (2%), jackals (1.1%), brown hyaenas and cetaceans (0.84% respectively), fishes (0.5%), Cape foxes, klipspringers and springbok (0.42% respectively), mustelids (0.08%) and Cape hares, ostriches and medium to large reptiles (0.04%). See Table 24 for complete breakdown of NISP and MNI for each species identified.

When broken down by skeletal element 94.6% of the faunal remains were identified (See Table 25). Ribs were the majority of identified remains, constituting 31% of the

entire assemblage. Vertebrae and skull fragments were the next most abundant identified elements, making up 9.1% and 4.1% respectively. In order to illustrate the relative abundance of identified elements, ribs and vertebrae were removed from the chart (See Chart 44). All long bones were present, with humerus being the most abundant comprising 3.8% of the identified remains. The next most abundant long bone is tibia (3.6%), then radius (3.1%), femur and ulna (2.9% each) and pelvic (2.6%). Fusion data collected from 1,646 specimens indicated that 56.3% of the examined elements came from young animals. Of these seal remains were 91% of the unfused specimens.

SPECIES	NISP	MNI
Antidorcas marsupialis	10	2 (left femur)
Arctocephalus pusillus	1619	66 (left tibia)
Avian (large)	194	15 (right humerus)
Canis familiaris	311	26 (left ulna)
Canis mesomelas	27	5 (right radius)
Cetacean	20	1 (left scapula)
Felis (domestic size)	76	5 (right acetabulum)
Fish	12	1 (mandible)
Lepus capensis	1	1 (right humerus)
Mustelidae/Viverirdae/Herpestidae	2	1 (left mandible)
Oreotragus oreotragus	10	1 (right femur)
Oryx gazella	47	2 (right tibia)
Parahyaena brunnea	20	2 (right ulna)
Reptilian (med-lg)	1	1 (right mandible)
Spheniscus demersus	22	1 (humerus)
Struthio camelus	1	1 (tibia)
Vulpes chama	10	2 (right femur)
TOTAL	2383	133

Table 24: Species NISP & MNI Brown Hyaena Project D-P 9

SKELETAL ELEMENT	NUMBER	SPECIES BREAKDOWN
Scapula	142	83 Seal; 37 unknown; 14 Dog; 5 Cat; 1 Brown Hyaena; 1 Klipspringer; 1 Cetacean
Humerus	212	102 Seal; 31 large Bird; 30 unknown; 15 Dog; 10 Penguin; 7 cat; 6 Jackal; 4 bovid; 2 Gemsbok; 1 Cape Fox; 1 Cape Hare; 1 Klipspringer; 1carnivore
Radius	175	120 Seal; 15 Dog; 8 Jackal; 6 large bird; 5 cat; 5 carnivore; 4 bovid; 4 unknown; 3 Gemsbok; 3 Cape Fox; 1 Brown Hyaena; 1 Springbok
Metacarpal	38	27 Dog; 4 Cat; 2 Gemsbok; 2 Klipspringer; 2 bovid, 1 Seal
Pelvis (acetabulum)	102	47 Seal; 24 Dog; 9 Cat; 6 unknown; 5 Jackal; 4 large bird; 3 Cape Fox; 1 Brown Hyaena; 1 Springbok; 1 Gemsbok; 1 bovid
Illium	36	35 Seal; 1 Gemsbok
Ishium	11	Seal
Femur	163	79 Seal; 35 unknown; 24 large bird; 10 Dog; 3 Cat; 3 Springbok; 2 Cape Fox; 2 Gemsbok; 1 Brown Hyaena; 1 Klipspringer; 1 Jackal; 1 carnivore; 1 bovid
Tibia	205	132 Seal; 30 Dog; 30 unknown; 5 Jackal; 4 Gemsbok; 2 Cat; 1 Ostrich; 1 Klipspringer
Fibula	63	Seal
Metatarsal	47	30 Dog; 9 Seal; 8 Cat
Ulna	163	88 Seal; 32 Dog; 20 unknown; 12 large bird; 5 bovid; 2 Cat; 2 Brown Hyaena; 2 carnivore
Metapodial	268	232 Seal; 19; 15 carnivore; 1 Klipspringer; 1 Gemsbok
Calcaneus	37	21 Seal; 16 Dog
Astragalus	42	24 Seal; 17 unknown; 1 Klipspringer
Proximal Phalanx	137	82 Seal; 25 Dog; 15 carnivore; 2 Brown Hyaena; 1 bovid
Medial Phalanx	270	229 Seal; 20 Dog; 7 Cat; 7 Gemsbok; 3 Brown Hyaena; 1 Mustelidae; 1 Klipspringer; 1 large bird; 1 bovid
Distal Phalanx	44	20 Seal; 11 Dog; 4 Penguin; 4 large bird; 2 Gemsbok; 1 Springbok; 1 Cat; 1 Brown Hyaena
Carpal	41	36 unknown; 5 Gemsbok
Skull	1	Gemsbok
Skull fragments	228	199 unknown; 14 large bird; 14 Seal; 1 Cetacean
Mandible	183	95 Seal; 33 carnivore; 24 Dog; 16 unknown; 4 Brown Hyaena; 3 Springbok; 2 Klipspringer; 1 Cat; 1 Mustelidae; 1 fish; 1 Jackal; 1 reptile (med-lg); 1 unknown
Mandibular hinge	11	unknown
Maxilla	129	56 Seal; 36 carnivore; 17 Dog; 8 Cat; 5 Gemsbok; 4 Brown Hyaena; 1 Cape Fox; 1 bovid; 1 unknown
Mandibular tooth	8	4 carnivore; 2 bovid; 1 Gemsbok; 1 Seal
Maxillary Tooth	24	15 Seal; 6 carnivore; 1 Cat; 1 Gemsbok; 1 bovid
Tooth (loose)	55	27 Seal; 27 carnivore; 1 unknown
Zygomatic arch	31	unknown
Occipital condyle	4	unknown
Atlas	21	20 unknown; 1 Gemsbok
Axis	19	15 unknown; 2 Seal; 2 Gemsbok
Cervical vertebra	48	47 unknown; 1 Seal
Thoracic vertebra	97	96 unknown; 1 Gemsbok

SKELETAL ELEMENT	NUMBER	SPECIES BREAKDOWN
Lumbar vertebra	49	48 unknown; 1 Seal
Sacrum	11	6 unknown; 5 large bird
Caudal vertebra	133	126 unknown; 6 Seal; 1 Cetacean
Disk Joints	68	67 unknown; 1 Cetacean
Sternum	64	unknown
Coracoid	10	large bird
Carpo-metacarpus	19	large bird
Tarso-metatarsus	18	10 large bird; 8 Penguin
TOTAL	5636	

Table 25: Elements with species breakdown, Brown Hyaena Project D-P 9

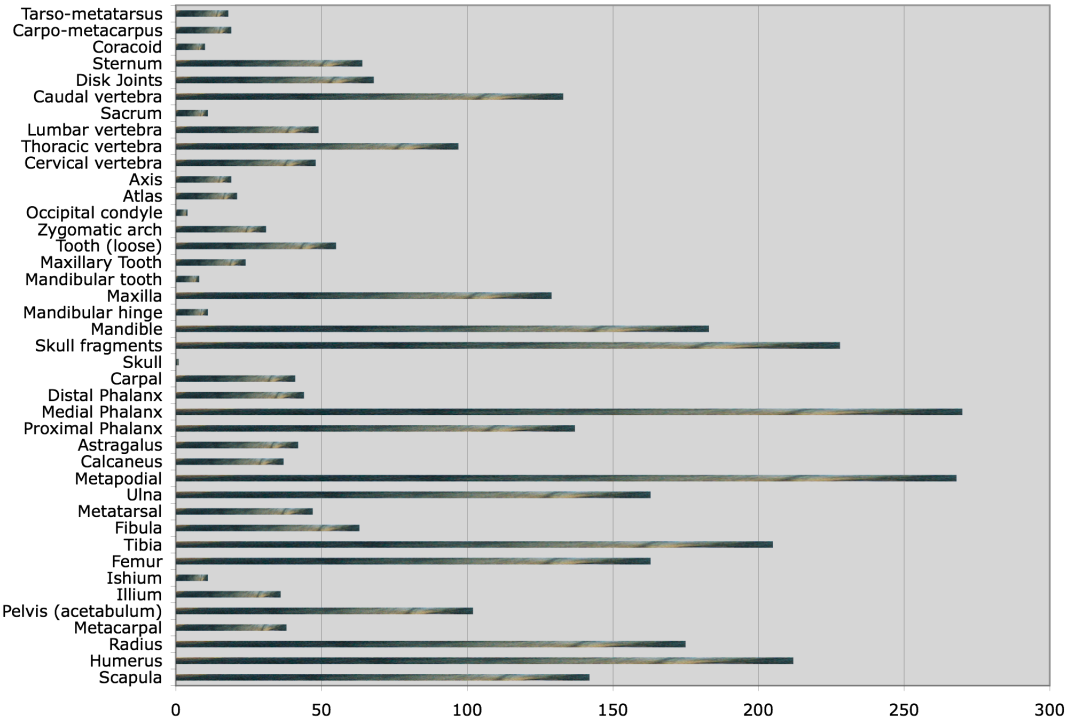

Chart 44: Elements, Brown Hyaena Project D-P 9

Fragment size ranged in length from < 1.0-36 cm, a tibia from a gemsbok. Types of fragmentation were recorded from 1,192 specimens and complete bones made up 41.8% of the examined assemblage. One end plus shaft was the next most abundant type of fragmentation with 24.6%, followed by shaft splinter (16.4%), cylinder

(10.6%), one end only (5%), end and shaft splinter (1.3%), both end present, some shaft missing (0.3%) and end splinter (0.08%) (See Chart 45).

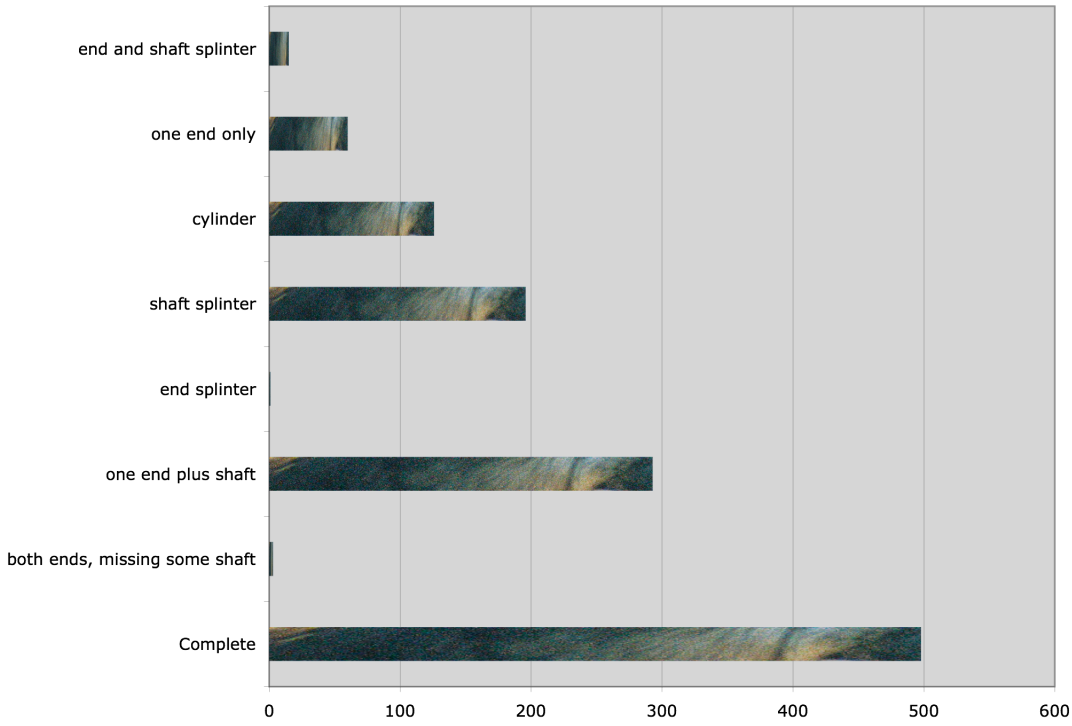

Chart 45: Fragmentation, Brown Hyaena Project D-P 9

Weathering data were logged for 5,807 of the analysed specimens in order to establish time since death of the animal. There were no samples in the range of 0-1 yr and only 0.7% of the specimens fall in the 6-15 yr range. The majority, 93.1%, of remains were indicative of 2-6 yrs since time of death. Specimens in the 4-15 yr range comprised 5.1% of the assemblage and 1.1% of the assemblage were in the 0-3 yr range (See Chart 46).

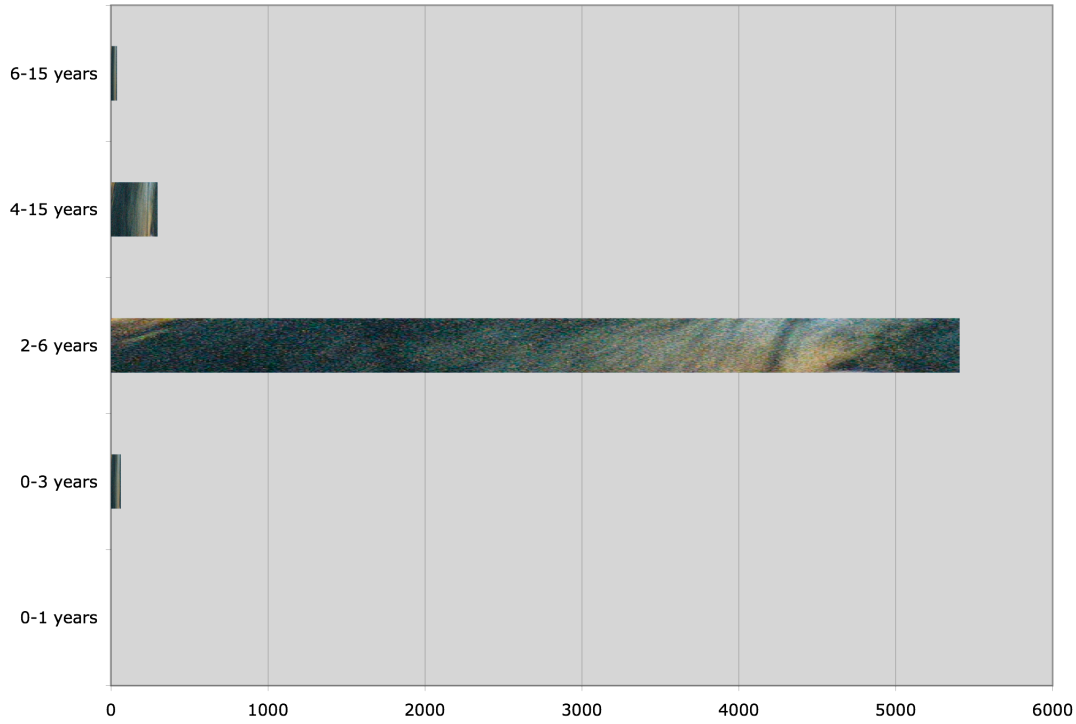

Chart 46: Weathering, Brown Hyaena Project D-P 9

Carnivore damage was documented on 1,318 specimens or 22.1% of the entire assemblage. Of this, two had both carnivore damage and porcupine gnawing upon the remains. The two specimens with porcupine gnawing were a carnivore mandible with crenulated edges over most of the bone and an unknown fragment of unknown species with punctuates and crenulated edges on one end of the bone. Crenulated edges were predominant at 67.4% of the gnawed material. Punctates comprised 9%, striations 0.5% and there were no examples of either scouring or acid etching. The combinations of punctates and crenulated edges made up 18.7%, crenulated edges and striations 3.4% and punctates, crenulated edges and striations 0.8% (See Chart 47). See Appendix K for complete breakdown of carnivore damage per element and location of damage upon individual elements.

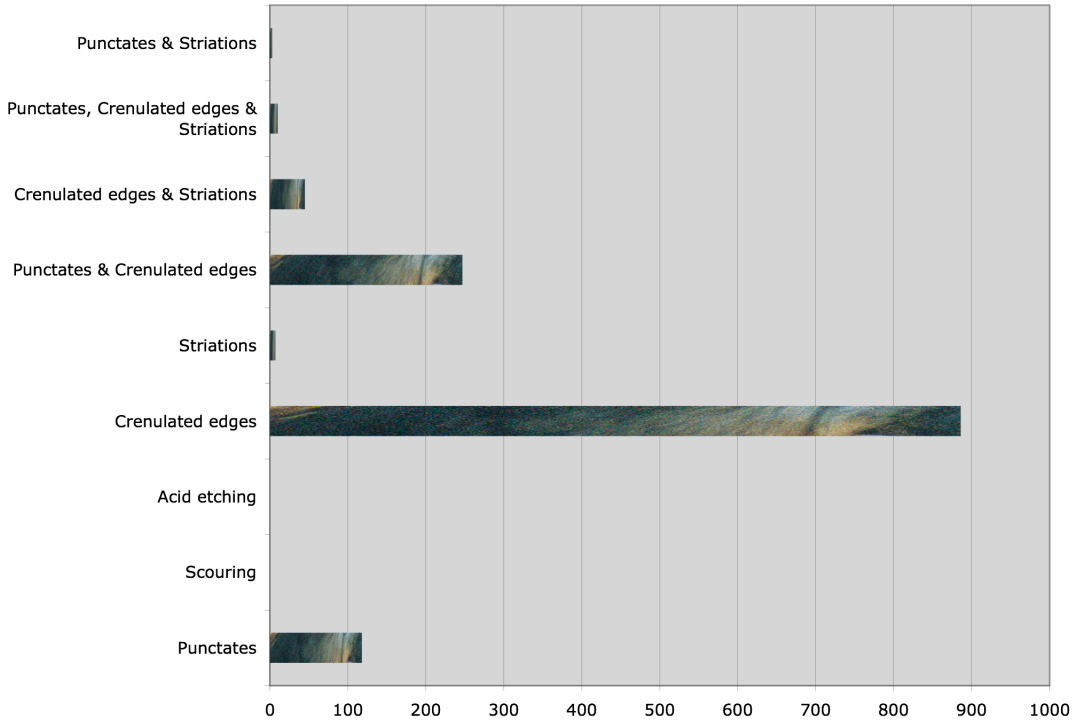

Chart 47: Carnivore Damage, Brown Hyaena Project D-P 9

Brown Hyaena Project D-P 11

Den D-P 11 yielded a total of 117 specimens, of which 24.8% were identified to species. Seal remains were the most common, making up 58.6% of the identified remains. Dogs were the next most abundant with 31% of the identified specimens, followed by large birds (6.9%) and jackals (3.5%).

SPECIES	NISP	MNI
Arctocephalus pusillus	17	2 (right tibia)
Avian (large)	2	1 (left tibio-tarsus)
Canis familiaris	9	1 (left tibia)
Canis mesomelas	1	1 (left humerus)
TOTAL	29	5

Table 26: Species NISP & MNI, Brown Hyaena Project D-P 11

Of the analysed remains, 80% were identified to skeletal element (See Table 27 & Chart 46). Of note is the lack of scapula, radius and pelvic bones. Ribs dominated the assemblage with 24 specimens (25.5%) followed by skull fragments with 14 of the identified specimens. Both ribs and skull fragments were removed from Chart 48 in order to show relative abundance of other elements. Tibias were the most common long bone with 5.3% of the identified remains. Fusion data were documented from 35 of the 117 specimens. Of these 28.6% of the remains indicated young animals, all of which are seal remains.

SKELETAL ELEMENT	NUMBER	SPECIES BREAKDOWN
Humerus	2	1 Seal; 1 Jackal
Metacarpal	2	Dog
Femur	1	unknown
Tibia	5	2 Seal; 2 unknown; 1 Dog
Fibula	4	Seal
Ulna	1	Seal
Metapodial	3	2 Seal; 1 unknown
Calcaneus	1	Dog
Astragalus	2	1 Seal; 1 Dog
Proximal Phalanx	8	6 carnivore; 1 Seal; 1 unknown
Medial Phalanx	6	carnivore
Carpal	2	unknown
Patella	1	Dog
Skull fragments	14	unknown
Mandible	3	2 Dog; 1 bovid
Maxilla	2	Seal
Zygomatic arch	1	unknown
Occipital condyle	1	Dog
Atlas	1	unknown
Axis	1	unknown
Thoracic vertebrae	1	unknown
Lumbar vertebrae	1	unknown
Vertebrae	2	unknown
Ribs	24	unknown
Sternum	3	unknown
Tibio-tarsus	1	large bird
Carpo-metacarpus	1	large bird
TOTAL	94	

Table 27:Elements with species breakdown, Brown Hyaena Project D-P 11

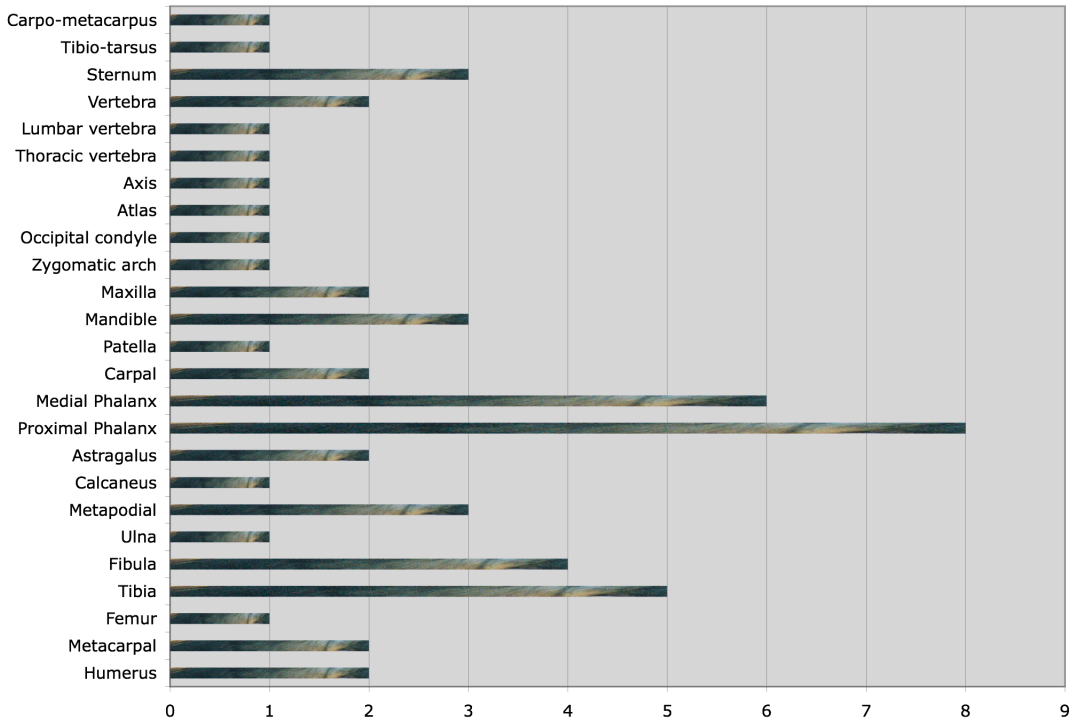

Chart 48: Elements, Brown Hyaena Project D-P 11

Fragment lengths ranged in size from < 1.0-13 cm, a tibia of a dog. Fragmentation data for 56 specimens yielded 43% complete bones, 36% shaft splinters, 14.3 % one end plus shaft and 5.4% cylinders. There were no examples of end splinter, one end only or end and shaft splinter fragmentation patterns. (See Chart 49).

Weathering data were taken from 114 of the 117 specimens. Of these 97.4% of the assemblage falls in the 2-6 yr range since death. The remaining data indicates time since death of 4-15 yrs (1.8%) and 6-15 yrs (0.8%). There were no samples in the 0-1 or 0-3 yr ranges (See Chart 50).

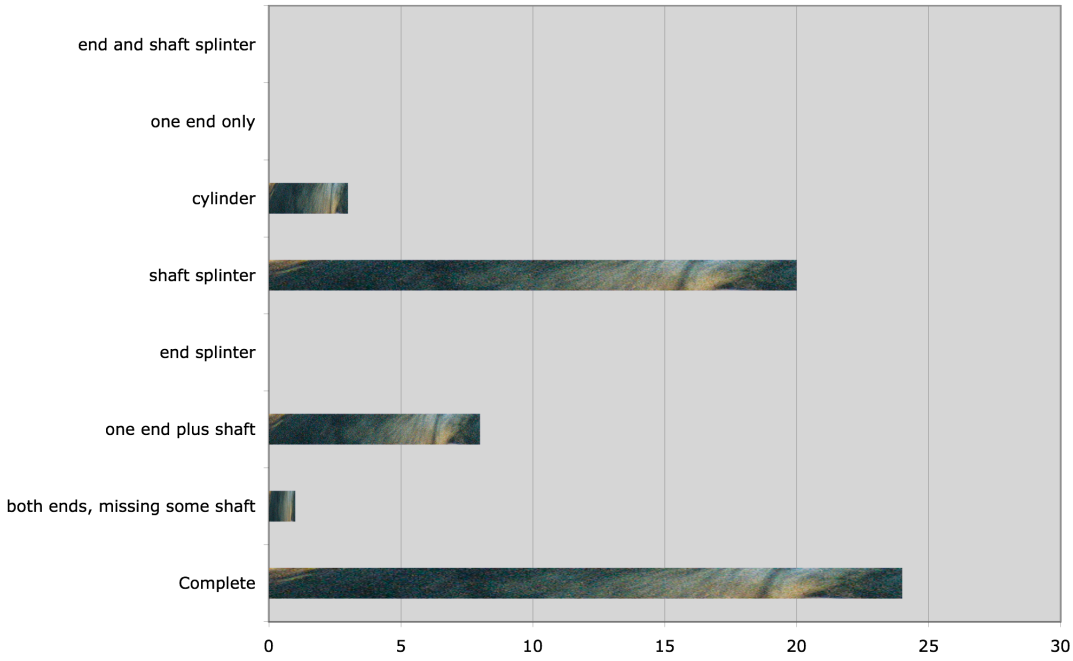

Chart 49: Fragmentation, Brown Hyaena Project D-P 11

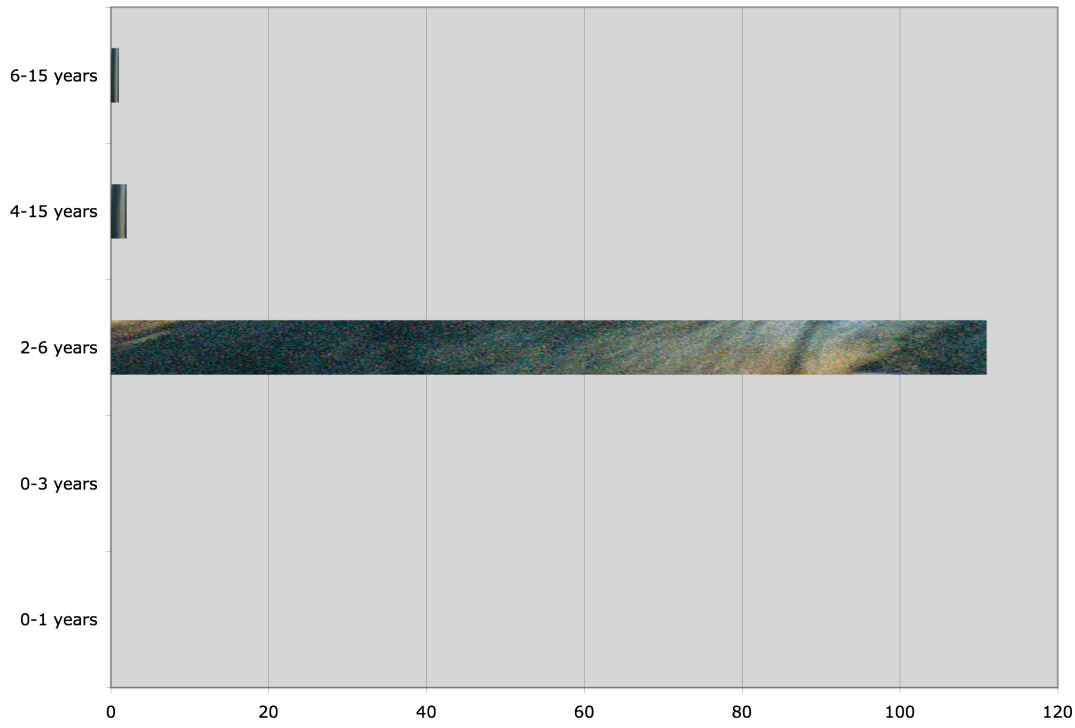

Chart 50: Weathering, Brown Hyaena Project D-P 11

Carnivore gnawing was identified on 61.4% of the assemblage. Crenulated edges were the most prolific type of damage with 84.3% of the specific damage recorded. Punctates yielded 4.3% of the assemblage and striations were 1.4%. There were no examples of either scouring or acid etching documented in the assemblage. The combination of punctuates and crenulated edges made up 8.6% of the identified damage while crenulated edges and striations were 1.4% (See Chart 51). For complete breakdown of carnivore damage per element and location on said elements see Appendix L.

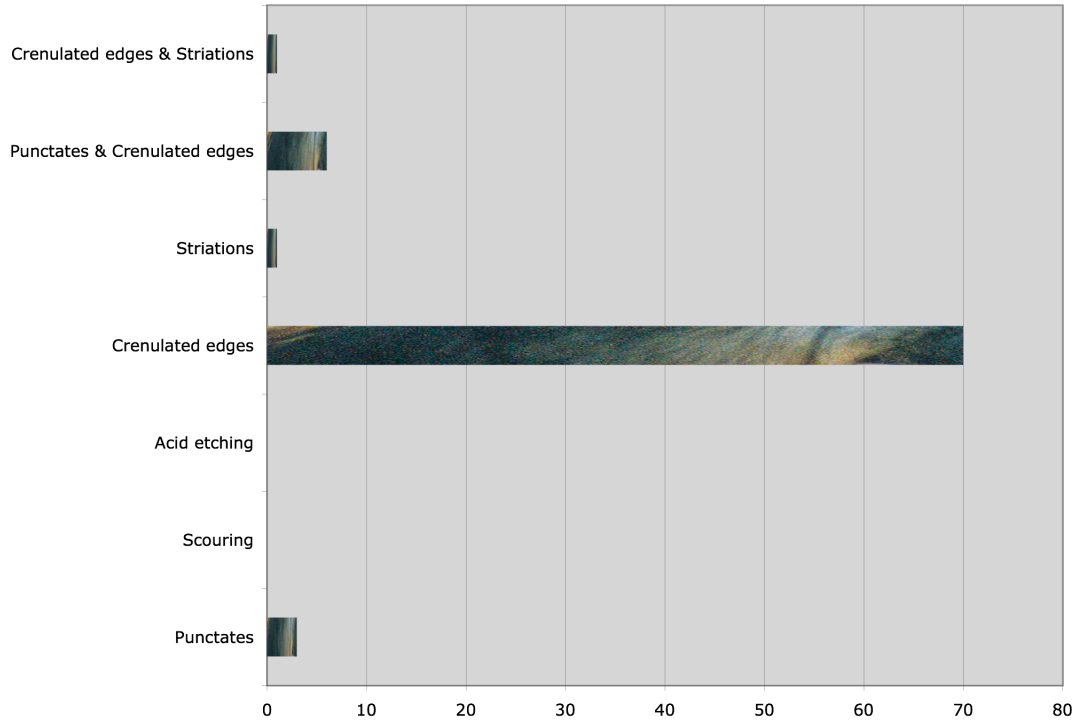

Chart 51: Carnivore Damage, Brown Hyaena Project D-P 11

Brown Hyaena Project D-P 16

D-P 16 yielded 1,287 faunal remains, of which 17.9% were identified to species or class size. Of the identified remains, seals made up 38.2%, dogs 32%, jackals and large birds 6.8% each, Cape foxes 3.2%, springbok 2.7%, small mammals 1.8%, horses 1.4%, cats1% and fishes, Cape hares and reptiles 0.5% each (See Table 28).

SPECIES	NISP	MNI
Antidorcas marsupialis	6	3 (left mandible)
Arctocephalus pusillus	84	6 (left scapula)
Avian (large)	15	1 (right humerus)
Canis familiaris	70	4 (right tibia)
Canis mesomelas	15	2 (left humerus)
Equus caballus	3	1 (left humerus)
Felis (domestic size)	2	1 (right mandible)
Fish	1	1 (vertebrae)
Lepus capensis	1	1 (right ulna)
Parahyaena brunnea	11	3 (right ulna)
Reptilian (med-lg)	1	1 (unknown)
Small mammal	4	1 (left calcaneus)
Vulpes chama	7	1 (right tibia)
TOTAL	220	26

Table 28: Species NISP & MNI Brown Hyaena Project D-P 16

In addition to the above-mentioned faunal remains, the single carcass of a black-backed jackal was also present at this location. The carcass was less than a week old, as Brown Hyaena Project staff was periodically checking the den and there was no carcass present the week prior to the analysis of faunal remains

.

Of the 1,287 specimens, 84.4% were identified to skeletal elements. Ribs and skull fragments made up the majority of the identified specimens with 28.2% and 14% respectively. Of the long bones there were 32 examples each of humerus and ulna, 28 scapulas, 25 tibias, 22 femurs and 20 radius (See Table 29). Both ribs and skull fragments have been removed from Chart 52 in order to illustrate the relative abundance of the remaining faunal material. Fusion data collected from 219 specimens indicated that 32% of the faunal remains were from young (unfused) animals. Of the unfused elements identified to species, seals made up the bulk of the young remains (25.1%). Dogs (1.8%), brown hyaenas (1.4%), jackals (0.5%) and springbok (0.5%) made up the rest of the identified remains with fusion data.

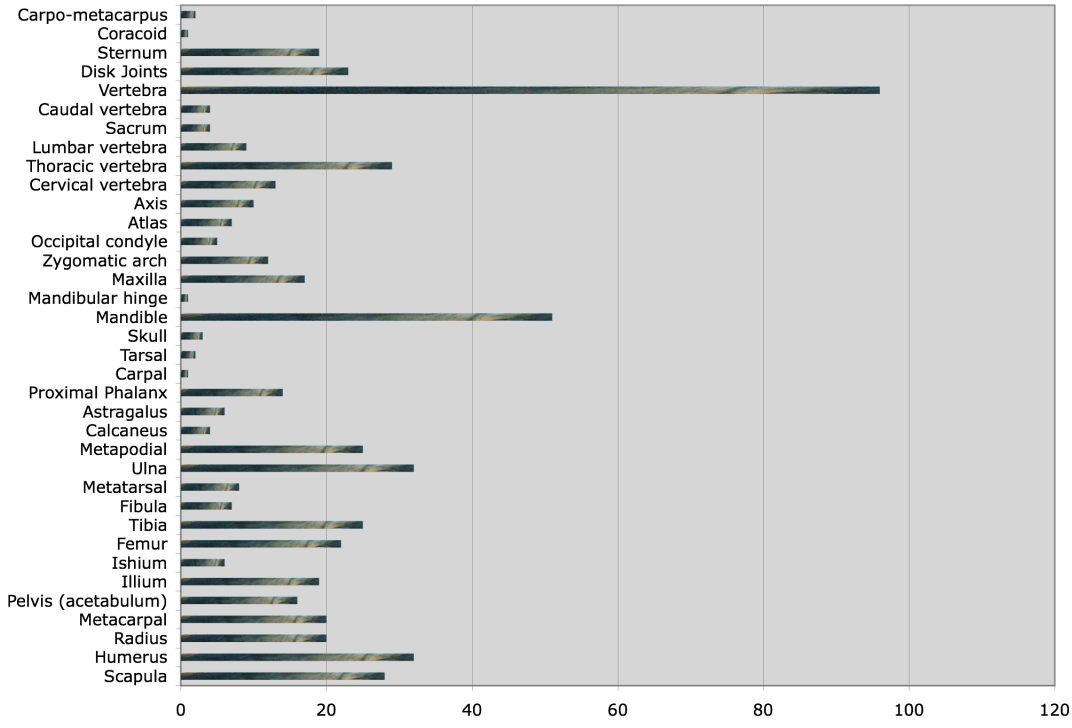

Chart 52: Elements, Brown Hyaena Project D-P 16

SKELETAL ELEMENT	NUMBER	SPECIES BREAKDOWN
Scapula	28	10 unknown; 8 Seal; 4 carnivore; 3 Dog; 1 Jackal; 1 Cape Fox; 1 small mammal
Humerus	32	18 unknown; 5 Seal; 4 Dog; 3 Jackal; 1 Horse; 1 large bird
Radius	20	5 unknown; 5 carnivore; 4 Dog; 3 Seal; 2 Brown Hyaena; 1 Jackal
Metacarpal	20	15 carnivore; 2 Jackal; 1 Dog; 1 Springbok; 1 Brown Hyaena
Pelvis (acetabulum)	16	4 Seal; 3 Jackal; 3 Dog; 2 Brown Hyaena; 2 large bird; 1 Cape Fox; 1 carnivore
Illium	19	10 unknown; 4 Seal; 4 Dog; 1 carnivore
Ishium	6	3 Dog; 3 unknown
Femur	22	11 unknown; 5 Seal; 2 Jackal; 1 Brown Hyaena; 1 large bird; 1 Cape Fox; 1 carnivore
Tibia	25	10 Seal; 7 unknown; 5 Dog; 2 Cape Fox; 1 Cat
Fibula	7	4 Seal; 3 carnivore
Metatarsal	8	6 carnivore; 1 Brown Hyaena; 1 Springbok
Ulna	32	10 unknown; 8 Seal; 3 Dog; 3 Brown Hyaena; 3 carnivore; 2 jackal; 1 large bird; 1 Horse, 1 Cape Hare
Metapodial	25	19 Seal; 3 carnivore; 2 unknown; 1 bovid
Calcaneus	4	1 Seal; 1 Horse; 1 small mammal; 1 unknown
Astragalus	6	4 Seal; 1 Brown Hyaena; 1 Cape Fox
Proximal Phalanx	14	7 unknown; 5 Seal; 1 small mammal; 1 Dog
Carpal	1	unknown
Tarsal	2	unknown
Skull	3	2 Dog; 1 unknown
Skull fragments	140	unknown
Mandible	51	22 Dog; 11 carnivore; 6 unknown; 4 Springbok; 3 Seal; 2 Jackal; 1 Cat; 1 small mammal
Mandibular hinge	1	unknown
Maxilla	17	11 Dog; 4 carnivore; 1 Seal; 1 Cape Fox
Zygomatic arch	12	unknown
Occipital condyle	5	unknown
Atlas	7	unknown
Axis	10	unknown
Cervical vertebrae	13	unknown
Thoracic vertebrae	29	unknown
Lumbar vertebrae	9	unknown
Sacrum	4	unknown
Caudal vertebrae	4	unknown
Vertebrae	96	95 unknown; 1 fish
Disk Joints	23	unknown
Ribs	286	unknown
Sternum	19	unknown
Coracoid	1	large bird
Carpo-metacarpus	2	large bird
TOTAL	1016	

Table 29: Elements with species breakdown, Brown Hyaena Project D-P 16

The length of 386 specimens were logged and ranged from < 1.0-19 cm, a radius of a brown hyaena. Of these specimens 48.7% were typed as shaft splinter, 18.1% complete, 15.5% one end plus shaft, 9.1% cylinder, 6.5% one end only, 1% each both ends present, some shaft missing and end and shaft splinter. There were no examples of end splinter in the assemblage (See Chart 53).

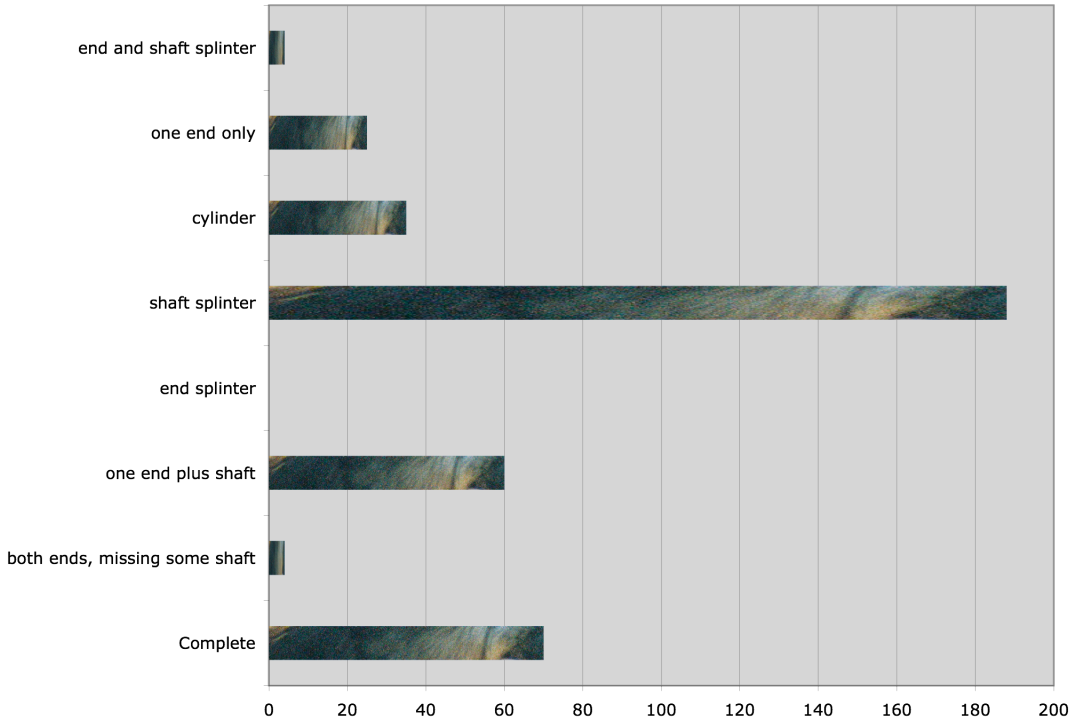

Chart 53: Fragmentation, Brown Hyaena Project D-P 16

Weathering data collected from 1,229 specimens indicated that 85% of the remains are within the range of 2-6 yrs since death. The rest of the faunal remains are divided between ranges from 0-15 yrs. Specifically 9.4% from 0-3 yrs, 4.5% from 4-15 yrs, 1% from 0-1 yr and 0.08% from 6-15 yrs (See Chart 54).

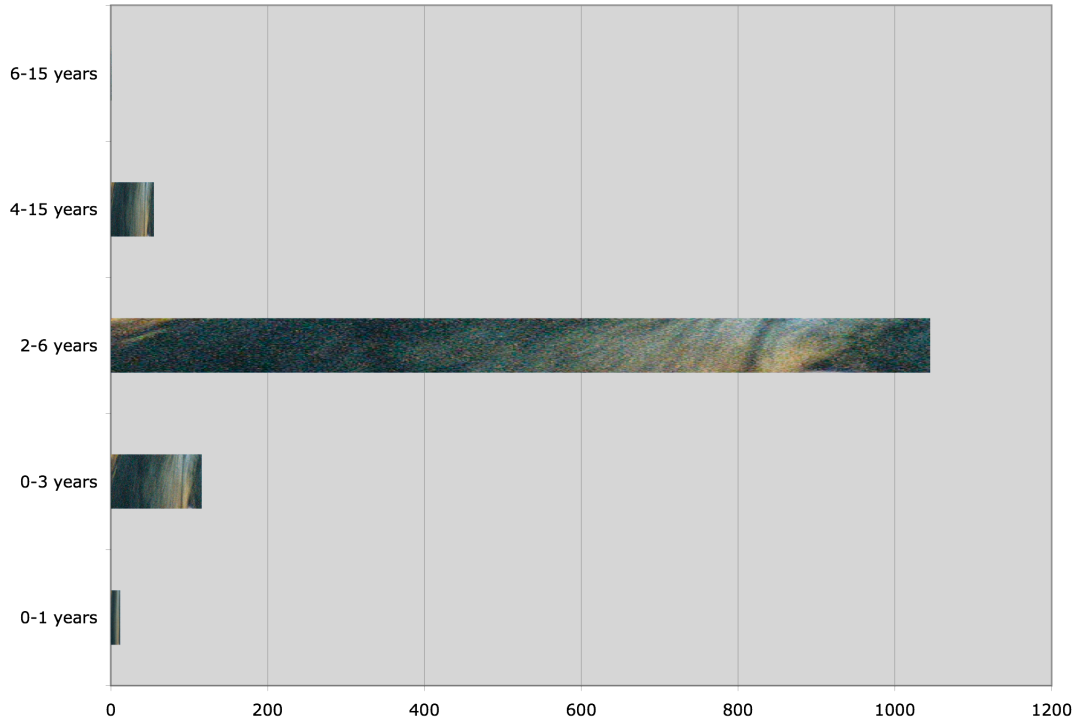

Chart 54: Weathering, Brown Hyaena Project D-P 16

Damage due to gnawing was recorded from 757 specimens, one of which was indicative of both carnivore and porcupine gnawing activity. The specimen in question was an unidentified mandible with crenulated edges along one edge of the bone. Crenulated edges comprised 87.4% of the carnivore damaged remains. Punctates made up 2.4% and there were no examples of scouring, acid etching or striations in the assemblage. The combination of punctates and crenulated edges totalled 6.9% of the assemblage and crenulated edges and striations were 1.5% of the carnivore gnawed material (See Chart 55). See Appendix M for breakdown of damage type per element and location.

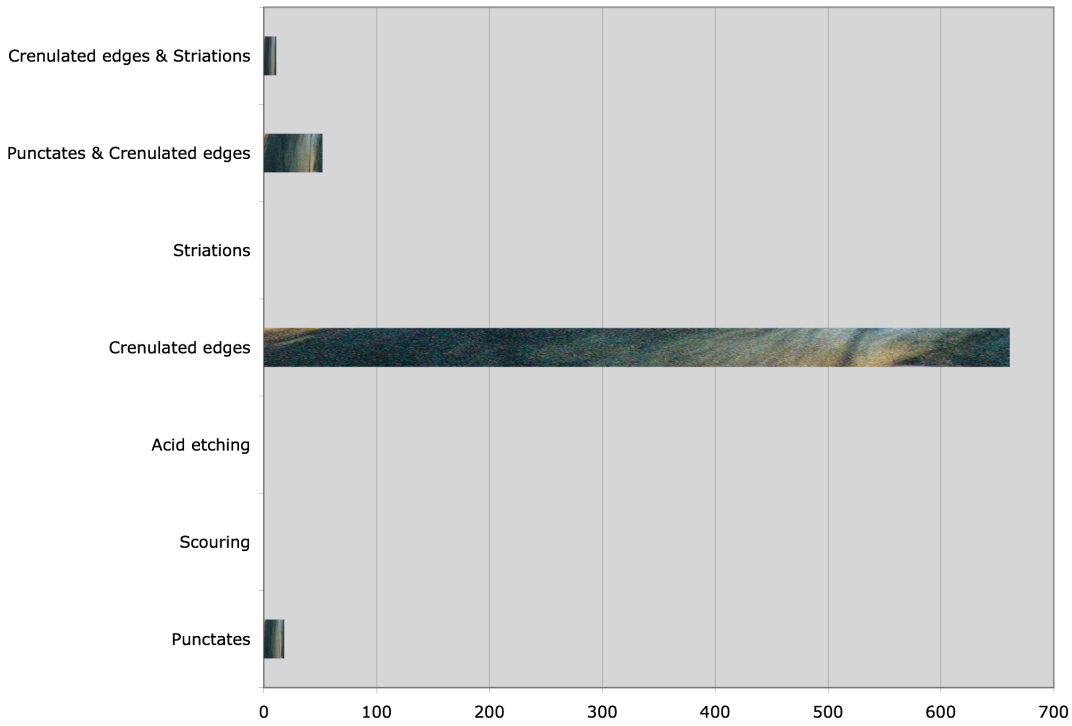

Chart 55: Carnivore Damage, Brown Hyaena Project D-P 16

Brown Hyaena Project D-P 18

Den D-P 18 consisted of 1,811 documented remains, plus 14 carcasses of seal pups, all of which had their skulls bitten through as seen in Plate 17. Of the logged remains 36.1% were identified to species, with seal comprising the majority at 71.4%. Large bird remains yielded 16.1%, dogs 2.8%, Cape foxes 1.4%, small mammals and medium birds 1.2% each, Cape hares 1.1%, brown hyaenas and fishes 1% each, jackals, ostriches and steenbok 0.6%, cats and cetaceans 0.3% and horses, small birds, gemsbok and reptiles 0.1% (See Table 30).

SPECIES	NISP	MNI
Arctocephalus pusillus	466	14 (left scapula)
Avian (large)	105	4 (left femur)
Avian (medium)	8	1 (humerus)
Avian (small)	1	1 (carpo-metacarpus)
Canis familiaris	18	1 (right femur)
Canis mesomelas	4	1 (right humerus)
Cetacean	2	1 (vertebrae)
Equus caballus	1	1 (left metacarpal)
Felis (domestic size)	2	1 (complete maxilla)
Fish	6	1 (mandible)
Lepus capensis	7	2 (left ulna)
Oryx gazella	1	1 (tooth)
Parahyaena brunnea	6	1 (left mandible)
Raphicerus campestris	4	1 (right radius)
Reptilian (med-lg)	1	1 (unknown)
Small mammal	8	1 (right femur)
Struthio camelus	4	1 (unknown)
Vulpes chama	9	2 (left tibia)
TOTAL	653	36

Table 30: Species NISP & MNI Brown Hyaena Project D-P 18

Of 1,811 specimens, 86.3 % were identified to skeletal element. Ribs, skull fragments and vertebrae made up the majority of the assemblage (26.4%, 13.2% and 12.6% respectively). As such these elements are removed from Chart 56 in order to illustrate the relative abundance of the remaining identified elements. Femurs are the most abundant of the long bones at 2.6% of the assemblage, followed by tibia (2.2%), radius (2%), scapula (1.9%) and humerus (1.8%) (See Table 31). Fusion data from 457 identified specimens indicate that 50.3% of the assemblage is from young (unfused) animals. Of these 95.7% were seal remains, 1.3% dog, 0.9% bovid, 0.9% carnivore, 0.4% brown hyaena and 0.4% small mammals.

SKELETAL ELEMENT	NUMBER	SPECIES BREAKDOWN
Scapula	30	22 Seal; 8 unknown
Humerus	29	18 Seal; 3 large bird; 2 medium bird; 2 Jackal; 2 Cape Fox; 2 unknown
Radius	31	14 Seal; 9 carnivore; 3 medium bird; 3 bovid; 2 Steenbok
Metacarpal	7	2 Brown Hyaena; 2 Dog; 2 Cape Fox; 1 Horse
Pelvis (acetabulum)	15	10 Seal; 4 Cape Hare; 1 Dog
Illium	2	Seal
Ishium	2	Seal
Pubis	1	Seal
Femur	41	19 Seal; 8 large bird; 6 unknown; 3 carnivore; 2 bovid; 1 Cape Hare; 1 small mammal
Tibia	35	26 Seal; 3 Cape Fox; 2 unknown; 1 Dog; 1 Steenbok; 1 carnivore
Fibula	18	Seal
Metatarsal	8	5 Dog; 2 Brown Hyaena; 1 Cape Fox
Ulna	41	21 Seal; 12 large bird; 2 Cape Hare; 2 bovid; 2 unknown; 1 carnivore
Metapodial	81	78 Seal; 1 small mammal; 1 carnivore; 1 unknown
Calcaneus	3	2 Seal; 1 Dog
Astragalus	6	2 Seal; 2 Jackal; 1 Cape Fox; 1 Steenbok
Proximal Phalanx	76	70 Seal; 5 carnivore; 1 small mammal
Medial Phalanx	21	9 Seal; 6 bovid; 6 carnivore
Distal Phalanx	9	5 Seal; 2 Dog; 1 Cat; 1 small mammal
Carpal	20	Seal
Patella	1	unknown
Skull	1	Seal
Skull fragments	207	199 unknown; 5 Seal; 2 large bird; 1 medium bird
Mandible	34	22 Seal; 5 carnivore; 2 Brown Hyaena; 2 unknown; 1 Dog; 1 fish; 1 small mammal
Mandibular hinge	1	unknown
Maxilla	24	17 Seal; 2 Dog; 2 carnivore; 2 small mammal; 1 Cat
Zygomatic arch	9	unknown
Occipital condyle	2	1 Seal; 1 unknown
Atlas	4	3 unknown; 1 small animal
Axis	1	Seal
Thoracic vertebrae	61	33 Seal; 28 unknown
Lumbar vertebrae	7	unknown
Sacrum	7	4 large bird; 2 medium bird; 1 unknown
Caudal vertebrae	19	unknown
Vertebrae	197	180 unknown; 7 large bird; 5 fish; 3 medium bird; 2 cetacean
Disk Joints	34	unknown
Ribs	413	381 unknown; 38 Seal
Sternum	27	26 unknown; 1 Seal
Fircula	1	large bird
Tibio-tarsus	8	large bird
Coracoid	16	large bird
Carpo-metacarpus	12	11 large bird; 1 small bird
Tarso-metatarsus	1	large bird
TOTAL	1563	

Table 31: Elements with species breakdown, Brown Hyaena Project D-P 18

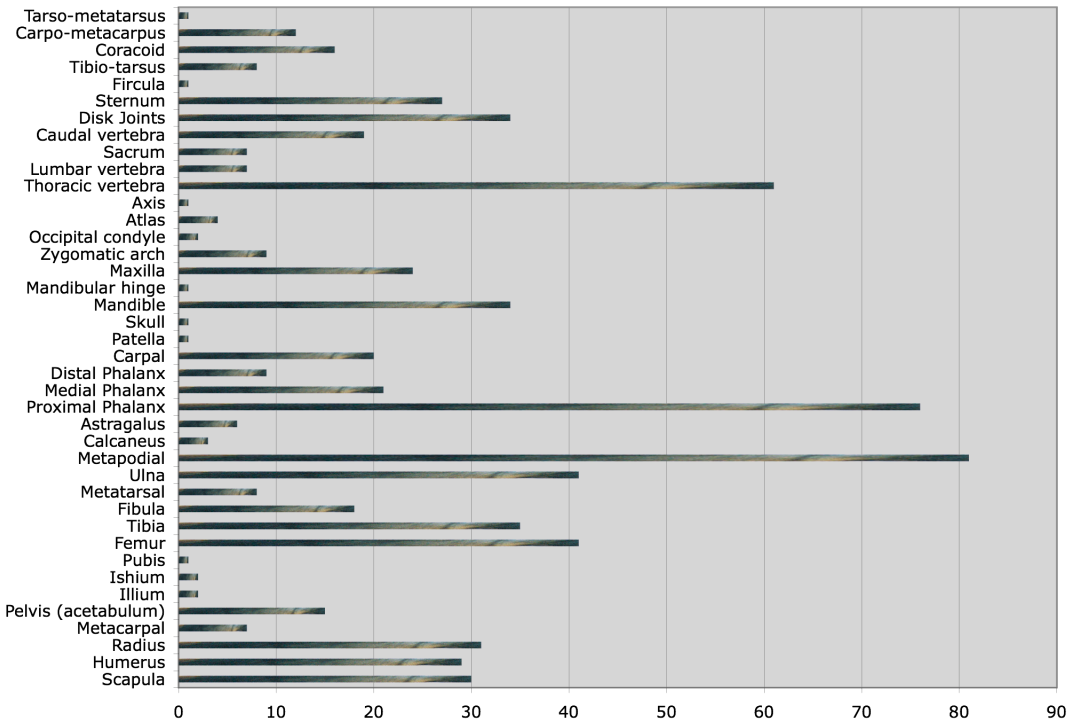

Chart 56: Elements, Brown Hyaena Project D-P 18

Measured fragments ranged in length from < 1.0-14 cm. Of these 43.7% were complete bones, 27.8% shaft splinters, 18.1% one end plus shaft, 5.9% cylinder, 2.1% one end only, 1.9% end and shaft splinter and no examples of both ends present, missing some shaft (See Chart 57).

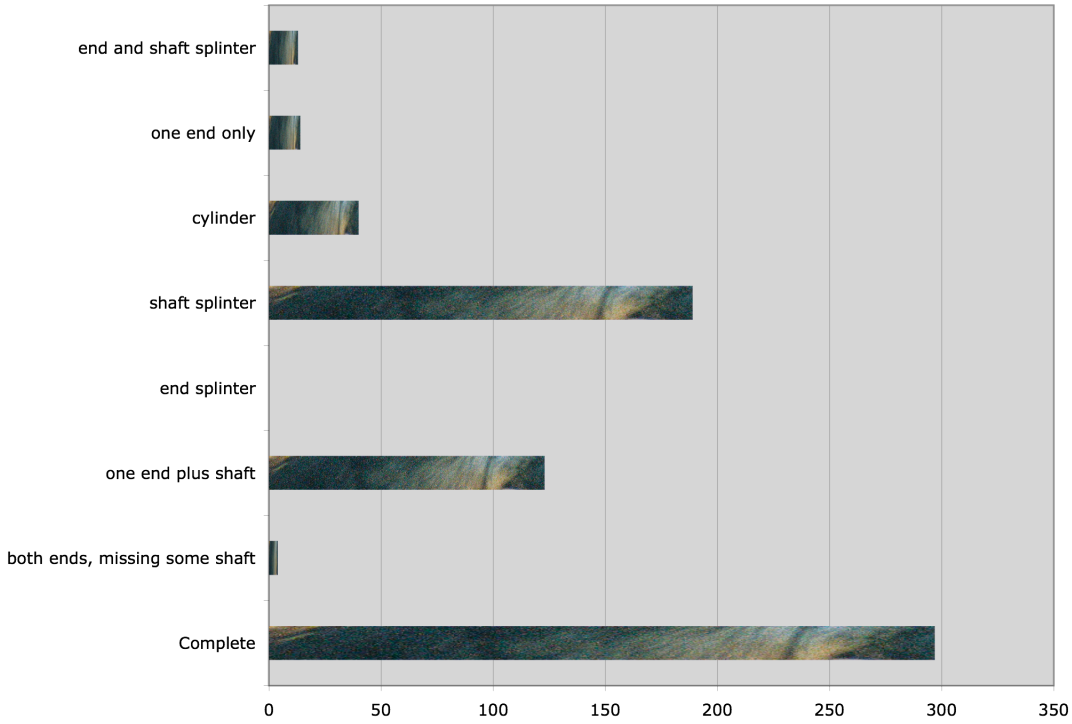

Chart 57: Fragmentation, Brown Hyaena Project D-P 18

Weathering data were recorded from 1,789 specimens, of which 96.7% suggest a time range of 2-6 yrs since death. There were no samples in the 0-1 or 0-3 yr ranges and only 3.2% in the 4-15 yr range and 0.1% in the 6-15 yr range (See Chart 58).

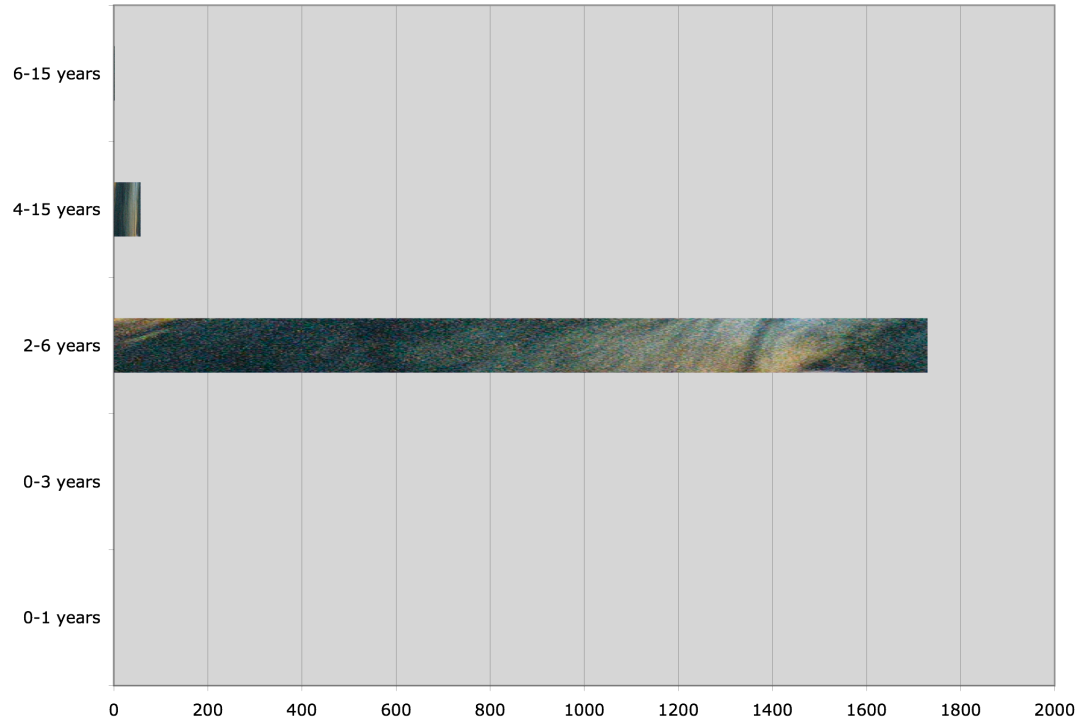

Chart 58: Weathering, Brown Hyaena Project D-P 18

Carnivore gnawing was documented on 64.4% of the assemblage. Crenulated edges made up 87.4% of the documented carnivore damage. Punctates constituted 3%, striations 0.7% and there were no examples of scouring or acid etching recorded in the assemblage. The combinations of punctates and crenulated edges were 7.2%, crenulated edges and striations were 1.1% and punctates, crenulated edges and striations made up 0.7% of the recorded carnivore damage (See Chart 59). Appendix N gives a complete break down of carnivore damage per elements and location of damage on said element.

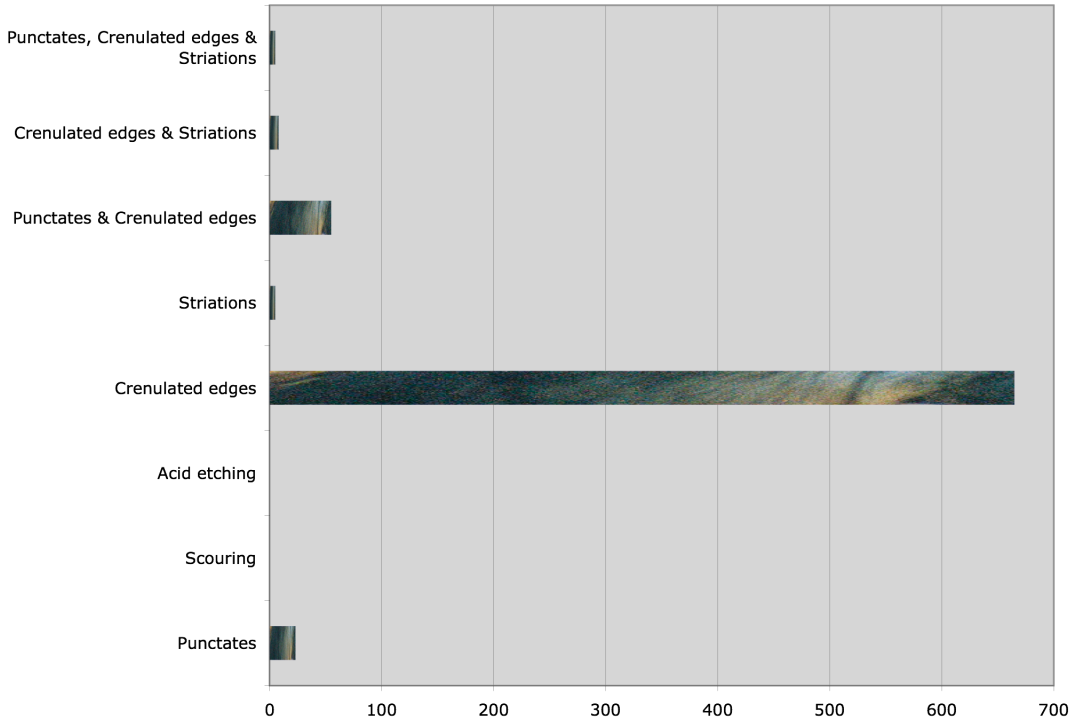

Chart 59: Carnivore Damage, Brown Hyaena Project D-P 18

Brown Hyaena Project D-SPG 1

Of the 3,252 total specimens recorded, 46% were identified to species or class size. Seal remains comprised 96.5% of all identified remains. Remains of large birds followed with 1.5%, dog remains at 1.3%, then jackals (0.3%), brown hyaenas (0.2%), horses (0.1%) and ostriches and medium birds each with 0.07% (See Table 32). In addition to the identified remains listed above, there were also 17 seal pup carcasses associated with the den. All of the carcasses had very distinctive bite marks on the skulls as seen in Plate 17.

SPECIES	NISP	MNI
Arctocephalus pusillus	1441	71 (left radius)
Avian (large)	22	1 (right femur)
Avian (medium)	1	1 (left humerus)
Canis familiaris	19	2 (right femur)
Canis mesomelas	4	1 (right radius)
Equus caballus	2	1 (right tibia)
Parahyaena brunnea	3	1 (left ulna)
Struthio camelus	1	1 (radius/ulna fused)
TOTAL	1493	79

Table 32: Species NISP & MNI Brown Hyaena Project D-SPG 1

Complete analysis identified 97.9% of the specimens to skeletal element. Ribs were the most prominent identified element with 25.5% of the assemblage. Skull fragments made up 13.2%, seal metapodials 11.5% and vertebrae 9.7%. These four elements have been removed from Chart 60, which illustrates the relative abundance of the remaining elements. Of the long bones, radius was the most abundant at 4.4% of the identified elements. Radius were followed by tibia (4.3%), ulna (3.7%), scapula (2.8%), femur (2.8%) and humerus (2.5%) (See Table 33). Fusion data were recorded for 715 specimens, of which 76.5% were from young (unfused) animals. Seals made up the majority of unfused data with 99.3% of the identified remains. Other unfused specimens were from brown hyaenas (0.5%), large birds (0.4%) and dogs (0.2%).

SKELETAL ELEMENT	NUMBER	SPECIES BREAKDOWN
Scapula	90	64 Seal; 22 unknown; 3 bovid; 1 carnivore
Humerus	80	71 Seal; 4 unknown; 3 Dog; 1 Jackal; 1 large bird; 1 medium bird
Radius	140	131 Seal; 3 Dog; 3 large bird; 2 Jackal; 1 unknown
Metacarpal	3	2 Brown Hyaena; 1 Dog
Pelvis (acetabulum)	43	39 Seal; 4 unknown
Illium	43	Seal
Ishium	18	Seal
Pubis	9	Seal
Femur	89	78 Seal; 6 unknown; 2 Dog; 2 large bird; 1 Jackal
Tibia	137	133 Seal; 2 unknown; 1 Dog; 1 Horse
Fibula	50	Seal
Metatarsal	2	Dog
Ulna	117	114 Seal; 2 carnivore; 1 Brown Hyaena
Metapodial	366	Seal
Calcaneus	39	38 Seal; 1 Dog
Astragalus	36	Seal
Proximal Phalanx	154	152 Seal; 2 Dog
Medial Phalanx	18	16 Seal; 1 large bird; 1 Dog
Radius/Ulna fused	1	Ostrich
Carpal	4	unknown
Tarsal	4	unknown
Skull	1	large bird
Skull fragments	419	unknown
Mandible	52	41 Seal; 8 unknown; 3 carnivore
Mandibular hinge	7	6 unknown; 1 Seal
Maxilla	36	30 Seal; 3 carnivore; 2 Dog; 1 unknown
Zygomatic arch	12	unknown
Occipital condyle	3	unknown
Atlas	1	unknown
Axis	2	1 Seal; 1 unknown
Cervical vertebrae	1	unknown
Sacrum	2	unknown
Vertebrae	308	307 unknown; 1 Horse
Disk Joints	12	unknown
Ribs	810	unknown
Sternum	64	63 unknown; 1 large bird
Tibio-tarsus	4	large bird
Coracoid	2	large bird
Carpo-metacarpus	2	large bird
Tarso-metatarsus	1	large bird
TOTAL	3182	

Table 33: Elements with species breakdown, Brown Hyaena Project D-SPG 1

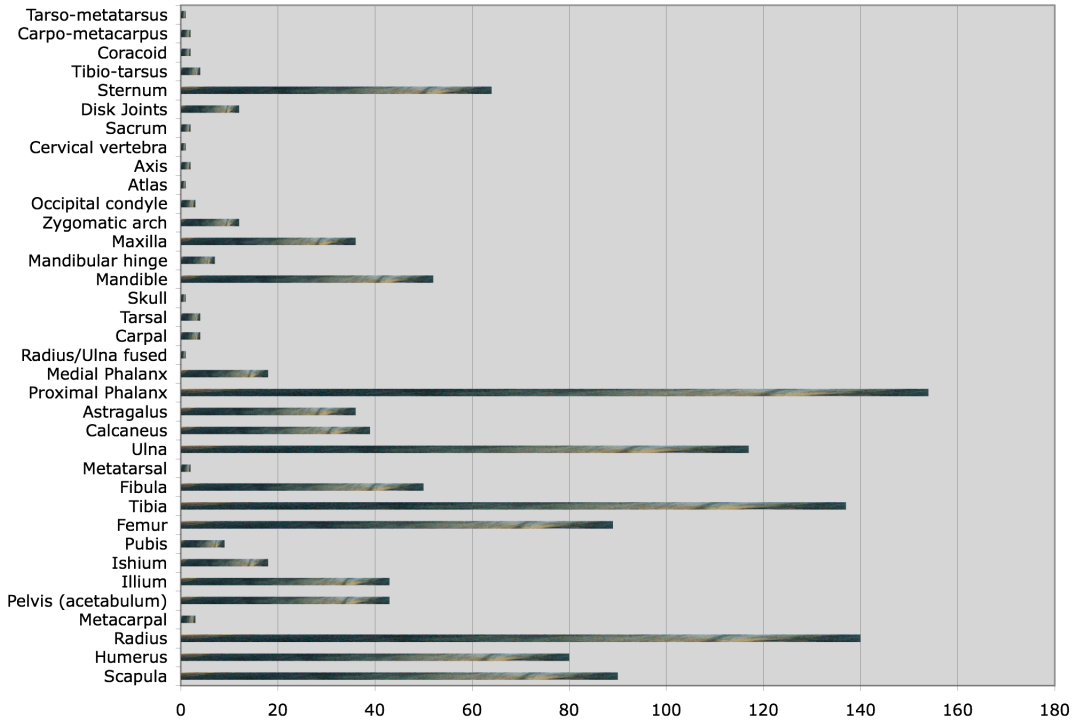

Chart 60: Elements, Brown Hyaena Project D-SPG 1

Measurements were taken from 680 specimens and ranged from < 1.0-32 cm, a tibia from a horse. Of the recorded fragment types complete bones made up 57.5% of the measured specimens. One end plus shaft yielded 21%, cylinder 10.6%, shaft splinter 4.3%, both ends present, missing some shaft 3.2%, one end only 2.9%, end and shaft splinter 0.4% and no examples of end splinter (See Chart 61).

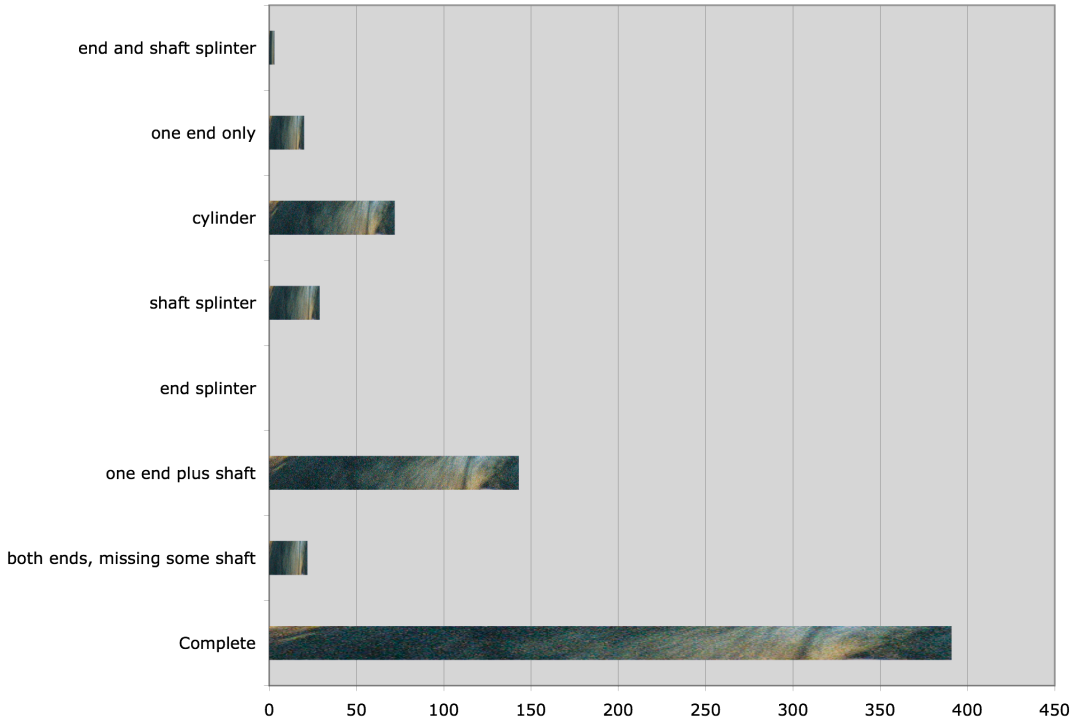

Chart 61: Fragmentation, Brown Hyaena Project D-SPG 1

Weathering data from 3,241 specimens places the majority of remains in the range of 2-6 yrs since death (84.1%). The range of 4-15 yrs contained 15.5%, 6-15 yrs 0.4%, 0-3 yrs 0.03% and there were no specimens in the 0-1 yr range (See Chart 62).

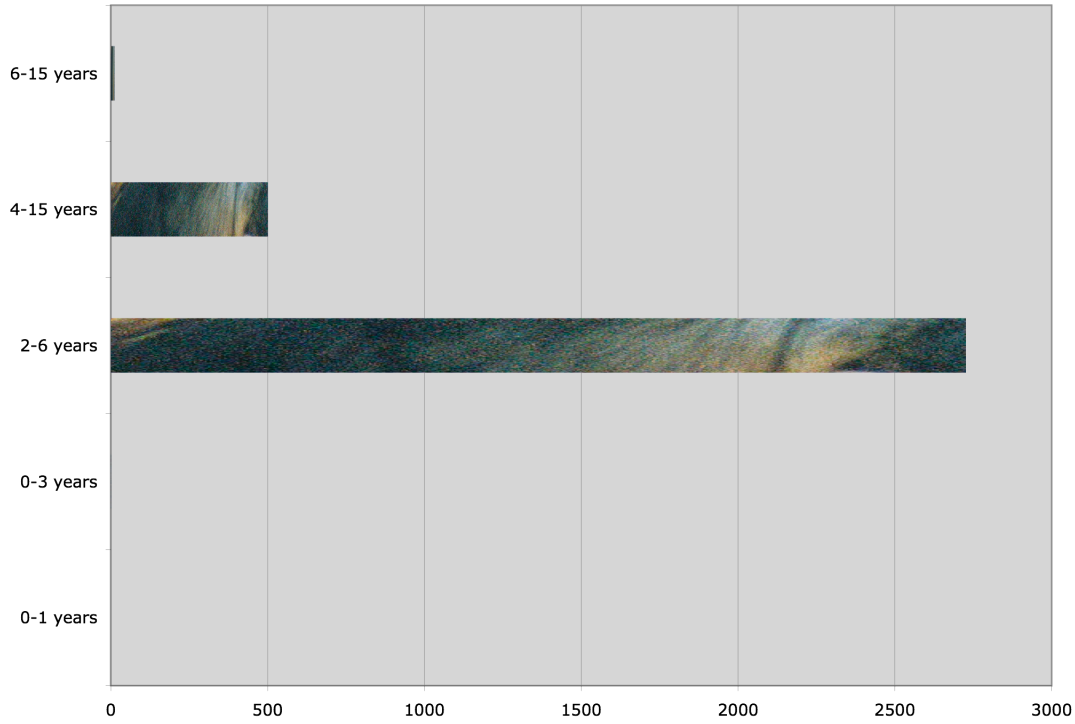

Chart 62: Weathering, Brown Hyaena Project, D-SPG 1

Carnivore damage was noted on 31.4% of the total assemblage. Crenulated edges made up 83% of the documented damage, punctates 6.3% and there were no examples of scouring, acid etching or striations. The combination of punctuates and crenulated edges made up 11% of the carnivore gnawed specimens (See Chart 63). Appendix O gives a complete breakdown of carnivore damage per bone and location of damage on said bones.

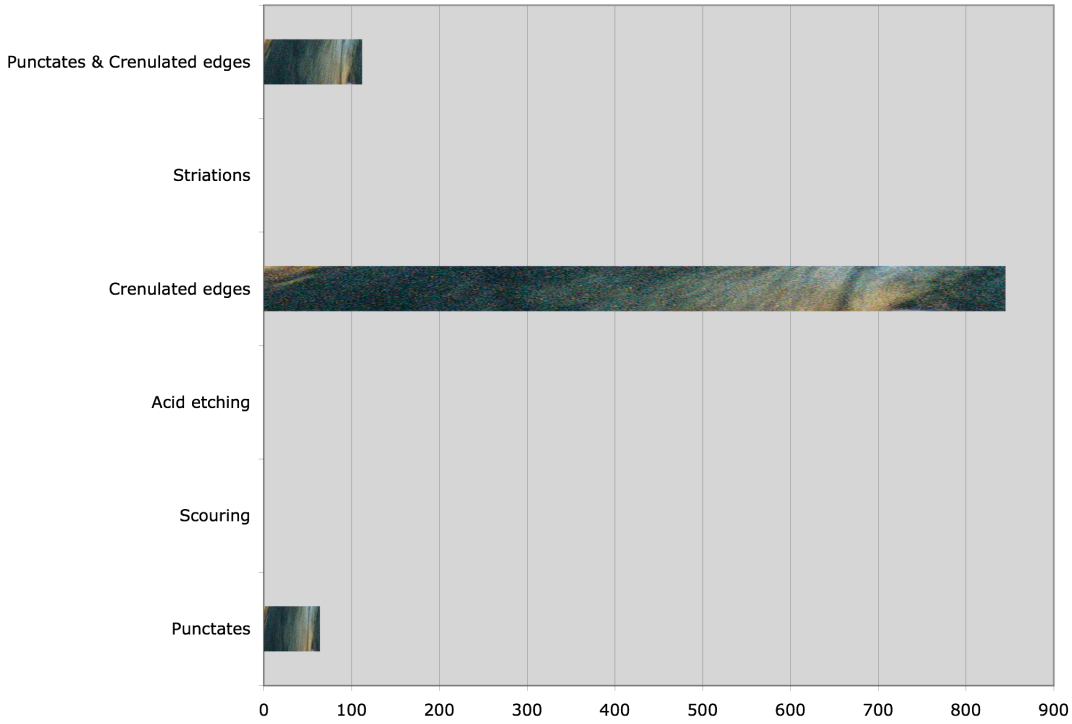

Chart 63: Carnivore Damage, Brown Hyaena Project D-SPG 1

Brown Hyaena Project D-BB 1

The Bakers Bay den yielded 1,351 specimens, of which 37.8% were identified to species or class size. Seal remains constituted the majority of faunal material identified to species with 59.6%. The rest of the identified remains consisted of gemsbok (9.6%), springbok (8.2%), large birds (7.7%), dogs (6.1%), ostriches (2.4%), jackals (1.6%), brown hyaenas and cetaceans (1.2% each), size I bovids (1%), Cape foxes and small mammals (0.6% each) and baboons and medium birds (0.2% each) (See Table 34).

SPECIES	NISP	MNI
Antidorcas marsupialis	42	2 (left radius)
Arctocephalus pusillus	304	29 (right humerus)
Avian (large)	39	4 (left femur)
Avian (medium)	1	1 (unknown)
Bovid size I	5	1 (left radius)
Canis familiaris	31	4 (left tibia)
Canis mesomelas	8	2 (left femur)
Cetacean	6	1 (vertebrae)
Oryx gazella	49	4 (right femur)
Papio cynocephalus	1	1 (left humerus)
Parahyaena brunnea	6	2 (right mandible)
Small mammal	3	1 (left femur)
Struthio camelus	12	1 (right tibia)
Vulpes chama	3	2 (left acetabulum)
TOTAL	510	55

Table 34: Species NISP & MNI Brown Hyaena Project D-BB 1

Of the examined specimens, 75.9% were identified to skeletal element. Of these ribs and skull fragments were the most prolific with 14.5% and 12.7% respectively. Of the identified long bones humerus made up the majority with 8.3%. Humerus were followed in abundance by femur (5.7%), tibia (4.9%), scapula (4.7%), and radius (3.9%) (See Table 35 and Chart 64). Fusion data were recorded from 398 long bones, of which 22.6% were from young unfused animals, 91.1% of them being seal remains.

SKELETAL ELEMENT	NUMBER	SPECIES BREAKDOWN
Scapula	48	29 Seal; 11 unknown; 4 bovid; 3 Gemsbok; 1 Springbok
Humerus	85	57 Seal; 14 unknown; 3 Gemsbok; 2 Springbok; 2 Brown Hyaena; 1 Baboon; 1 Cape Fox; 1 Jackal; 1 Ostrich; 1 large bird; 1 bovid; 1 carnivore
Radius	40	29 Seal; 5 Gemsbok; 2 Dog; 2 Springbok; 1 Jackal; 1 bovid size I
Metacarpal	13	5 Dog; 3 Springbok; 3 bovid; 2 Gemsbok
Pelvis (acetabulum)	20	7 Seal; 3 carnivore; 2 Gemsbok; 2 Cape Fox; 2 bovid; 1 Springbok; 1 Dog; 1 large bird; 1 unknown
Illium	4	2 Seal; 1 bovid; 1 carnivore
Ishium	2	Seal
Pubis	1	Seal
Femur	58	20 Seal; 11 unknown; 9 large bird; 8 Gemsbok; 4 Dog; 2 Jackal; 2 small mammal; 1 Ostrich; 1 carnivore

SKELETAL ELEMENT	NUMBER	SPECIES BREAKDOWN
Tibia	50	30 Seal; 6 Gemsbok; 6 unknown; 4 Dog; 2 Springbok; 2 Ostrich
Fibula	13	11 Seal; 2 unknown
Metatarsal	9	3 Dog; 2 Gemsbok; 2 Springbok; 2 bovid
Ulna	42	37 Seal; 3 Dog; 2 large bird
Metapodial	34	25 Seal; 7 bovid; 1 Gemsbok; 1 Springbok
Calcaneus	3	2 Seal; 1 Gemsbok
Astragalus	3	2 Gemsbok; 1 carnivore
Proximal Phalanx	8	4 Seal; 2 Dog; 2 Gemsbok
Medial Phalanx	3	1 Seal; 1 Dog; 1 Gemsbok
Distal Phalanx	5	2 Seal; 2 Springbok; 1 Gemsbok
Carpal	3	unknown
Tarsal	3	unknown
Patella	1	Gemsbok
Skull	7	5 Seal; 1 Jackal; 1 bovid
Skull fragments	130	unknown
Mandible	57	23 Seal; 7 Springbok; 7 unknown; 6 Dog; 6 bovid; 3 Brown Hyaena; 3 Gemsbok; 1 Jackal; 1 small mammal
Mandibular hinge	5	3 unknown; 1 Seal; 1 bovid
Maxilla	30	16 Seal; 5 Springbok; 4 Gemsbok; 2 Jackal; 1 Brown Hyaena, 1 carnivore; 1 bovid
Zygomatic arch	6	unknown
Occipital condyle	1	unknown
Atlas	4	unknown
Axis	4	unknown
Cervical vertebrae	8	unknown
Thoracic vertebrae	19	unknown
Lumbar vertebrae	6	unknown
Sacrum	12	unknown
Caudal vertebrae	5	unknown
Vertebrae	95	90 unknown; 3 large bird; 2 Cetacean
Disk Joints	14	12 unknown; 2 Cetacean
Ribs	149	unknown
Sternum	6	5 unknown; 1 medium bird
Tibio-tarsus	8	large bird
Coracoid	6	large bird
Tarso-metatarsus	5	Ostrich
TOTAL	1025	

Table 35: Elements with species breakdown, Brown Hyaena Project D-BB 1

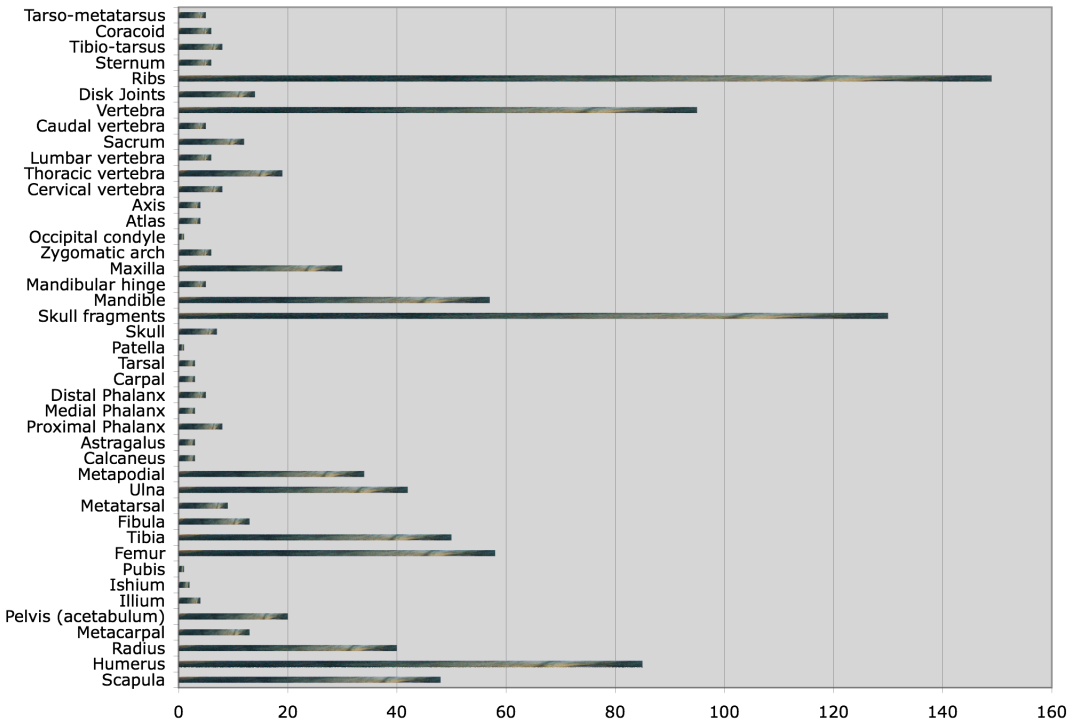

Chart 64: Elements, Brown Hyaena Project D-BB 1

Length was measured from 613 specimens and ranged from < 1.0-48 cm. Of the measured specimens 43.4% were shaft splinter, 20.2% complete, 19.1% one end plus shaft, 10.4% cylinder, 3.4% one end only and 2.1% both ends present, missing some shaft. There were no examples of end splinter (See Chart 65).

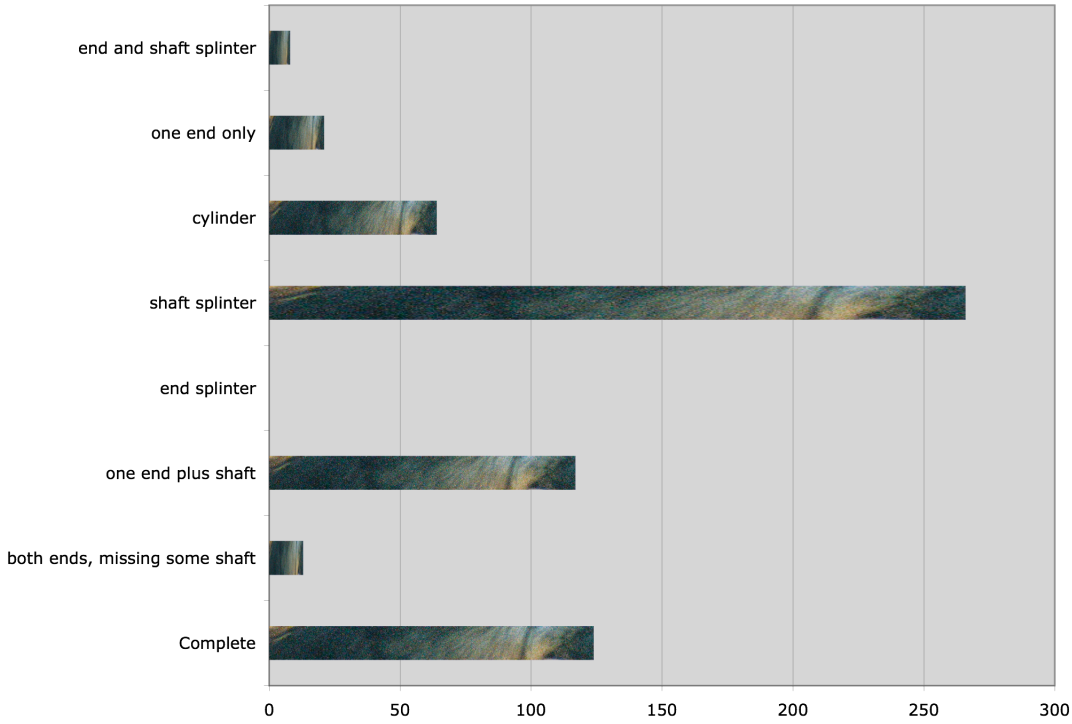

Chart 65: Fragmentation, Brown Hyaena Project D-BB 1

Weathering data were taken from 1,289 specimens. No remains were in the 0-1 yr range since death. The majority of remains were indicative of a range of 2-6 yrs since death (55.1%). This was followed by the 4-15 yr range (31%), 0-3 yr range (11.5%) and 6-15 yr range (See Chart 66).

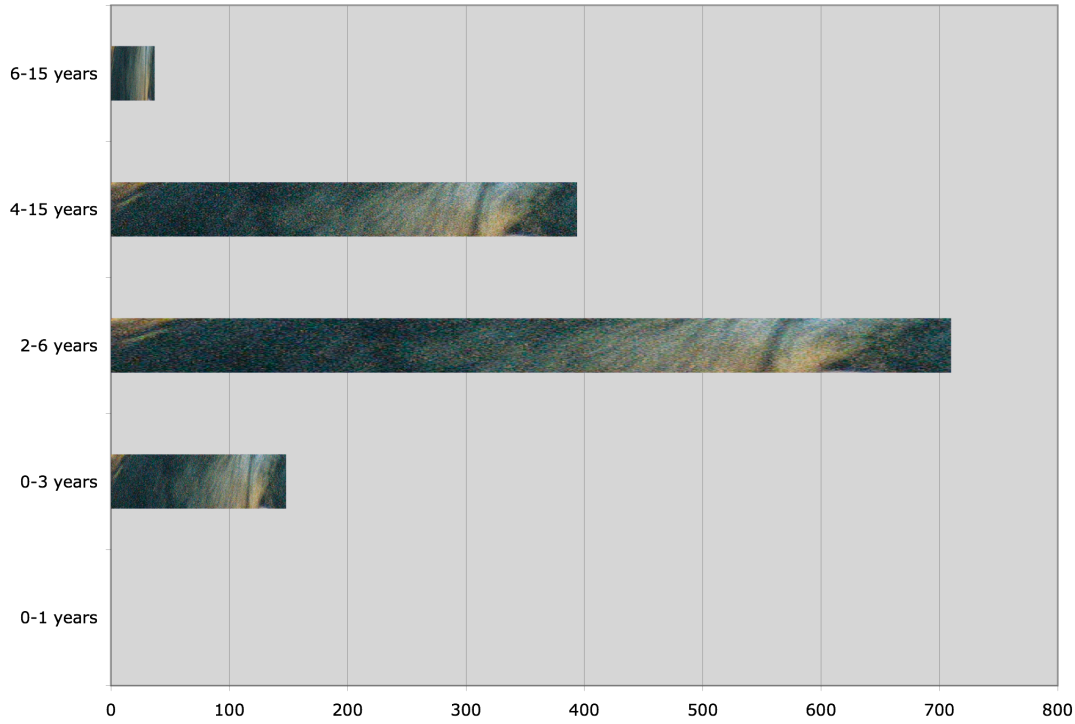

Chart 66: Weathering, Brown Hyaena Project D-BB 1

Damage due to carnivore activity was documented on 66% of the specimens, one of which had both carnivore and porcupine gnawing upon it. The carnivore gnawing for this particular specimen was crenulated edges over most of an unidentified fragment. Of the other 891 specimens with identified carnivore damage crenulated edges comprised 81.5%. Punctates made up 5.6%, striations 0.1% and there were no examples of either scouring or acid etching. The combinations of punctuates and crenulated edges produced 9.4%, crenulated edges and striations 2% and punctuates and striations 0.1% (See Chart 67). Appendix P shows a complete breakdown of elements, type of carnivore damage, and location of damage on bones.

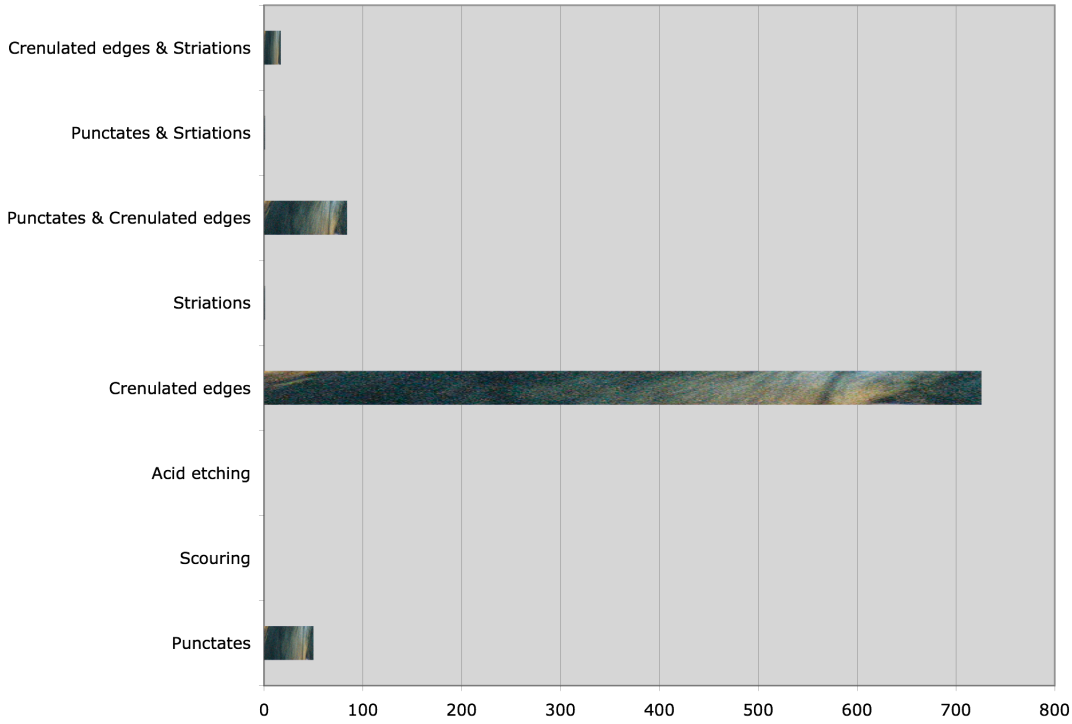

Chart 67: Carnivore Damage, Brown Hyaena Project D-BB 1

Skinner Collection

A total of 5,466 specimens made up this assemblage and were re-examined for this study. Of the 5,466 specimens, 50.4% were identified to species or class size. Seals were by far the most prolific of the identified remains with 82.6%. Birds in general combined to form 8.6%, followed by jackals (5.5%) then cats (1.1%), springbok (0.6%), dogs (0.4%), gemsbok (0.3%), bovid size I (0.2%), brown hyaenas (0.15%), Cape foxes and ostriches (0.1% each), cetaceans and small mammals (0.07% each) and steenbok, horses and amphibians 0.04% (See Table 36).

SPECIES	NISP	MNI
Amphibian	1	1 (skull fragment)
Antidorcas marsupialis	16	2 (left tibia)
Arctocephalus pusillus	2277	76 (right scapula)
Avian (large)	29	8 (right radius)
Avian (medium)	87	2 (right tibia)
Avian (small)	5	1 (left radius)
Bovid size I	5	1 (left radius)
Canis familiaris	12	2 (right scapula)
Canis mesomelas	153	5 (left femur)
Cetacean	2	1 (right radius)
Equus caballus	1	1 (skull fragment)
Felis (domestic size)	29	1 (left tibia)
Homo sapien	1	1 (maxillary tooth)
Lepus capensis	2	1 (right acetabulum)
Oryx gazella	9	2 (right acetabulum)
Parahyaena brunnea	4	1 (right ulna)
Raphicerus campestris	1	1 (left femur)
Small mammal	2	1 (fibula)
Spheniscus demersus	115	16 (radius)
Struthio camelus	3	1 (vertebrae)
Vulpes chama	3	1 (right humerus)
TOTAL	2757	125

Table 36: Species NISP & MNI Skinner Collection

Of the faunal remains stored and re-examined, 85.6% were identified to skeletal element (See Table 36). Ribs and skull fragments combined for 37.5% of the entire identified assemblage (20.3% and 17.3% respectively). Of the long bones radius was the most prolific at 4.3%, followed by humerus (3.9%), scapula (3.7%), tibia (3%), ulna (2.1%) and femur (1.7%). In order to illustrate the relative abundance of the remaining elements, ribs and skull fragments were removed from Chart 68. Fusion data were recorded for 2,065 specimens, of which 60.5% were from young unfused animals, seals being the most abundant with 89.8% of the unfused assemblage.

SKELETAL ELEMENT	NUMBER	SPECIES BREAKDOWN
Scapula	174	159 Seal; 7 Jackal; 4 unknown; 3 Dog; 1 Cat
Humerus	181	143 Seal; 16 Penguin; 7 unknown; 5 Jackal; 5 medium bird; 1 Cetacean; 1 Cape Fox; 1 Dog; 1 bovid
Radius	199	135 Seal; 26 Penguin; 16 large bird; 5 Jackal; 5 medium bird; 5 unknown; 2 carnivore; 2 bovid; 1 Springbok, 1 small bird
Metacarpal	12	6 Seal; 2 Springbok; 2 Cat; 1 Jackal; 1 unknown
Pelvis (acetabulum)	78	56 Seal; 9 Penguin; 6 Jackal; 2 Gemsbok; 1 medium bird; 1 small bird; 1 Cape Hare; 1 Dog; 1 Cat
Illium	47	43 Seal; 3 Penguin; 1 Cape Hare
Ishium	23	Seal
Pubis	15	Seal
Femur	77	52 Seal; 8 Penguin; 6 Jackal; 6 unknown; 2 medium birds; 1 Steenbok; 1 Dog; 1 Brown Hyaena
Tibia	142	118 Seal; 7 Jackal; 3 medium bird; 3 unknown; 2 large bird; 2 Springbok; 2 Dog; 1 Cat; 1 Gemsbok; 1 Cape Fox; 1 Brown Hyaena
Fibula	75	71 Seal; 1 large bird; 1 medium bird; 1 small mammal; 1 unknown
Metatarsal	24	15 Jackal; 7 Cat; 1 Gemsbok; 1 bovid size I
Ulna	100	83 Seal; 12 Jackal; 2 medium bird; 1 Gemsbok; 1 Cape Fox; 1 Brown Hyaena
Radius/ulna fused	5	Penguin
Metapodial	244	225 Seal; 8 Jackal; 6 unknown; 3 Penguin; 2 carnivore
Calcaneus	63	56 Seal; 6 Cat; 1 Springbok
Astragalus	5	4 Seal; 1 Cat
Proximal Phalanx	127	103; 9 Jackal; 6 Cat; 5 Penguin; 2 medium bird; 1 Dog; 1 small mammal
Medial Phalanx	110	98 Seal; 4 Penguin; 2 Jackal; 2 medium bird; 2 cat; 1 medium bird; 1 Springbok
Distal Phalanx	223	208 Seal, 9 Penguin; 3 Jackal; 2 Cat; 1 Springbok
Carpal	7	5 Seal; 2 unknown
Tarsal	6	5 unknown; 1 Seal
Patella	3	2 unknown; 1 Seal
Sesamoid	6	unknown
Skull	3	2 Seal; 1 Brown Hyaena
Skull fragments	804	671 unknown; 118 Seal; 8 Jackal; 2 Springbok; 1 large bird; 1 medium bird; 1 amphibian; 1Gemsbok; 1 Horse
Horn/antler	3	2 Springbok; 1 unknown
Mandible	67	53 Seal; 7 Jackal; 2 Penguin; 2 unknown; 1 medium bird; 1 Springbok; 1 Gemsbok
Mandibular hinge	1	unknown
Maxilla	70	51 Seal; 12 Jackal; 2 unknown; 1 Springbok; 1 Gemsbok; 1 Dog; 1 bovid
Mandibular tooth	12	11 Seal; 1 Springbok
Maxillary Tooth	5	1 Human; 1 Seal; 1 Jackal; 1 Springbok; 1 Gemsbok
Zygomatic arch	29	23 Seal; 4 unknown; 1 Jackal; 1 Dog
Occipital condyle	31	27 Seal; 4 Jackal
Atlas	18	unknown
Axis	21	unknown
Cervical vertebrae	127	unknown

SKELETAL ELEMENT	NUMBER	SPECIES BREAKDOWN
Thoracic vertebrae	70	67 unknown; 2 medium bird; 1 Cetacean
Lumbar vertebrae	88	79 unknown; 7 medium bird; 2 large bird
Sacrum	9	5 unknown; 3 medium bird; 1 large bird
Caudal vertebrae	191	190 unknown; 1 medium bird
Vertebrae	112	unknown
Ribs	948	912 unknown; 25 medium bird; 3 large bird; 3 small bird; 3 Penguin; 2 Ostrich
Sternum	109	92 unknown; 15 Penguin; 2 medium bird
Tibio-tarsus	11	7 medium bird; 4 Penguin
Carpo-metacarpus	2	Penguin
TOTAL	4677	

Table 37: Elements with species breakdown, Skinner Collection

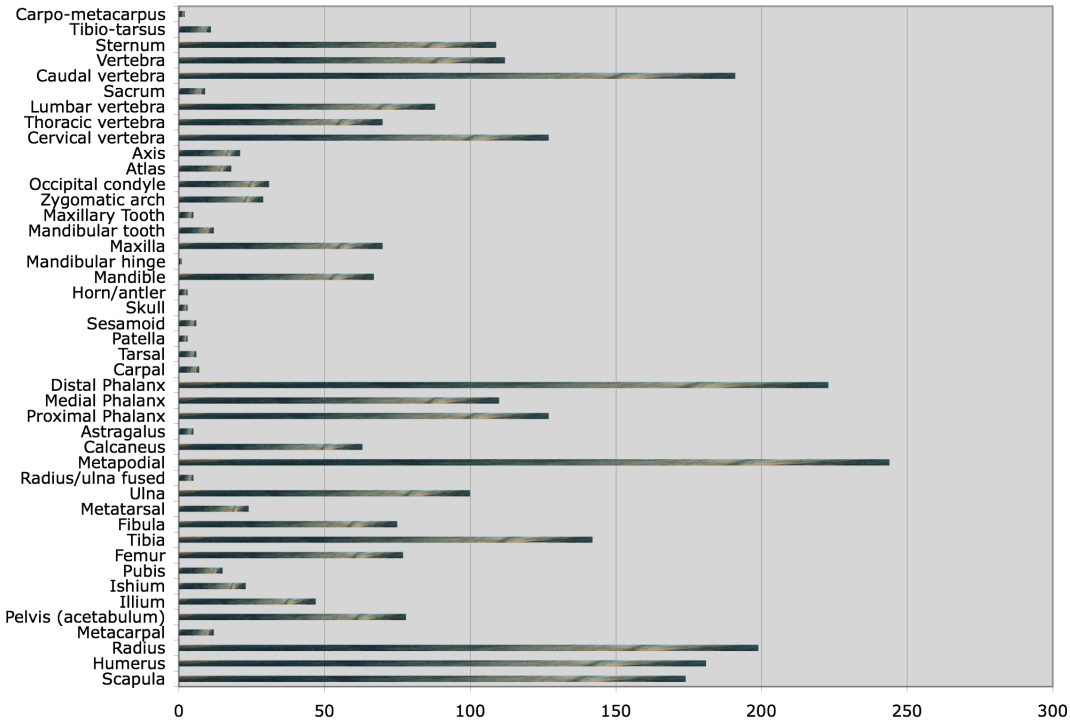

Chart 68: Elements, Skinner Collection

Fragmentation data were recorded from 1,517 specimens ranging in length from <1.0-28 cm. Complete bones made up 56.1% of the measured assemblage. Shaft splinter followed with 15.3%, then one end plus shaft (14.4%), one end only (2.2%), both ends present, missing some shaft (1.3%), end and shaft splinter (0.7%) and end splinter (0.3%) (See Chart 69).

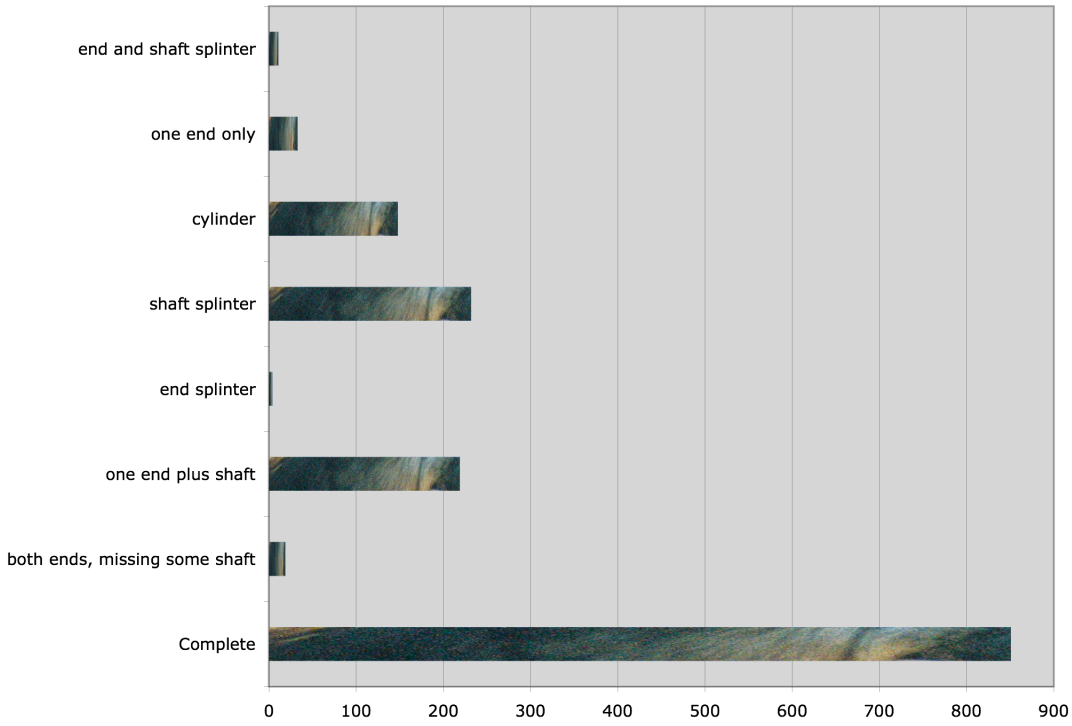

Chart 69: Fragmentation, Skinner Collection

Weathering information was not documented as it was unknown which specimens were collected from interior of dens or aprons.

Carnivore inflicted damage was recorded on 43.2% of the assemblage. Crenulated edges were the most common type of damage recorded, occurring on 82.8% of all the damaged specimens. Punctates were found on 3.9% of the remains, striations 0.4% and there were no examples of scouring or acid etching. The combinations of punctate and crenulated edges was documented on 9.7% of remains, crenulated edges and

striations on 1.5%, punctuates, crenulated edges and striations on 0.7% and punctuates and striations on 0.3% (See Chart 70).

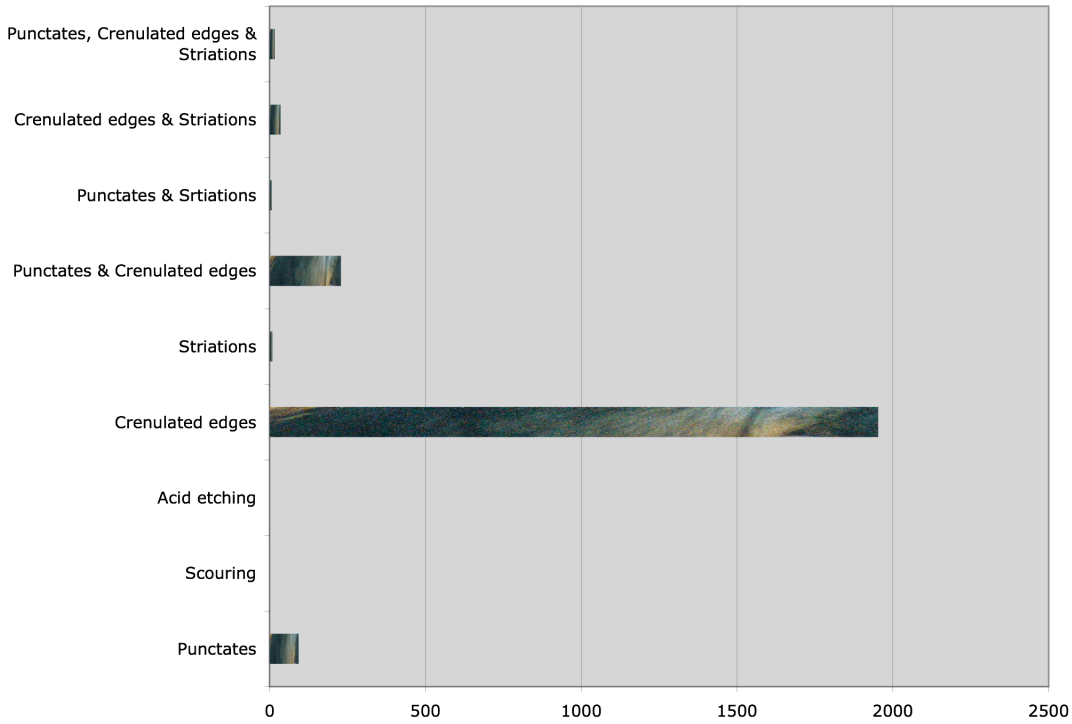

Chart 70: Carnivore Damage, Skinner Collection

Gladysvale

Only 17 specimens were collected and logged from the dens near the Gladysvale palaeontology site. Of these 16 were identified to species (94.1%) and all 17 identified to skeletal element (See Tables 38 & 39). All fusion data indicated adult animals.

SPECIES	NISP	MNI
Bovid size II	3	1 (right humerus)
Canis mesomelas	4	2 (1 complete maxilla, 1 right maxilla)
Connochaetes taurinus	2	1 (right tibia)
Damaliscus dorcas phillipsi	3	1 (left radius)
Redunca fulvorufula	1	1 (left mandible)
Taurotragus oryx	1	1 (right calcaneus)
Tragelaphus scriptus	2	1 (right mandible)
TOTAL	16	8

Table 38: Species NISP & MNI Gladysvale

SKELETAL ELEMENT	NUMBER	SPECIES BREAKDOWN
Humerus	2	bovids size II
Radius	1	Blesbok
Pelvis (acetabulum)	1	Blesbok
Tibia	3	1 Wildebeest; 1 bovid size II; 1 unknown
Calcaneus	1	Eland
Skull	2	1 Jackal; 1 Blesbok
Mandible	4	2 Bush Buck; 1 Mountain Reed Buck; 1 Jackal
Maxilla	3	2 Jackal; 1 Wildebeest
TOTAL	17	

Table 39: Elements with species breakdown, Gladysvale

Fragmentation patterns for seven long bones, <1.0-22 cm in length, yielded 3 shaft splinter, 2 one end plus shaft, 1 complete, 1 cylinder and no examples of both ends present, missing some shaft, end splinter, one end only or end and shaft splinter (See Chart 71).

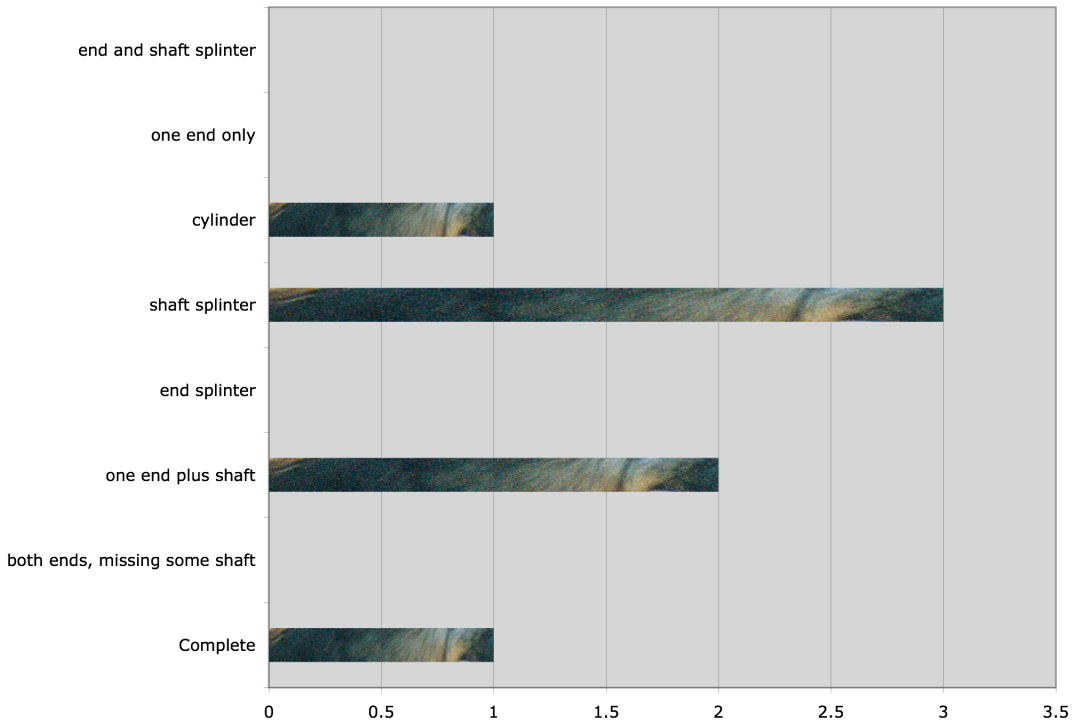

Chart 71: Fragmentation, Gladysvale

All weathering information from all 17 specimens places them in the 0-1 yr since death range.

Carnivore damage was noted on 16 of the 17 specimens. Crenulated edges made up 50% of the carnivore damage. Punctates yielded 6.3% and there were no examples of scouring, acid etching or striations. The combinations of crenulated edges and striations made up 25%, punctuates and crenulated edges 12.5% and punctates, crenulated edges and striations 6.3% (See Chart 72). Appendix R gives a complete breakdown of damage by element and location upon said elements.

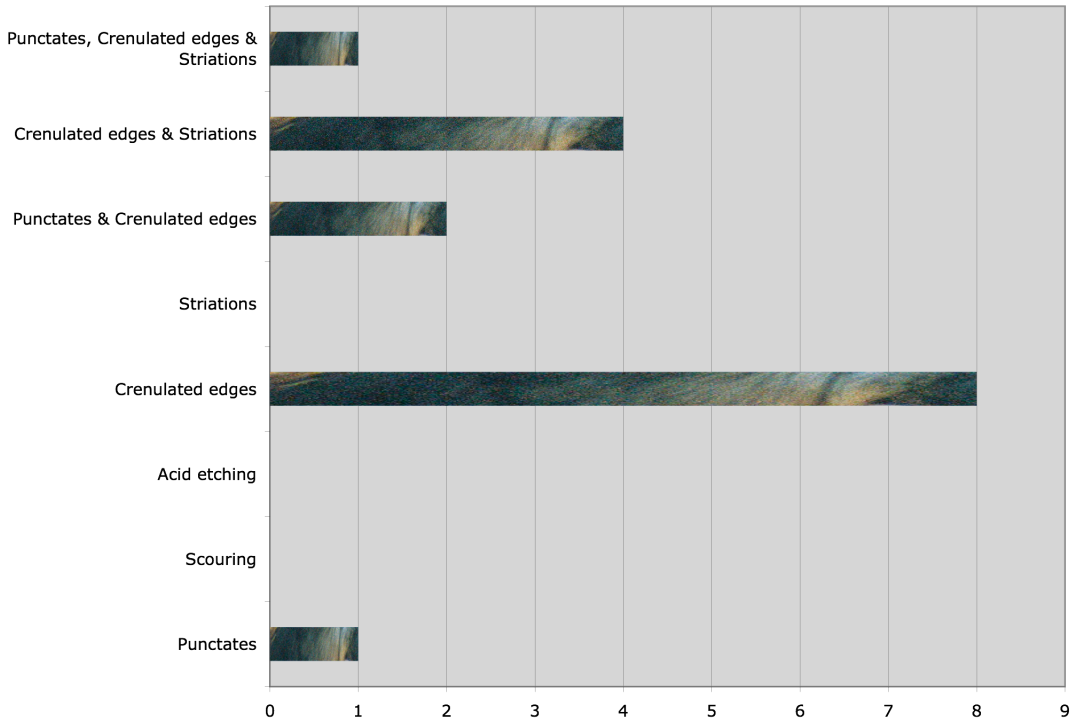

Chart 72: Carnivore Damage, Gladysvale

CHAPTER 6

Discussion

Hyaena hyaena assemblages

Jordan

The faunal remains from five striped hyaena dens in Jordan were collected and analysed in May and June of 2001 (Kuhn, 2001, 2005, unpublished). Three areas in the eastern desert known as the Badia were surveyed, one near the bronze age city of Jawa, one near Al-Arteen, and the third at Dhahik, near the Saudi Arabian border. Jawa and Al-Arteen are in the core of the black basalt desert and lay approximately 20 km from one another. Dhahik, some 90 km to the south of Al-Arteen, is outside of the basalt desert and is part of the limestone desert that covers most of Jordan and extends into Saudi Arabia (Figure 7).

The Badia region receives approximately 200 mm of rainfall per annum (Allison *et. al.*, 1998) and is made up of a series of wadis (valleys) and depressions. Jawa and Al-Arteen are both wadi systems while Dhahik is a large depression where the surrounding wadis deposit any rainfall. Outside of the wadis and depressions there is little to no vegetation, thus most wildlife in the region can be found near the numerous wadis and depressions. In the past the region had a plethora of wildlife roaming free, while today the native onager (*Equus onager hemippus*) is extinct and the Arabian Oryx (*Oryx leucoryx*) and ostrich (*Struthio camelus*) are limited to the Shaumari Reserve. While the majority of larger game species are either extinct or have been reintroduced onto nature reserves there are still a number of wild species in

the region, aside from a great number of smaller mammals, birds and reptiles. These include rheem gazelles (*Gazella subguttursa marica*), dorcas gazelles (*Gazella dorcas*), golden jackals (*Canis aureus*), Arabian wolves (*Canis lupus arabs*) and striped hyaenas (*Hyaena hyaena syriaca*).

Figure 11: Map of Jordan showing the study areas

Of five dens analysed, 24.5% of 3,755 remains were identified to species (See Table 40) and 41.2% identified to skeletal element (See Chart 73). The dens were individually broken down to Jawa 4, Jawa 7, Al-Arteen 11, Al-Arteen 13 and Dhahik 32. With the exception of Dhahik 32 all of the dens were natural caves (see Plates 28 & 29). The assemblages of each were analysed for species, skeletal element, fusion

data, carnivore damage and weathering. The percentage of remains identifiable to species or class size for the five dens ranged between 13.5% and 38.3%.

SPECIES/DEN	Al-Arteen 11	Al-Arteen 13	Dhahik 32	Jawa 4	Jawa 7	Total NISP
Camelus dromedarius	16	12	185	125	11	349
Camel/horse size	1	2	33	26	0	62
equid	4	0	8	14	0	26
Equus caballus	1	1	4	22	0	28
Bos spp.	1	0	0	2	0	3
canid (jackal size)	19	7	26	40	0	92
Equus asinus	19	6	20	53	0	98
Fox	4	0	4	1	0	9
Hyaena hyaena	0	0	0	1	0	1
Sus scrofa	3	0	0	0	0	3
Capra hircus	11	0	3	17	3	34
Ovis/Capra	18	9	15	72	2	116
sheep/goat/gazelle size	15	4	6	42	0	67
Ovis aries	4	0	4	3	0	11
Gazelle	2	0	1	13	0	16
Erinaceus spp.	0	0	0	6	0	6
hare/small fox size	0	0	0	2	0	2
Lepus spp.	3	0	0	2	0	5
Small mammal	2	0	0	42	0	44
Struthio camelus	0	0	1	0	0	1
large bird	0	0	1	1	0	2
small bird	1	0	0	13	0	14
small reptile	0	0	0	3	0	3
Total	124	41	311	500	16	992

Table 40: Species NISP per Den, Jordan

Carnivore activity documented for the Jordan dens was limited to punctates, scouring, acid etching and crenulated edges and any combinations thereof. Striations were not noted individually during the Jordanian fieldwork and therefore are not discussed when looking at the striped hyaena dens or comparing striped hyaenas to the other hyaena species in this study.

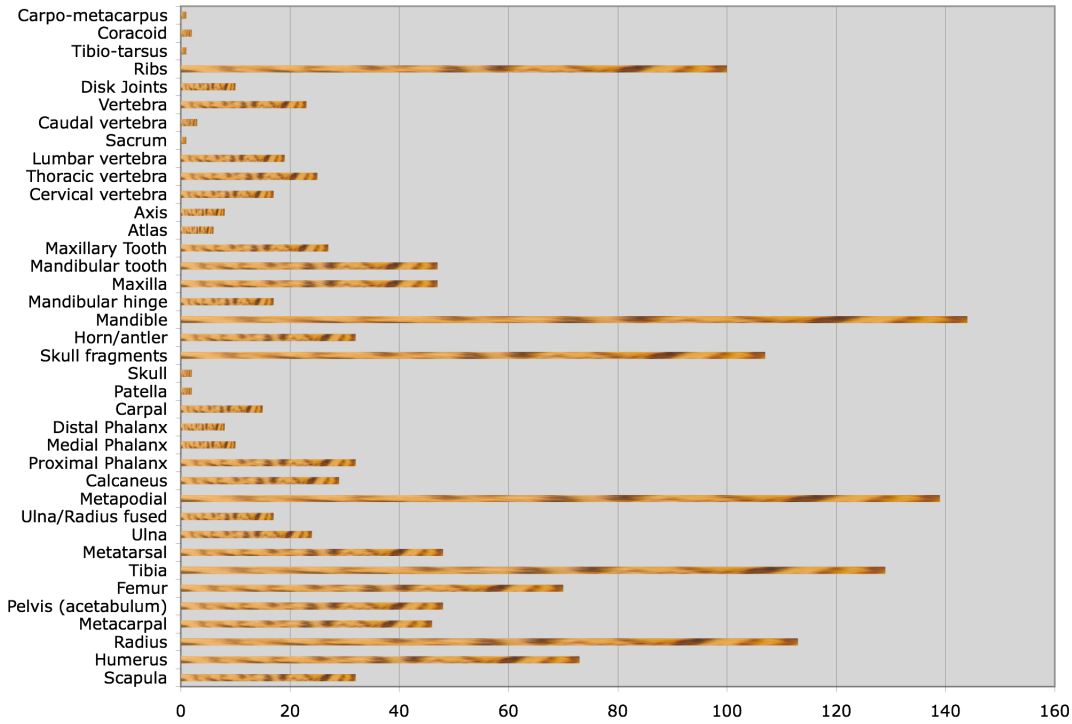

Chart 73: Elements, Striped Hyaena Dens

Jawa den 4 consisted of 1,791 specimens, of which 27.9% were identified to species and had an MNI of 62. Of the 62 individuals, carnivores (hyaena, fox and dog) contributed 29%, the remainder were camel, equid, bovid, avian, reptile and small mammal. Fragment length ranged from <1.0-54 cm, with shaft splinters being the predominant pattern recorded at 74.4% (See Chart 74) followed by one end plus shaft at 9.5%. Carnivore damage was found on 56.2% of the entire assemblage with crenulated edges and punctates being the most prevalent type of damage recorded (See Chart 75). All long bones and small compact bones were represented in the assemblage. Proximal and distal ends of long bones were equally represented with the exception of humerus, which were predominantly distal ends.

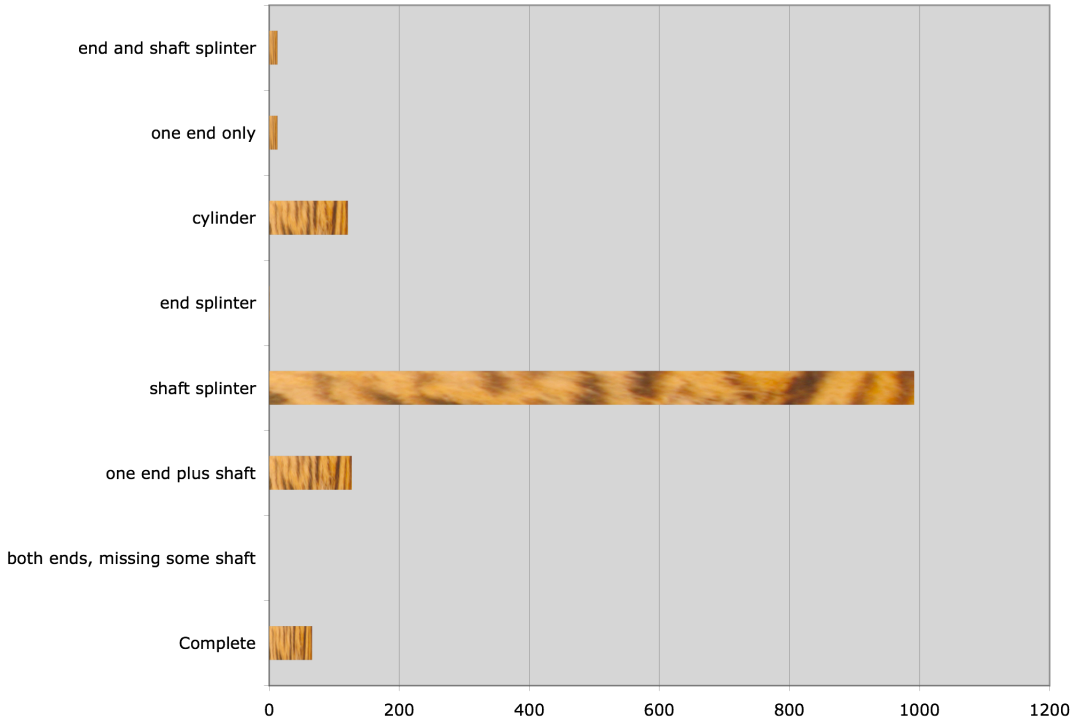

Chart 74: Fragmentation, Jawa Den 4

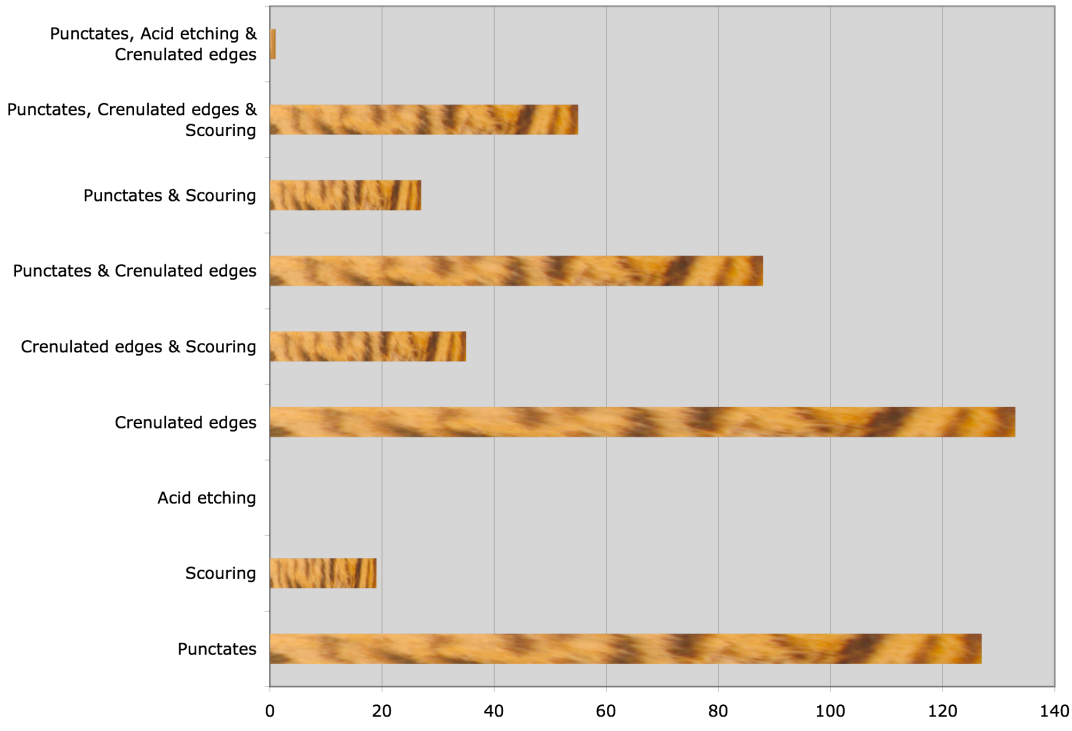

Chart 75: Canivore Damage, Jawa Den 4

Jawa Den 7 consisted of 119 remains, of which 13.5% were identified to species. With an MNI of 4, all of the identified individuals were 'prey' species and carnivore remains were absent from the assemblage. Length of measured fragments ranged from 1.0-45 cm and shaft splinter was the most abundant type of fragmentation pattern recorded (See Chart 76). Carnivore gnawing was noted on 23.5% of the examined remains; specifically of note is the absence of scouring except in combination with punctates and crenulated edges. Absent from the assemblage were scapula, radius, pelvis, and femur; small bones were represented by a single calcaneus and single proximal phalange.

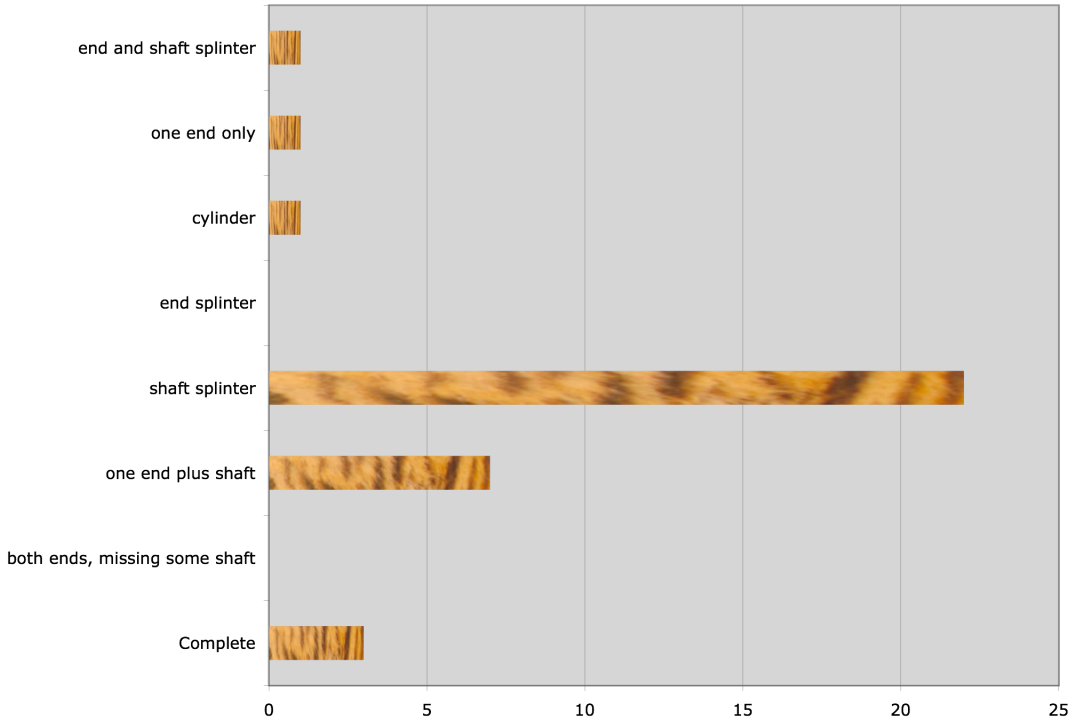

Chart 76: Fragmentation, Jawa Den 7

Al-Arteen Den 13 had 107 specimens in the assemblage, of which 38.6% were identified to species. Of the MNI of 7, 28.6% were carnivore and the remainder were

from 'prey' species (horse, camel, donkey and sheep/goat). Fragment length ranged from 2-38 cm, with shaft splinter being the most recorded type of fragmentation (See Chart 77). Carnivore gnawing was found on 39.3% of the assemblage and crenulated edges made up 33.3% of the recorded damage. Punctates constituted 9.5%, scouring 4.8% and there were no examples of acid etching recorded. The combinations of punctates and crenulated edges as well as punctates, crenulated edges and scouring made up 7.1% of the damaged assemblage respectively. Femur was absent from the assemblage as were all small bones except for a single calcaneus. Other long bones were equally represented both proximally and distally except humerus, which were mostly represented by distal ends.

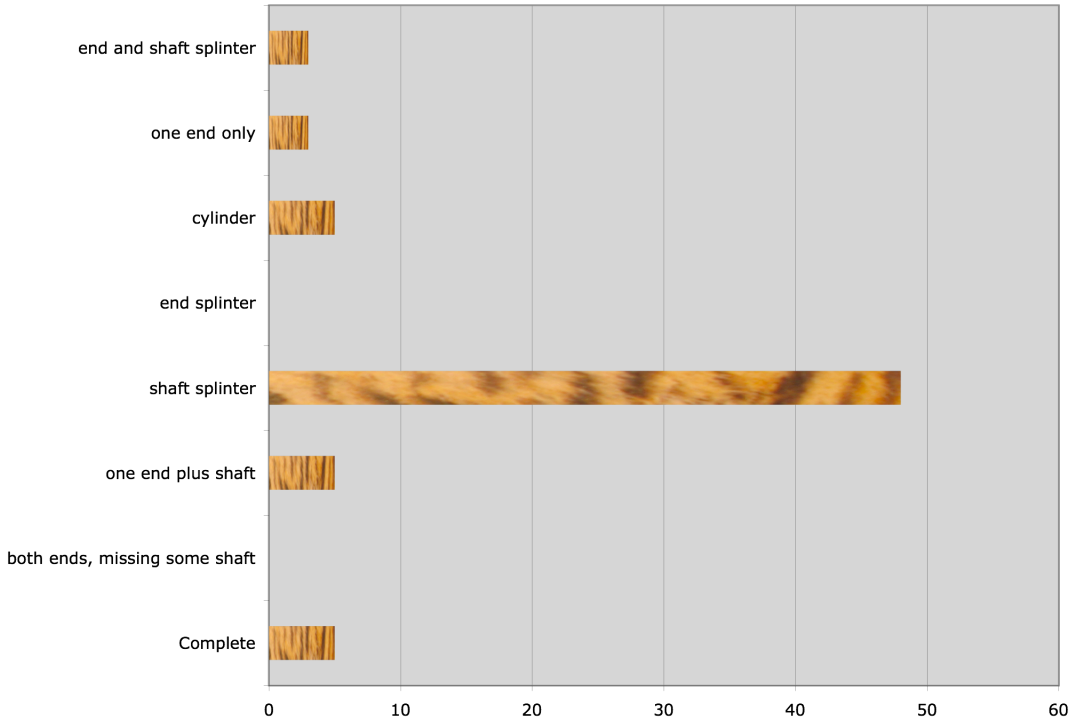

Chart 77: Fragmentation, Al-Arteen Den 13

The den at Al-Arteen 11 consisted of 361 faunal remains, 34.4% of which were identified to species. The den yielded an MNI of 26, of which 26.9% were carnivores

including striped hyaena, fox, and canids. The remaining species consisted of sheep/goat, camel, small mammals, cow (*Bos spp*.), pig *(Sus scrofa*) and gazelle. Length of fragments ranged from 2.0-33 cm and shaft splinter was the predominant type of fragmentation recorded (See Chart 78). Carnivore damage was noted on 41.6% of the assemblage, breakdown of damage is shown on Chart 79. All long bones are present in the assemblage as are the small compact bones. All of the humerus were distal ends; the remaining long bones were represented equally between proximal and distal ends and complete bones.

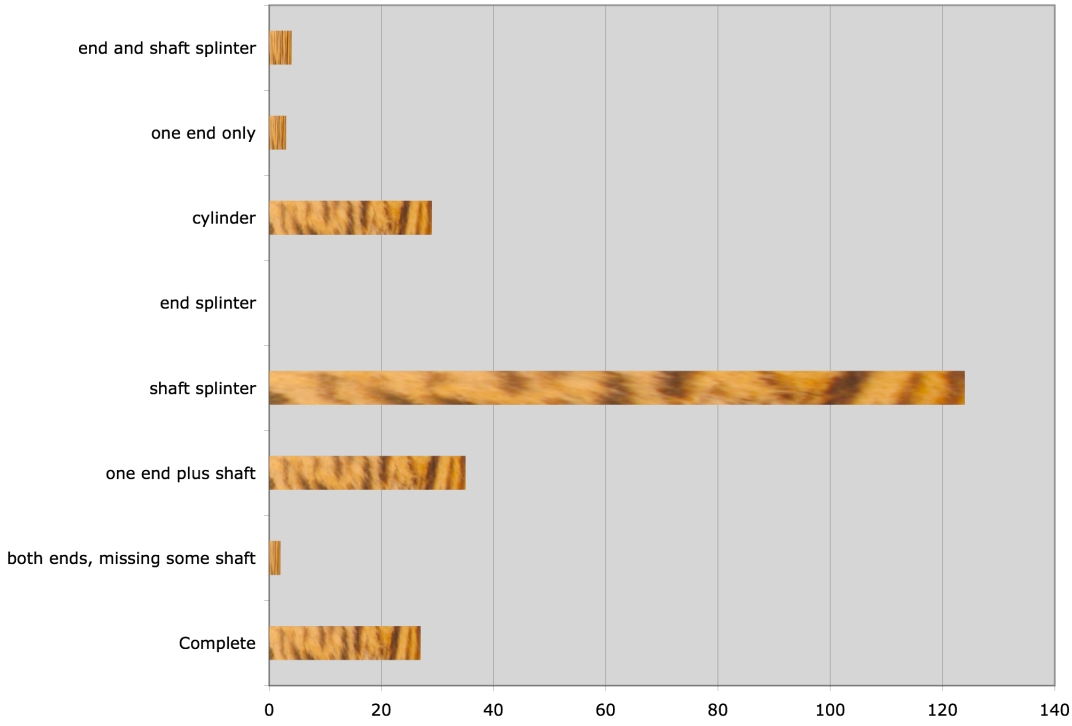

Chart 78: Fragmentation, Al-Arteen Den 13

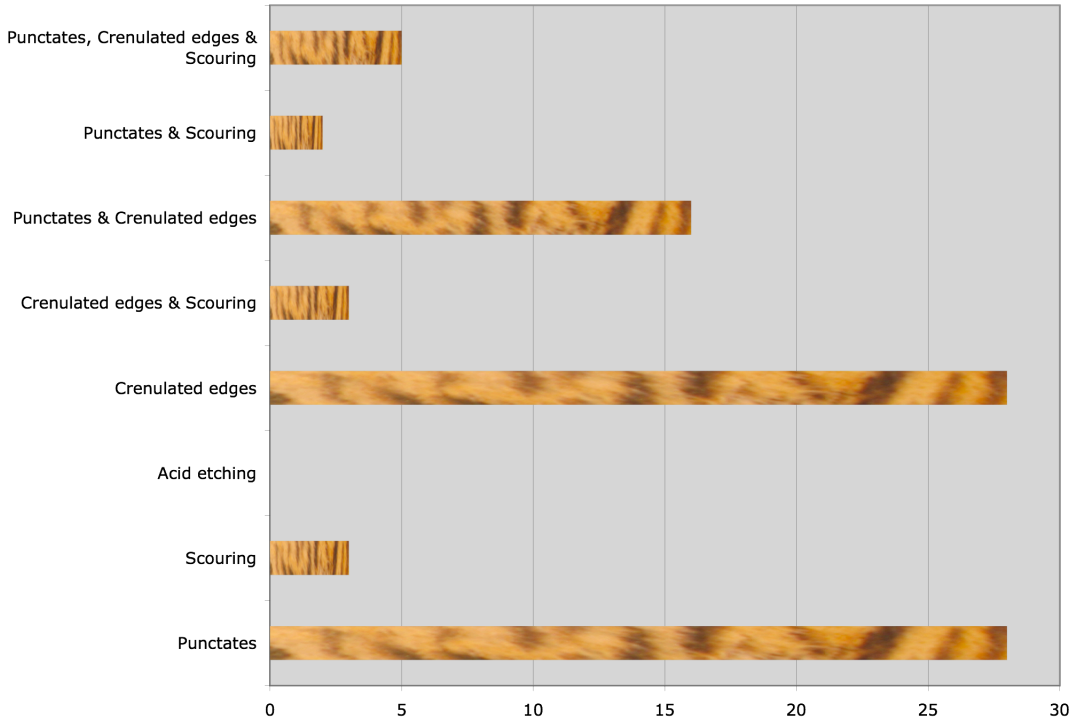

Chart 79: Carnivore Damage, Al-Arteen Den 13

The Dhahik den, Dhahik Den 32, consisted of 1,377 faunal remains, of which 22.5% were identified to species. The den yielded an MNI of 36, of which 19.4% were carnivore (canine and fox) while the remaining individuals were camel, sheep/goat and a single horse. Fragments ranged in length from 2.0-51 cm and shaft splinters predominated the recorded types of documented fragmentation patterns (See Chart 80). Carnivore damage was documented on only 6% of the entire assemblage, with 28 examples of crenulated edges, 20 punctates, no scouring or acid etching a single example of the combination punctates and crenulated edges and two examples of scouring and crenulated edges. Of note is the fact that nearly 80% of the assemblage was weathered heavily, suggesting a range since death of 4-15 yrs. All long bones and small compact bones were represented in the assemblage, with humerus being made up of distal ends and ulnas consisting of only proximal ends.

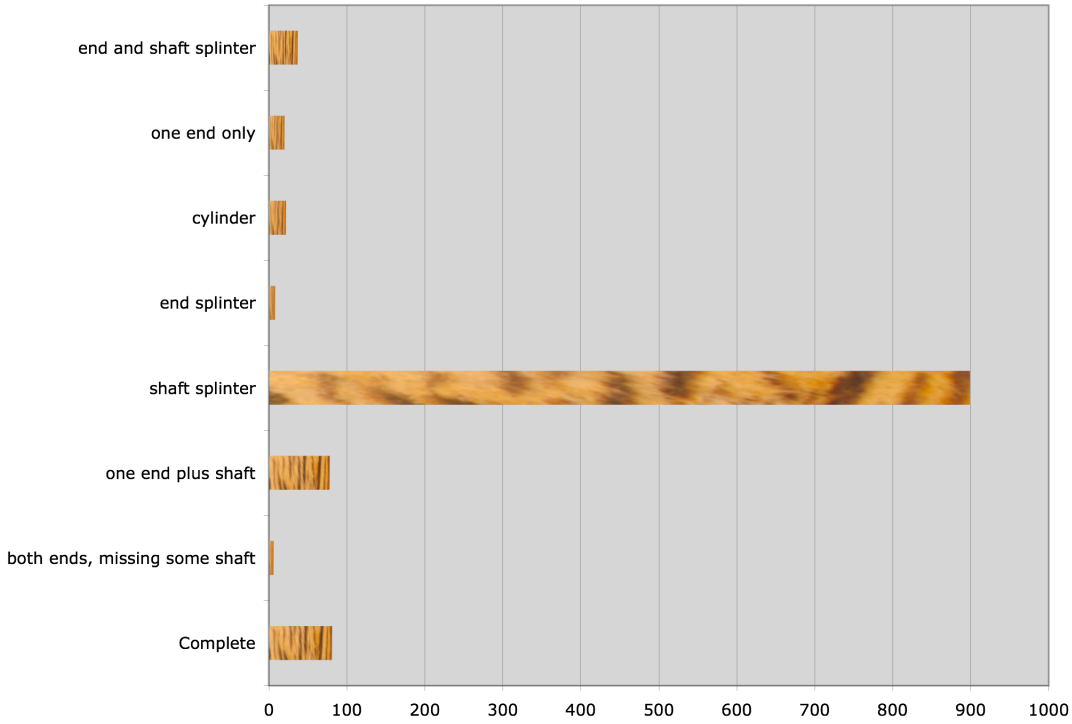

Chart 80: Fragmentation, Dhahik Den 32

Brief summation

The size of the assemblages from striped hyaenas ranged from 107-1,791 specimens. While the size range is similar to that of striped hyaena dens studied by Leakey *et. al.* (1999) it is larger than previous work by Skinner *et. al.* (1980) and smaller than a den excavated by Kerbis-Peterhaus & Horwitz (1992) in Israel. With the exception of the smaller assemblages of Jawa Den 7 and Al-Arteen 13 all major skeletal elements are represented in the assemblages. Elements from the skull and shaft fragments from long bones are the most abundant type of skeletal element identified in the assemblages. With the exception of Jawa Den 7 all the humerus remains examined were mostly from the distal end. This is seen with 2/3 of the humerus from Jawa Den 4, all humerus recovered from Al-Arteen Den 11 and Den 13 and 3/4 of the humerus from Dhahik Den 32. Small compact bones were represented in some form in all five

dens. Of the 2,983 fragments measured to length (for all five dens) 37.1% are shorter than 5 cm and 8.7% are longer than 20cm, thus just over half of the measured remains are between 5 and 20 cm. The assemblages represent the fauna occurring in the region as well as a relative abundance of mammalian fauna within the region. This was also the case with striped hyaena dens in Kenya (Leakey *et. al.*, 1999) and Israel (Kerbis-Peterhans & Horwitz, 1992). When broken down by carnivore MNI per den, Jawa Den 4 had a carnivore MNI of 29%, Jawa Den 7 0%, Al-Arteen Den 11 26.9%, Al-Arteen Den 13 28.6% and Dhahik Den 32 19.4% (mean of 20.1% carnivore). Fragmentation patterns for the five Jordan dens showed a ratio of 3-1 or greater of shaft splinter to other types of fragmentation. Carnivore damage was noted on a range of 6% to 56.2% of the examined remains (a mean of 33.3%). Of the documented damage punctates and crenulated edges were equally distributed in four of the five dens, the lone den (Al-Arteen 13) having a greater number of crenulated edges (33.3% compared to 9.5% punctates). The combination of punctates and crenulated edges was documented in all five dens, but was not in any greater abundance than other recorded combinations of damage.

Crocuta crocuta assemblages

Mashatu

The assemblage from Mashatu Den 1 was identified to species at the 64.5% level and to skeletal element at 74.3% (25.7% unidentifiable). All major skeletal elements are present, including all long bones as well as the small compact bones such as carpals, tarsal, and all phalanges. Ribs and skull fragments made up the bulk of the identified elements. Proximal and distal ends are equally represented in all of the long bones,

with no significant difference in numbers for proximal, distal or complete portions. Length of fragments ranged up to 44 cm and complete bones was the most common type of fragmentation pattern recorded (37.3%) followed by shaft splinter (30.7%). Carnivore damage was recorded from 32.2% of the entire assemblage. Crenulated edges were the most common type of carnivore damage documented (46.4%) and the combination of punctates and crenulated edges were the most common type of multiple damage recorded (26.1%). Of note is the complete lack of carnivore remains from this assemblage, all identified remains belong to bovids, small mammals, and reptiles.

Of the 58 faunal remains from Mashatu Den 2, 65.5% were identified to the species or class size and 67.2% were identified to skeletal element. Thus, 32.8% of the collected materials were unidentifiable. The only significant element absent from the assemblage is scapula; all other major skeletal elements are present. This includes six humerus and five femurs, plus many small compact bones such as the distal, medial and proximal phalanges. Three of the six humerus were distal ends, while the other three were mid-shaft segments. Three of the five femurs were proximal ends; one was a distal end and one a mid-shaft segment. Complete, distal and proximal ends of metapodials are equally represented. Fragment length was measured between 2-36 cm with one end and shaft being 27.8% of the recorded fragmentation patterns. Complete, cylinder and end and shaft fragment types were 22.2% of the assemblage. Carnivore damage was found on 53.5% of the entire assemblage, of which crenulated edges made up 87.1% and punctates 29%. The combinations of punctates and crenulated edges made up 19.4% and crenulated edges and striations 6.5%. Of the

MNI (11), bovids made up 54.6%, hyrax 9.1%, baboons 9.1%, spotted hyaenas 9.1% and equids 9.1%.

Mashatu Den 3 consisted of 93 specimens, of which 59.1% were identified to species and 72% identified to element. Thus 28% of all remains were unidentifiable. Ulna is the only long bone absent from the assemblage, all other major skeletal elements are represented, including the small compact bones such as phalanges and carpals. Of the six humerus, two are distal ends, three are shaft splinters and one is a complete bone. There are no examples of proximal end only in the assemblage. Metapodials are equally represented by proximal, distal, complete and shaft splinters. Fragments measured 3-35 cm in length, with shaft splinters being the most recorded type of fragmentation with 58.2% of fragment data. Carnivore damage was identified on 42% of the entire assemblage. Of this, 51.3% of the documented damage was crenulated edges. Scouring was found on 28.2% and punctates on 20.5% of the gnawed assemblage. The combinations of punctates and crenulated edges were recorded from 23.1% of the damaged assemblage, punctates and striations as well as punctates and scouring occurred on 2.5% of the assemblage respectively. Of note is the absence of any carnivore remains in the assemblage. Of an MNI of 14, two were hyrax, two baboons, and one elephant; the remaining fauna belong to bovids and equids.

Mashatu Den 4 consisted of 611 specimens, of which 51.1% were identified to species and 67.8% to skeletal element. Thus 32.2% of the assemblage was unidentifiable. All long bones were present as well as many small dense bones such as calcaneus, astragalus, and phalanges. Of the long bones humerus was most abundant, and 53.4% of humerus were distal ends, as oppose to 7.1% being proximal ends. All

other long bones were equally distributed between distal and proximal ends. Measured remains ranged from less than 1.0-46 cm, the bulk of fragments consisting of shaft splinters (38%). Complete bones made up 26.2% and one end plus shaft constituted 21% of the fragment types recorded. Carnivore gnawing was recorded on 39.1% of the entire assemblage, of this 58.6% were crenulated edges. Punctates made up 16% while the combination of punctates and crenulated edges was documented on 25% of the gnawed assemblage. Of the 44 minimum species identified, with the exception of one leopard, one porcupine, 3 baboons and 4 hyraxes, all were bird, bovid or equid.

Gobabeb

Gobabeb Den NN-1 was previously collected and published by Henschel *et. al.* in 1979. In total 296 bone and bone fragments were collected from the outside of the den. Identified in the remains were a minimum of seven gemsbok, one equid, one steenbok or klipspringer, four domestic goats and one ostrich. Of the total identified remains (numbers not published) 74.6% were from gemsbok, 13.4% from steenbok or klipspringer, 8.9% from domestic goat, 1.5% from equid and 1.5% from ostrich. Damage noted by Henschel includes 'a splintering of bones by adults with their powerful premolars and gnawing of bones by juveniles'. Fragmentation patterns were not published, nor fragment size.

The current study collected 685 specimens, from which only two species were identified. There was a minimum of one gemsbok and one goat in the assemblage, and 94.1% unidentifiable to species. Long bones and small compact bones were

identified with equal abundance, in contrast to earlier work that suggested leg and skull bones predominate the assemblage. Shaft splinter made up the bulk of fragmentation patterns at 73% and crenulated edges were documented on 79 of the specimens with only a single example of punctates. The single gemsbok left distal humerus from NN-2 had evidence of carnivore gnawing with punctates on the distal end and crenulated edges along the distal shaft. Of note is the complete absence of carnivore bones in either the earlier collection or the current study.

Brief summation

The faunal assemblages of spotted hyaena dens investigated had a range of 1-685 specimens. The size range of the assemblages in question were similar to previous research on spotted hyaena dens (Hughes, 1954, 1961: Mills & Mills, 1977; Henschel *et. al.*, 1979; Skinner *et. al.,* 1986). Looking at the Gobabeb dens and the previous research at den NN-1, one could conclude that spotted hyaena assemblages tend to consist of less than 1,000 bones or bone fragments with a high percentage of unidentifiable remains consisting of mostly shaft fragments with crenulated edges. The identified remains would be that of prey species representative of the region, be they bird (ostrich), bovid or equid and no carnivore remains. The Mashatu dens are consistent with the Gobabeb Dens in that the sizes of the assemblages are less than 1,000 remains, and for the most part consist of prey species within the region. Exceptions are the single leopard skull from Mashatu Den 4 (carnivore MNI 2.3%) and the two spotted hyaena bones from Mashatu Den 2 (carnivore MNI 9.1%). Sutcliffe (1970) stated that bone assemblages of spotted hyaena should consist of distal humerus, proximal radius and ulna, complete metapodials, teeth, complete horns, and upper parts of skulls. The previous collection of Gobabeb NN-1 by

Henschel *et. al.* (1979) is in complete agreement with the stated premise. While in this study Mashatu Den 4 does show a predilection for more distal humerus than proximal, none of the other dens have an over abundance of distal humerus. As for the proximal radius and ulna, none of the Mashatu dens have an excess of either, nor do the dens consist of an over abundance of complete metapodials. Of the 976 remains collected from Mashatu, 742 were measured to length. Of these 33% were 5 cm or less while 14.8% were 20 cm or greater. When the specimens measured from Gobabeb are included the number changes to 57.7% at 5 cm or shorter and 9.1% that are 20 cm or longer. Shaft splinters were the most common type of fragmentation on three of the six dens, while one end plus shaft was predominant on two of the dens and complete bones on one of the dens. Carnivore damage was found on a range of 21-100% of the remains per den, the 100% coming from Gobabeb Den NN-2 that consisted of a single gemsbok humerus with both punctates and crenulated edges. The mean of the remaining five dens with carnivore gnawing was 37.6% (ranged from 21-53.5%). Crenulated edges were the most common type of damage recorded from all four Mashatu dens and Gobabeb Den NN-1.

Parahyaena brunnea assemblages

Rietvlei

Rietvlei Den R01 yielded 27 specimens, of which 74.1% were identified to species and 81.5% to skeletal element, leaving 18.5% unidentifiable. Humerus is absent from the assemblage as are any small bones such as carpals or phalanges. Of the long bones present, both proximal and distal ends are equally represented in the assemblage. Fragments ranged in length from 4-47 cm with shaft splinters constituting 36.4% of

all fragmentation patterns. Complete bones were the next most abundant type of fragmentation with 32%. Carnivore damage was documented on 88.9% of the assemblage. Of this crenulated edges were found on 46% of the damaged remains. Three combinations of damage were noted in the assemblage. Punctates and crenulated edges were found on 21% of the damaged specimens, crenulated edges and striations yielded 12.5% and punctates, crenulated edges and striations were documented on 8.3% of the gnawed material. Of the minimum number of individuals comprising this assemblage, all but a single brown hyaena bone were either equid or bovid.

Of the 12 specimens logged from Rietvlei Den R02 16.7% were unidentifiable, with 83.3% being identified to both species and skeletal element. There were no small bones such as phalanges in the assemblage, also absent were tibia, femur and ulna. The two humerus were medial fragments and the lone radius was a distal end. Length of fragments ranged from 4-35cm with complete bones comprising 55.6% of the assemblage and shaft splinters 22.2%. Carnivore damage was noted on 92% of the assemblage with crenulated edges making up 55% of this. Three combinations of damage types were also documented, these include punctates and crenulated edges (18%), crenulated edges and striations (9%) and punctates and striations (9%). Of an MNI of six, all but one are bovid or equid, the lone exception being from a jackal.

All seven specimens from Rietvlei Den R03 were identified to both species and skeletal element. There were no examples of small bones in the assemblage, also absent were ulna, femur and scapula. Long bones were represented by a complete radius, distal humerus, distal metacarpal and proximal tibia. Fragments ranged in

length from 14-26 cm, of which 50% were one end plus shaft, 25% were complete and 25% were shaft splinters. All specimens had evidence of carnivore damage, 28.6% of the damaged remains were crenulated edges and 14.2% were punctates. The combination of punctates and crenulated edges was documented on 57% of the assemblage. All identified remains (MNI of 7) were bovids.

Brown Hyaena Project Namibia

Den D-P 1 yielded 241 specimens of which 31.1% were identified to species and 89.2% to skeletal element. Thus 10.8% of the examined remains were unidentifiable. All long bones were present in the assemblage as were numerous small compact bones such as astragalus, calcaneus, carpals and phalanges. Proximal and distal ends as well as complete bones and medial shafts equally represented all long bones except humerus. There were no examples of distal humerus, a single complete bone and four proximal ends. Fragment size ranged from <1.0-17 cm and complete bones comprised 30% of the recorded fragmentation patterns and shaft splinters made up 25.6%. Carnivore damage was noted on 31.5% of the entire assemblage, of these 66.7% had crenulated edges. The combinations of punctates and crenulated edges were recorded on 20% of the damaged assemblage, crenulated edges and striations were found on 2.7% and punctates, crenulated edges and striations were found on 1.3% of the damaged remains. Of the 13 minimum number of individuals identified, only three were bovid, three were seals and six were other carnivores.

Den D-P 2 consisted of 256 specimens of which 26.2% were identified to species and 74.2% were identified to skeletal element, leaving 25.8% unidentified. All long bones are represented in the assemblage as well as small compact bones such as calcaneus,

carpals, proximal phalanges and medial phalanges. Proximal and distal ends of long bones were equally represented in the assemblage. Length of fragments ranged from <1.0-15 cm and shaft splinters made up 54.7% of the fragmentation patterns recorded. Complete bones comprised 18% of the recorded fragmentation types. Carnivore damage was documented on 39.5% of the entire assemblage, of these 68.3% had crenulated edges. The combinations of punctates and crenulated edges were noted on 14.8% of the damaged assemblage, crenulated edges and striation on 4.9% and punctates, crenulated edges and striations on 3.9%. Of the seven minimum identified individuals, two were bovid, two seal, one bird and two were other carnivores.

Den D-P 4 consisted of 1,865 specimens, of which 20.7% were identified to species and 81.2% to skeletal element. Thus 18.8% of the assemblage was unidentifiable. All long bones are represented in the assemblage as well as small bones such as proximal, medial and distal phalanges, calcaneus and tarsals. Complete, proximal and distal ends of all long bones were equally represented in the assemblage. Lengths of fragments ranged from <1.0-23 cm with shaft splinters comprising 50.2% of the recorded fragmentation patterns. Complete bones made up 23.6% of the fragmentation types. Carnivore damage was documented on 26% of the entire assemblage, of which 73.6% had crenulated edges. Combinations of punctates and crenulated edges occurred on 14% of the damaged remains, crenulated edges and striations on 2.9% and punctates, crenulated edges and striations on 0.8% of the carnivore gnawed remains. Of the MNI identified (47) 13 are seals, four are avian, 20 are from other carnivores and ten are bovid.

Yielding a total of 5,935 specimens, den D-P 9 was the largest assemblage analysed during this study. Of the total remains examined 40% were identified to species and 94.6% were identified to skeletal element, leaving 5.4% unidentifiable. All major elements of the skeleton were represented, including all long bones and small compact bones. Both proximal and distal ends of all long bones were equally represented in the assemblage. Fragment lengths ranged from <1.0-36 cm with complete bones comprising 41.5% of the fragment types and one end plus shaft making 24.6%. Carnivore damage was documented on 22.1% of the entire assemblage and of this crenulated edges made up 67.4% of the documented damage. The combinations of punctates and crenulated edges were found on 18.7% of the damaged remains, crenulated edges and striations were on 3.4% and punctates, crenulated edges and striations were documented on 0.8% of the carnivore gnawed remains. Bovids, birds and hare combined to make up 24 of the MNI of 133. There were 66 seals, 41 other carnivores, one fish and a single cetacean also identified.

Den D-P 11 consisted of 117 faunal remains, of which 24.8% were identified to species and 80% to skeletal element. Leaving 20% of the examined remains unidentifiable. All long bones are represented in the assemblage as well as smaller compact bones such as phalanges, carpals, astragalus and calcaneus. Fragments ranged in length from <1.0-13 cm and complete bones made up 43% of the measured remains while shaft splinter made up 36%. Carnivore damage was documented on 61.4% of the assemblage with crenulated edges being found on 84.3% of the gnawed remains. The combinations of punctates and crenulated edges were found on 8.6% of the damaged remains and crenulated edges and striations were documented on 1.4%

of the gnawed assemblage. No bovids were amongst the five species identified in the MNI.

Den D-P 16 consisted of 1,287 specimens, 17.9% of which were identified to species, 84.4% identified to skeletal element and 15.6% unidentifiable. All long bones were present in the assemblage as were small bones such as phalanges, carpals and astragalus. Proximal and distal ends of long bones were equally represented with the exception of radius that had a high number of proximal ends when compared to distal ends or complete bones. Length of fragments ranged from <1.0-19 cm and shaft splinter was the most common type of fragmentation with 48.7% of the recorded fragment patterns. Complete bones made up 18.1% of the recorded fragmentation types. Carnivore gnawing was found on 58.8% of the examined remains. Crenulated edges were the most common type of gnawing and were noted on 87.4% of the gnawed remains. The combinations of punctates and crenulated edges were recorded on 6.9% of the gnawed remains and crenulated edges and striations were found on 1.5%. Bovids, birds, small mammals, equids, reptile and fish comprised eight of the MNI of 26, seals contributed to six individuals and other carnivores 11 individuals.

Of the 1,811 faunal remains examined from den D-P 18 36.1% were identified to species and 86.3% to skeletal element, leaving 13.7% unidentifiable. All major skeletal elements were represented, including all long bones and small bones such as phalanges, astragalus, calcaneus and carpals. Of note is the over abundance of proximal radius in the assemblage, when compared to distal ends and complete bones. Fragment length ranged from <1.0-14 cm and complete bones made up 43.7% of the measured fragment types. Shaft splinter made up 27.8% of the fragmentation patterns

recorded. Carnivore gnawing was documented on 64.4% of the assemblage; of these crenulated edges was the most prominent type of damage being on 87.4% of the gnawed remains. The combinations of punctates and crenulated edges were noted on 7.2% of the damaged remains, crenulated edges and striation on 1.1% and punctates, crenulated edges and striation on 0.7%. Seals comprised 14 of the MNI of 36, other carnivores accounted for six individuals, birds seven, reptiles one, fish one and 'prey' species (bovid, equid, small mammal) six individuals.

Den D-SPG 1 yielded 3,252 faunal remains, 46% of which were identified to species and 97.9% were identified to skeletal element. Thus 2.1% of the examined remains were unidentifiable. All long bones and small compact bones are represented in the assemblage and there was no over abundance of proximal or distal ends for any of the long bones. Length of fragments ranged fro <1.0-32 cm with complete bones making up 57.5% of the fragment patterns and one end plus shaft comprising 21% of the fragmentation types documented. Carnivore gnawing was noted on 31.4% of the assemblage with crenulated edges noted on 83% of the gnawed remains. The combination of punctates and crenulated edges made up 11% of the damaged assemblage. There were no other combinations documented for this assemblage. Of the 79 minimum individuals making up the assemblage, 71 are seals, four are other carnivores, three are avian and one is a horse. Of note is the complete absence of bovid in this assemblage.

The Bakers Bay den, D-BB 1, consisted of 1,351 specimens, of which 37.5% were identified to species and 75.9% to skeletal element. Thus 24.1% of the examined remains were unidentifiable. All long bones and small compact bones were

represented in the assemblage and there was no over abundance of any proximal or distal ends of long bones. Fragment lengths ranged from <1.0-48 cm and shaft splinter made up 43.4% of the fragmentation patterns recorded, with complete bones making up 20.2%. Carnivore gnawing was noted on 66% of the assemblage with crenulated edges noted on 81.5% of the gnawed remains. The combinations of punctates and crenulated edges were found on 9.4%, crenulated edges and striations on 2% and punctates and striations on 0.1% of damaged remains. Seals were 29 of the MNI of 55, other carnivores were 10 individuals, avian six, small mammal one, baboon one and bovids seven.

Skinner Collection

The Skinner collection is currently housed at the Bernard Price Institute, University of Witwatersrand, Johannesburg and is a set of faunal remains collected by Skinner *et. al.* in Diamond Area No. 1 in the 80's and early 90's (Skinner & van Aarde, 1991; Skinner *et. al.,* 1998). The current collection had 5,466 faunal remains that were re-examined. Published data indicated that 14,585 remains were collected between 1982 and 1996. Of the 5,466 specimens re-examined 50.4% were identified to species and 85.6% to skeletal element, leaving 14.4% unidentifiable. All long bones and small compact bones were represented in the assemblage with no predilection for either proximal or distal ends of any of the long bones. Length of measured fragments ranged from <1.0-28 cm with complete bones making up 56.1% of the fragment types recorded and shaft splinter yielding 15.3%. Carnivore gnawing was noted on 43.2% of the complete assemblage, 82.8% of which had crenulated edges. The combinations of punctates and crenulated edges were noted on 9.7%, crenulated edges and striations

1.5% and punctates, crenulated edges and striations were noted on 0.7% of the gnawed remains. Of the total MNI of 125, 76 were seal, 16 penguins, 11 avian, 10 other carnivores, six bovid, one ostrich, one horse, one cetacean, one hare, one small mammal, one amphibian and one human. With the exceptions of equid, amphibian and human remains documented during the re-examination of the assemblage, all other species and ratios between species were the same as the previously published works.

Gladysvale

Seventeen specimens were collected from the dens sites near Gladysvale, of which 94.1% were identified to species and 100% to skeletal element. Of the long bones femur, ulna and scapula were absent in the assemblage. Of the small bones only a single calcaneus was present. Fragment length ranged from 7-22 cm and shaft splinter was the most common type of fragmentation pattern. Carnivore gnawing was noted on 94% of the remains, with crenulated edges comprising 50% of the documented damage. The combinations of crenulated edges and striations were found on 25% of the damaged remains, punctates and striations on 12.5% and punctates, crenulated edges and striation s on 6.3% of the gnawed material. All but two of the identified individuals (MNI 8) were bovid, the two exceptions being jackal.

Brief summation

The accumulations of faunal remains ranged from 7-5,935 specimens. The high number of faunal material is consistent with previous research by Skinner & van Aarde (1991) and Skinner *et. al.* (1998), while the lower number of remains is consistent with published work by Lacruz & Maude (2005). With the exception of

the very small assemblages (those with less than 27 examined specimens) all long bones were represented, as were numerous small compact bones such as carpals, phalanges, calcaneus and astragalus. Of the long bones there was no significant predominance for proximal or distal ends. When measured to length 35.7% of the remains are 5 cm or shorter and 2.7% are 20 cm or longer. In seven of the 14 examined assemblages complete bones were the most common type of fragmentation recorded. Shaft splinter was the most common fragmentation pattern in six of the 14 assemblages and in one assemblage one end plus shaft was the most common type of fragmentation documented. The percentage of assemblages that had carnivore gnawing ranged from 22.1% to 100% (a mean of 58.5%). This is similar to the range of carnivore gnawed material from brown hyaena dens in the Makgadikgadi Pans of northern Botswana (Lacruz & Maude, 2005). Crenulated edges were the predominant type of gnawing recorded for all 14 dens examined in this study. The combination of punctates and crenulated edges was the most common multi-type gnawing documented and was noted on 13 of the 14 assemblages. The assemblages were representative of the fauna found in the local regions. Of the inland dens, carnivore made up 14.8% of the total MNI (0% for Rietvlei Den 03, 16.7% for Rietvlei Dens 01 and 02 respectively and 25% for Gladysvale). With the coastal dens the fact that seal make up the majority of remains identified and that seals are the preferred food item by the hyaenas in the region (Goss, 1986; Wiesel, 2006) as well as the fact that seals are carnivores themselves gives a very high MNI for carnivores in the assemblages with a mean of 73.8% carnivore. Removing seals from the total MNI and carnivore MNI, the percentage of carnivores is 43.4%.

Comparative between the three hyaenids

Direct comparisons between species of hyaenids are few in the published record. Skinner recently (2006) published a review of hyaena bone collecting; Skinner & van Aarde published an ecological comparison of brown hyaenas and spotted hyaenas in 1981; Skinner & Ilani published an article on striped hyaenas with a comparison to brown hyaenas in 1979; and there is an unpublished manuscript by Cooper *et. al.* that compares fieldwork with spotted hyaenas to published works on both brown hyaenas and striped hyaenas. Nearly all published works to date concentrate on one species and compare findings with those of previously published studies.

Hyaena assemblages examined in this study can range from a single specimen to over 5,000 faunal remains at a single den site. Assemblages attributed to spotted hyaenas tend to have less remains associated with them, in this study less than 700 remains. Both striped hyaenas and brown hyaenas examined in this study were capable of collecting large faunal assemblages, at times well over 1,000 remains, as well as assemblages of less than 10 specimens. Thus if one locates an unknown assemblage of less than 1,000 remains in a region where hyaenids overlap, small size alone will not determine which hyaena was responsible. This is of course further complicated in the fossil record where all three extant hyaenas overlap along with other extinct hyaenids which may or may not have accumulated faunal assemblages.

All three species in this study utilised natural caves and crevasses as well as modifying the burrows of other animals for their prospective dens. Although all four Mashatu dens that were collected were natural caves, there were two other den sites

located that were modified aardvark burrows. The other spotted hyaena dens located in the Namib Desert were both natural cave sites. With the lone exception of D-SPG 4, brown hyaena dens in and around Diamond Area No. 1 were natural caves. While all the dens of brown hyaenas in the Rietvlei Nature reserve were modified aardvark burrows. In Jordan the Dhahik den was a modified burrow and the dens of the Jawa and Al-Arteen regions were natural caves.

It has been well established that spotted hyaenas are efficient hunters that feed mainly at the site of a kill and bring few faunal remains back to den sites (Kruuk, 1966; Sutcliffe, 1970; Kruuk, 1972; Bearder, 1977; Skinner *et. al*, 1986; Skinner & Chimimba, 2005; Cooper *et. al*., unpublished). In contrast, both brown hyaenas and striped hyaenas are poor hunters in general and rely upon foraging and scavenging alone, or in the case of the Namibian coast, killing of seal pups, and both species bring large quantities of faunal remains back to den sites and resting sites (Mills, 1973, 1990; Mills & Mills, 1977; Skinner, 1976; Owens & Owens, 1978; Yom-Tov & Medelssohn, 2002; Maude, 2005; Maude & Mills, 2005; Skinner & Chimimba, 2005; Wiesel, 2006; pers. obs.). While brown hyaenas have been observed foraging amongst seal colonies in large numbers (eight were observed at one time during the present study), they forage alone and, aside from the occasional greeting or attempts to steal another hyaenas kill, they work completely independently of one another (Wiesel, 2006).

As Figure 1 illustrates, both brown hyaenas and striped hyaenas are separated geographically, but both fill similar niches within their given ranges which tend to be environmentally arid where they survive primarily by scavenging. Both brown hyaena

and striped hyaenas also share a portion of their extant ranges with spotted hyaenas. Little has been documented about the interaction between striped hyaenas and spotted hyaenas, but considering how six Arabian wolves dominated four adult striped hyaenas in Israel on one occasion, while three hyaena were dominant over three wolves on another occasion (Skinner & Ilani, 1979) is suggestive that spotted hyaenas would be the dominant species whenever the two meet at a carcass. Similarly in regions where spotted hyaenas and brown hyaenas overlap, due to the behavioural differences and size differences it is certain that brown hyaenas would be dominated by the larger and more social spotted hyaenas (Skinner & van Aarde, 1981). For example, in the Kruger National Park, spotted hyaenas through competitive exclusion have exterminated brown hyaenas; on the other hand, both species co-exist in the Kgalagadi Transfrontier Park because only a small number of spotted hyaena clans survive in such rigorous climatic conditions (Skinner, J.D., unpublished).

The species represented in the faunal assemblages will naturally vary according to the fauna that inhabit the various regions. Thus, in the case of the striped hyaena, which has the largest range by far (Kruuk, 1976), it would be expected to have very different bone assemblages if one compared dens in the Middle East to those of dens on the Indian sub-continent or Africa. But it is reasonable to hypothesize that the taphonomic signatures left by *Hyaena* in the deserts of Jordan should be similar to those left by the same species in India or Africa and may be related to fossil assemblages associated with *Hyaena* (*makapani*) remains in southern Africa. Additionally, the fact that all three extant hyaena species have latrine areas that are regularly used, both inside and outside of dens, where large quantities of coprolites are deposited is a positive indicator for the presence of hyaenas (Skinner, 1976; Owens & Owens, 1979;

pers. obs.). This factor has been routinely ignored in the archaeological literature with the noted exceptions of Klein (1986), Klein *et. al.* (1999) and more recently Berger (unpublished).

Examining the patterns of fragmentation for the species the Skinner collection and the assemblage from Gobabeb NN-1 were not included due to the assemblages being collected previously and the researcher not knowing for sure what, if any, faunal remains were not collected. As Chart 81 illustrates, shaft splinters predominate the collections of striped hyaenas, while in collections by spotted hyaenas and brown hyaenas shaft splinters are a major type of fragmentation but do not dominate the assemblage. In this study the assemblages of spotted hyaenas and brown hyaenas are actually quite similar in fragmentation patterns. The noted exception being that there are more complete bones in brown hyaena assemblages and less shaft splinters when compared to assemblages of spotted hyaenas. Both the spotted hyaena and brown hyaena assemblages have a similar number of one end plus shaft, which is double the amount found in the assemblages of striped hyaenas. All three species have similar numbers of both ends present, some shaft missing. A very small number of end splinters were found in the assemblages of spotted hyaenas and striped hyaenas, while there were more end and shaft splinters found amongst the assemblages of spotted hyaenas. End and shaft splinters were equally represented between brown hyaenas and striped hyaenas. One end only was equally represented in spotted hyaena and brown hyaena assemblages, while approximately 50% were noted in the assemblages of striped hyaenas. Cylinders were found more often amongst brown hyaena assemblages, followed by striped hyaenas and spotted hyaenas. Of note is the fact that not all of the dens follow the patterns established for species, for instance the three

Rietvlei dens in this study each had a different type of fragmentation than that which predominated the coastal brown hyaena assemblages. Den R01 was 36.5% shaft splinter, Den R02 was 55.6% complete and Den R03 was 50% one end plus shaft. The same is true for the Mashatu dens, two were predominantly shaft splinter, one complete and one was one end plus shaft. Only with striped hyaenas were the fragmentation patterns uniformly shaft splinters across all five dens.

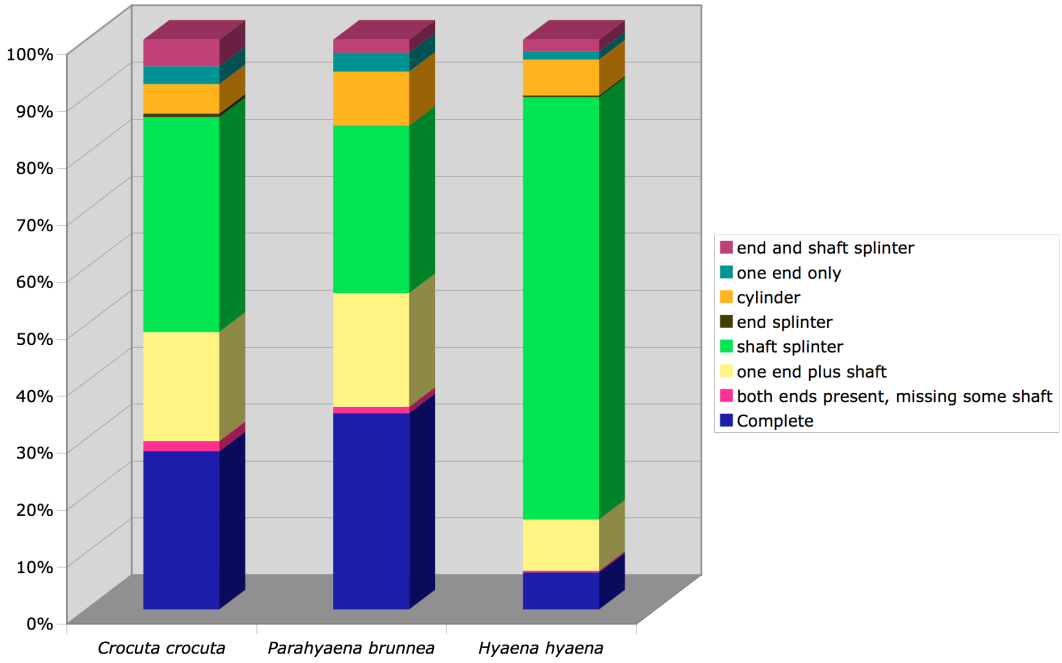

Chart 81: Fragmentation by Species

In this study the damage due to gnawing upon the faunal remains ranges from 33.3% in striped hyaenas to 48% in spotted hyaenas and 58.5% in the case of brown hyaenas. The gnawing damage done to the examined elements by hyaena species is illustrated in Chart 82. Crenulated edges were the most prevalent type of damage found in brown hyaena and spotted hyaena assemblages, while both crenulated edges and punctates were equally noted on gnawed material from striped hyaena assemblages. Punctates made up a considerable portion of the damage done by striped hyaenas, but in spotted

hyaenas punctates alone were found on less than 20% of the assemblage and in the case of brown hyaenas that number declines to just over 5%. Of note is that the combination of punctates and crenulated edges are more prevalent in both spotted hyaena and brown hyaena assemblages than punctates alone, while in the striped hyaena assemblages in Jordan this was not the case. Scouring (See Plate 26), or scooping out to use Maguire (1980), was noted on a small percentage of spotted hyaena and striped hyaena assemblages. Of note were the combinations of scouring with other forms of gnawing documented on 23.2 % of the striped hyaena assemblages. This is contrary to a study done by Leakey *et. al.* (1999) where they state that this form of damage is uncommon in striped hyaena assemblages and Sutcliffe (1970) where he states that this form of damage is common in spotted hyaena damaged remains.

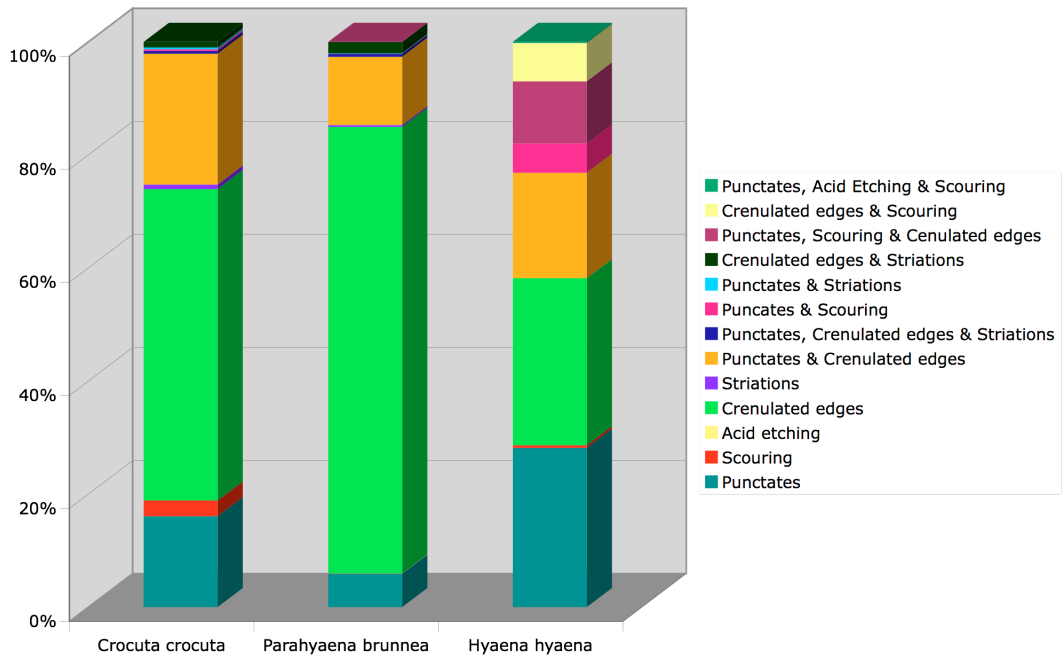

Chart 82: Carnivore Damage by Species

Analysing the gnawed long bones by proximal and distal ends per species in this study indicates that in spotted hyaena and striped hyaena assemblages there is an abundance of distal humerus. Spotted hyaena assemblages also have an abundance of proximal ulnas. All other long bones that have been gnawed are equally represented when broken down by species.

Criteria for distinguishing between hyaena or hominid

Of the published works attempting to distinguish between hyaena collected assemblages and those collected by hominids the research by Stiner (1991) and Cruz-Uribe (1991) has suggested criteria that rely upon 'tendencies' of hyaena collection activity. The lone contribution by Stiner states that 'a purported pattern of excessive proportions of horn or antler in hyaena-accumulated assemblages' is indicative of hyaena den occupation. Of the 25 dens/assemblages examined for the present study, none had an over abundance of horn or antler. Cruz-Uribe suggested the following criteria to confirm hyaenas as collecting agents: 1)'A purported absence or low occurrence of small, hard, compact bones such as sesamoids, carpals, smaller tarsals, and phalanges in hyaena-accumulated assemblages'. In the current study the three dens from Rietvlei would agree with this criterion, as there were no small, compact bones recovered from any of these dens. Data from the other 22 dens examined in this study is contrary to this particular criterion as even the smaller assemblages had small compact bones well represented. 2)'A purported tendency for smaller ungulates to be better represented by cranial bones and for larger ungulates to be better represented by post-cranial bones' suggests a hyaena assemblage. This does not appear to be the case in the 25 assemblages examined for this study, as there were a number of larger skulls from camel, kudu and gemsbok noted from dens of all three

hyaena species as well as numerous lower limb bones from smaller ungulates. 3) 'A purported tendency for bovid mortality profiles to be attritional in hyaena-accumulated assemblages'. As Pickering (2002) indicated, the assumptions needed to validate this particular criterion are not justified. That being said, the majority of fusion data for bovid remains indicated that the animals were adult at the time of death, and pathology from remains taken from the Mashatu dens indicate that at least one kudu was old enough for arthritic conditions to have developed (Franklin, unpublished). 4)'A relative abundance of carnivores (≥20 percent of the total MNI) in hyaena-accumulated assemblages'. This particular criterion has been refuted by Pickering (2002), Lacruz & Maude (2005) and Kuhn (2005). The data from Kuhn (2005) comes from the striped assemblages covered here and the percent carnivore (MNI) ranged from 0-29% with a mean of 20.1% carnivore. Spotted hyaena assemblages in this study had a range of 0-9.1%, with a mean of 1.9% carnivore. The question regarding brown hyaena assemblages and percent carnivore has been touched upon previously, the problem being that dens on the coast have a high number of seal remains and seals are carnivores. Thus the brown hyaena dens surveyed in this study had a range from 0-95% carnivore with a mean with seals counted of 73.8% and a mean with out seals at 43.4%. 5)'An abundance of limb bones with relatively complete shafts, but are lacking epiphyses, in hyaena-accumulated assemblages'. While not the most common type of fragmentation for any of the species in this study, cylinders did represent 23.2% of fragment types in spotted hyaena assemblages, 18.7% in striped hyaena assemblages and 12.1% in brown hyaena assemblages. 6) 'Hyaena-inflicted bone surface damage in hyaena-accumulated assemblages'. Obviously, hyaena-inflicted damage is indicative of hyaena activity on a given assemblage. The question remains what distinguishes

hyaena from other carnivores, be they extant or extinct. Pickering (2001) noted hyaena-inflicted damage on assemblages ranged from 38% to 100%, the present study indicated damage ranging from as low as 33% for striped hyaena assemblages to 56% for brown hyaena assemblages (with spotted hyaena assemblages being 48% gnawed).

CHAPTER 7

Conclusion

Trends of hyaenid assemblages

The history and importance of hyaenids as potential collectors of palaeontological bone assemblages has been well established in the literature and this study. In addition to establishing the background and reasoning for this particular study a number of questions were specifically asked at the outset of this study (see page 7):

Question 1) Are there observable differences in assemblages of striped hyaenas, brown hyaenas and spotted hyaenas? It was found in this study that the assemblages of striped hyaenas tend to have a greater proportion of shaft splinters when compared to the other species' assemblages. Striped hyaena assemblages also had a greater incidence of scouring, usually combined with other types of damage (see Chart 82). In contrast, the bone assemblages of brown hyaenas and spotted hyaenas were quite similar in their fragmentation patterns, while brown hyaena assemblages showed no evidence of scouring and individual bones exhibited predominantly crenulated edges, presumably from gnawing.

Question 2) Do spotted hyaenas create smaller assemblages than either striped hyaenas or brown hyaenas? In general the assemblages attributed to spotted hyaenas in this study were much smaller than the larger assemblages of either striped hyaenas or brown hyaenas. A pair of spotted hyaena assemblages, however, comprised over 600 remains, and were larger than many striped hyaena and brown hyaena

assemblages examined in this study (see chapter 5). Thus in this study a small assemblage was not diagnostic for a particular species of hyaenid.

Question 3) Are the bone fragments left after gnawing by spotted hyaenas consistently smaller than those of striped or brown hyaenas? While the fragments from the Rietvlei dens were seldom smaller than four centimetres, all of the brown hyaena sites in Namibia had numerous fragments smaller than one centimetre. This was also true of the striped hyaena material examined from the Jordanian sites. The environment possibly influences fragment size, as fragment size in this study was constantly smaller in the more arid environments.

Question 4) Are the striped hyaenas and brown hyaenas truly similar in their collecting behaviours as suggested by independent studies of the two species (Owens & Owens, 1978; Skinner, 1976; Kruuk, 1976; Bearder, 1977; Skinner *et. al.,* 1980, 1991; Leakey *et. al.,* 1999; Kuhn, 2001, 2005 and Lacruz & Maude, 2005)? Or will there be distinctive patterns established to differentiate between the two species? Contrary to some of the previous studies, it was noted in this study that both striped hyaenas and brown hyaenas scavenge species from small mammals up to the largest animals inhabiting the prospective regions (camels in the case of striped hyaenas and buffaloes in the case of brown hyaenas). The differences noted in this study between the collecting behaviour of these two species may be seen in the patterns of fragmentation and percentages of specific damage done to the faunal remains. Specifically, bones within the striped hyaena assemblages tend to have relatively equal numbers of crenulated edges and punctates while in contrast, bones within brown hyaena assemblages tend to have large numbers of crenulated edges. Remains

within striped hyaena assemblages also show scouring (Chart 82), albeit usually in conjunction with some other form of gnawing, while brown hyaena assemblages lack scouring.

Question 5) Are there noticeable differences in the collecting behaviours and den usage of the three hyaena species in question? All three species in this study made use of both natural caves and crevasses as well as modified burrows of other animals. There were no obvious differences in the assemblages associated with any type of den.

6) Are there differences between populations of the same species from different environments? Aside from the difference in prey species available, there were differences noted between brown hyaena populations from inland sites at Rietvlei and the coastal sites of Namibia as well as spotted hyaena populations in Mashatu and Gobabeb. Specifically, the brown hyaenas of Rietvlei did not leave many smaller fragments (nothing smaller than four centimetres), plus these populations did not exhibit the large assemblages typically associated with brown hyaenas, possibly due to a more abundant food supply through out the year (surrounding farms routinely drop domestic carcasses, especially chicken, in the reserve) thus less dependence upon bone material in their diet. The spotted hyaenas of the Namib-Naukluft Desert left behind a greater number of shaft splinters and a higher number of small fragments than the spotted hyaenas of Mashatu, possibly attributed to a greater utilization of bone in their diet as a direct reflection of environmental conditions and fewer prey species.

Question 7) Do spotted hyaenas bring back larger faunal remains than either striped hyaenas or brown hyaenas as hypothesised by numerous previous researchers (Kruuk, 1972; Bearder, 1977; Skinner *et. al*, 1986; Cooper *et. al.*, unpublished)? It was shown in the present study that all three species are capable of bringing back remains from the largest species available in their prospective regions. Striped hyaenas in Jordan scavenged from adult camels, brown hyaenas from Rietvlei had buffalo remains in the assemblages, brown hyaenas from the coast had adult seal remains as well as adult gemsbok in the assemblages while spotted hyaenas in Mashatu even had an elephant bone in the assemblage. Gemsbok was common in the assemblages from the Namib-Naukluft Desert.

Question 8) Which species leaves behind more distinctive taphonomic signatures, and which of these signatures is more prevalent? In this study the bone assemblages of brown hyaenas showed a greater percentage of carnivore gnawed remains in the combined assemblages, striped hyaenas the least. Crenulated edges were the most common type of damage left behind on bone by both brown hyaenas and spotted hyaenas. Crenulated edges and punctates were equally represented in the assemblages of striped hyaenas. Some of the punctates left behind by striped hyaenas were very deep, in one case transgressing a mid-line metapodial of a camel.

Question 9) Are there distinguishing taphonomic signatures of hyaenids that separate them from other carnivore collectors such as leopards? Deep punctates like the one found through the camel metapodial by a striped hyaena (most likely indicative of hyaena jaw strength) could be characterised as hyaena activity. In addition, Richardson (1980) and Richardson *et. al.* (1986) indicate that hyaena 'damage and

destroy' more bones than lions, leopards, dogs or jackals. While spotted hyaenas have been labelled as having the strongest jaws and are the 'most effective extant bone cracking carnivore' (Marean & Spencer, 1991). It is worth noting that striped hyaenas produced a larger percentage of shaft splinters of the three hyaena species examined in this study. Additionally much of the 'hyaena' damage, such as ragged-edged chewing/crenulated edges, pitting, punctates, striations and acid etching have been identified in modern collections in North America where it is believed that canids, most probably coyotes (*Canis latrans*) were the carnivore responsible for the damage (Lyman, 1994). Additionally Njau and Blumenschine (2006) found that crocodiles (*Crocodylus niloticus*) produce similar taphonomic signatures as large mammalian carnivores as well as bite marks unique to crocodiles. With this in mind it is perhaps better to use the ratios of fragmentation patterns and damage types that have been found here for the given species and not just the type of damage for determining if hyaenids are responsible for various unknown assemblages.

In addition to the above cautionary note, porcupine activity was recorded in the present study (see Chapter 5) in 10 of the 25 dens examined. In addition a black-backed jackal family was observed in residence at a previously identified hyaena den on the Luderitz Peninsula (D-P 10). The jackals in question remained at the den for over seven days and did not appear to be disturbed by human presence. This brings into question a number of variables, such as: have porcupines contributed to the faunal assemblages by bringing material into the dens, or have the porcupines gnawed on material that hyaenas have collected? If porcupines were contributing to the assemblages, how would their contributions affect the rate of accumulation?

Additionally what sort of damage do the jackals do to the faunal remains and how does one differentiate this damage from hyaena inflicted damage?

Although no census of current fauna was conducted, from what was observed on a daily basis it appears that all of the bone assemblages were direct reflections of the fauna inhabiting the region. Furthermore, the ratios of faunal remains reflect the ratios found between the local fauna of the given regions. The clearest examples were from the coastal den sites in Namibia where Cape fur seal (*Arctocephalus pusillus)* predominated the bone assemblages and are by far the most abundant mammals inhabiting the region at this particular time.

Criteria for distinguishing between hyaena or hominid

Of the seven criteria for distinguishing assemblages of hyaenids from hominids put forth by Stiner (1991) and Cruz-Uribe (1991), only two by Cruz-Uribe are substantiated by the current study. These are 'An abundance of limb bones with relatively complete shafts, but are lacking epiphyses, in hyaena-accumulated assemblages' and, 'Hyaena-inflicted bone surface damage in hyaena-accumulated assemblages'. A third criterion, 'A relative abundance of carnivores (≥20 percent of the total MNI) in hyaena-accumulated assemblages' has been refuted by the present study when one examines spotted hyaena assemblages, seriously questioned when examining the assemblages of striped hyaenas, but supported by and large in the bone assemblages of brown hyaenas. Even within the data set for brown hyaenas, however, all three dens examined at Rietvlei had less than 20%carnivore remains (two had 16% carnivore and one had 0%). Of the five dens examined from striped hyaenas two had

less than 20% carnivore. Thus, as Lacruz & Maude (2005) as well as Kuhn (2005) stated, using this criterion alone to determine hyaenids as the accumulator of an unknown assemblage should be done only with caution. As mentioned previously, other carnivores can produce what has previously been considered uniquely 'hyaena damage' features, such as crenulated edges. Thus combining the types of damage, along with percentages of damage and fragmentation types as well as assemblage make up (MNI percentages) may be better suited for determining an unknown collector.

Further research

While there has been a fair amount of research to date concerning bone collections and taphonomy of potential faunal accumulators, it is clear from the results of the present study that more needs to be done, especially on known accumulators such as leopards. Recognition of specific types of fragmentation and carnivore damage, as well as what percentage of each type of damage is found in a given assemblage needs to be examined, preferably over a large geographic range. In addition, the percentage of unidentifiable fragments left behind by other carnivores should be documented. Additionally more research needs to be done on the issue of multiple collectors and the issue of other 'non-collecting' carnivores such as jackals and their use of and impact on bone assemblages in 'hyaena dens'.

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APPENDICES

APPENDIX A: Mashatu Den 1 Bone Damage

Element	punctates/location	scouring/location	acid etching/location	crenulated edges/location	striations/location
astragalus	one end of non-long bone	none	none	none	none
astragalus	one end of non-long bone	none	none	none	none
atlas	none	unknown	unknown	one end of non-long bone	unknown
axis	unknown	unknown	unknown	one end of non-long bone	unknown
cervical vert	none	unknown	unknown	one end of non-long bone	unknown
cervical vert	none	unknown	unknown	one end of non-long bone	unknown
cervical vert	one end of non-long bone	none	none	one end of non-long bone	none
femur	both prox and dis ends	none	none	over most of bone	none
femur	distal end	none	none	distal shaft	none
great cornu	none	none	none	one end of non-long bone	none
humerus	proximal end	none	none	proximal end	none
humerus	none	none	none	distal shaft	none
humerus	none	none	none	proximal shaft	none
lumbar vert	none	none	none	over most of bone	none
lumbar vert	none	none	none	over most of bone	none
lumbar vert	none	none	none	over most of bone	none
lumbar vert	none	none	none	over most of bone	none
lumbar vert	none	none	none	over most of bone	none
mandible	one end of non-long bone	none	none	none	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	one end of non-long bone	none
mandibular hinge	one end of non-long bone	none	none	one end of non-long bone	none
maxilla	one end of non-long bone	none	none	one end of non-long bone	none
metacarpal	none	none	none	proximal shaft	none
metacarpal	none	none	none	proximal shaft	none
metapodial	none	none	over most of bone	none	none
pelvis (acetabulum)	both prox and dis ends	unknown	unknown	both prox and dist ends	unknown
pelvis (acetabulum)	one end of non-long bone	unknown	unknown	both prox and dist ends	unknown
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	over most of bone	none
phalanx 2	proximal shaft	none	none	none	none
phalanx 2	none	none	over most of bone	none	none
phalanx 3	over most of bone	none	none	none	none
radius	none	none	none	distal shaft	none
radius	none	none	none	both prox and dist ends	over most of bone
radius/ulna fused	none	none	none	none	over most of bone
rib	none	none	none	one end of non-long bone	none

rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	none	none
rib	none	none	none	over most of bone	over most of bone
sacrum	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
skull	one end of non-long bone	none	none	none	none
skull	over most of bone	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	none	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	one end of non-long bone	none
thoracic vert	one end of non-long bone	unknown	unknown	one end of non-long bone	unknown
thoracic vert	none	unknown	unknown	one end of non-long bone	unknown
thoracic vert	none	unknown	unknown	one end of non-long bone	unknown
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	over most of bone	none
thoracic vert	none	none	none	over most of bone	none
thoracic vert	one end of non-long bone	none	none	over most of bone	none
thoracic vert	over most of bone	none	none	over most of bone	none
thoracic vert	none	none	none	one end of non-long bone	none
tibia	none	none	none	distal end	none
tibia	none	none	none	proximal shaft	none
tibia	proximal end	none	none	proximal end	none
tibia	none	none	none	distal shaft	none
unidentified fragment	none	none	none	none	one end of non-long bone
unidentified fragment	none	none	over most of bone	none	none
unidentified fragment	none	none	over most of bone	none	none
unidentified fragment	none	none	over most of bone	none	none
unidentified fragment	none	none	over most of bone	none	none
unidentified fragment	over most of bone	none	none	over most of bone	over most of bone

APPENDIX B: Mashatu Den 2 Bone Damage

Element	punctates/location	scouring/location	acid etching/location	crenulated edges/location	striations/location
atlas	one end of non-long bone	none	none	none	none
axis	none	none	none	none	none
cervical vert	none	none	none	none	none
cervical vert	none	none	none	one end of non-long bone	none
femur	distal end	none	none	proximal shaft	none
femur	none	none	none	distal shaft	none
femur	proximal shaft	none	none	distal shaft	none
femur	proximal end	none	none	proximal shaft	none
femur	proximal end	none	none	none	none
humerus	none	none	none	proximal shaft	none
humerus	none	none	none	proximal shaft	proximal shaft
humerus	distal end	none	none	proximal shaft	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	distal shaft	none
lumbar vert	none	none	none	one end of non-long bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
maxilla	none	none	none	one end of non-long bone	none
metacarpal	proximal shaft	none	none	distal shaft	none
metapodial	none	none	none	both prox and dist ends	none
metapodial	none	none	none	none	none
metatarsal	none	none	none	none	none
phalanx 1	none	none	none	none	none
phalanx 1	none	none	none	none	none
phalanx 2	none	none	none	none	none
phalanx 3	none	none	none	none	none
radius	none	none	none	none	none
skull	none	none	none	none	none
skull fragment	one end of non-long bone	none	none	one end of non-long bone	none
skull fragment	none	none	none	none	none
skull fragment	unknown	unknown	unknown	unknown	unknown
skull fragment	none	none	none	none	none
thoracic vert	none	none	none	one end of non-long bone	none
tibia	none	none	none	over most of bone	none

ulna	none	none	none	none	none
unidentified fragment	none	none	none	none	none
unidentified fragment	one end of non-long bone	none	none	none	none
unidentified fragment	none	none	none	none	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	none	one end of non-long bone
unidentified fragment	none	none	none	one end of non-long bone	one end of non-long bone
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	none	none
unidentified fragment	none	none	none	none	none
unidentified fragment	none	none	none	none	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	none	none
unidentified fragment	none	none	none	none	none
unidentified fragment	none	none	none	none	none
unidentified fragment	none	none	none	none	none
unidentified fragment	none	none	none	none	none
unidentified fragment	none	none	none	none	none
unidentified fragment	none	none	none	none	none
unknown tooth	none	none	none	none	none

APPENDIX C: Mashatu Den 3 Bone Damage

Element	gnawed/type	punctates/location	scouring/location	acid etching/location	crenulated edges/location	striations/location
caudal vert	carnivore gnawed	one end of non-long bone	none	none	none	none
cervical vert	carnivore gnawed	none	none	none	one end of non-long bone	none
femur	carnivore gnawed	proximal shaft	none	none	none	none
femur	carnivore gnawed	both prox and dis ends	none	none	distal shaft	none
femur	carnivore gnawed	both prox and dis ends	none	none	both prox and dist ends	none
humerus	carnivore gnawed	distal end	none	none	proximal end	none
humerus	carnivore gnawed	distal end	none	none	distal shaft	none
humerus	carnivore gnawed	proximal end	none	none	proximal end	none
humerus	carnivore gnawed	none	none	none	both prox and dist ends	none
humerus	carnivore gnawed	none	none	none	over most of bone	none
humerus	carnivore gnawed	none	none	none	both prox and dist ends	none
illium	carnivore gnawed	one end of non-long bone	none	none	both prox and dist ends	none
illium	carnivore gnawed	none	none	none	both prox and dist ends	none
mandible	rodent and carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	mandibular heal	none	none	none	none
mandibular hinge	carnivore gnawed	none	none	none	mandibular heal	none
metacarpal	carnivore gnawed	distal end	none	none	distal shaft	none
metacarpal	carnivore gnawed	both prox and dis ends	none	none	none	distal shaft
metacarpal	carnivore gnawed	proximal end	proximal shaft	none	none	none
metapodial	carnivore gnawed	none	none	none	over most of bone	none
phalanx 1	carnivore gnawed	none	none	none	distal shaft	none
phalanx 1	carnivore gnawed	proximal end	none	none	none	none
phalanx 2	carnivore gnawed	proximal end	none	none	none	none
scapula	carnivore gnawed	proximal end	none	none	distal end	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
skull	carnivore gnawed	none	none	none	one end of non-long bone	none
skull fragment	carnivore gnawed	one end of non-long bone	none	none	none	none
thoracic vert	carnivore gnawed	none	none	none	one end of non-long bone	none
thoracic vert	carnivore gnawed	none	none	none	one end of non-long bone	none
thoracic vert	carnivore gnawed	none	none	none	one end of non-long bone	none
tibia	carnivore gnawed	proximal end	none	none	none	none
tibia	carnivore gnawed	none	none	none	over most of bone	none
tibia	carnivore gnawed	none	none	none	proximal shaft	none
unidentified fragment	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	over most of bone	none	none	none
unidentified fragment	carnivore gnawed	none	none	none	over most of bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	none	none	none	over most of bone	none

APPENDIX D: Mashatu Den 4 Bone Damage

Element	punctates/location	scouring/location	acid etching/location	crenulated edges/location	striations/location
astragalus	one end of non-long bone	none	none	none	none
astragalus	over most of bone	none	none	none	none
calcaneus	distal end	none	none	distal end	none
calcaneus	proximal end	none	none	distal end	none
calcaneus	proximal end	none	none	distal end	none
calcaneus	proximal shaft	none	none	none	none
calcaneus	over most of bone	none	none	over most of bone	none
cervical vert	none	none	none	one end of non-long bone	none
femur	none	none	none	proximal shaft	none
femur	none	none	none	distal end	none
femur	proximal shaft	none	none	both prox and dist ends	distal shaft
femur	none	none	none	distal shaft	none
femur	distal end	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	proximal end	none	none	none	none
femur	none	none	none	distal shaft	none
femur	distal end	none	none	distal shaft	none
femur	both prox and dis ends	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	both prox and dis ends	none	none	both prox and dist ends	none
femur	both prox and dis ends	none	none	proximal end	none
femur	proximal shaft	none	none	proximal shaft	none
femur	distal end	none	none	distal end	none
femur	proximal end	none	none	none	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	proximal end	none
femur	distal end	none	none	none	none
femur	both prox and dis ends	none	none	distal end	none
humerus	none	none	none	distal shaft	none
humerus	none	none	none	proximal shaft	none
humerus	none	none	none	proximal end	none
humerus	distal end	none	none	none	none
humerus	distal end	none	none	distal shaft	none
humerus	none	none	none	proximal end	none
humerus	none	none	none	distal shaft	none
humerus	none	none	none	proximal shaft	none
humerus	proximal end	none	none	proximal end	none
humerus	none	none	none	proximal shaft	none
humerus	none	none	none	distal shaft	none
humerus	none	none	none	over most of bone	none

humerus	both prox and dis ends	none	none	proximal shaft	none
humerus	distal shaft	none	none	none	none
humerus	distal end	none	none	proximal shaft	none
humerus	none	none	none	proximal end	none
humerus	none	none	none	proximal end	none
humerus	both prox and dis ends	none	none	none	none
humerus	proximal end	none	none	none	none
humerus	none	none	none	distal shaft	none
humerus	none	none	none	over most of bone	none
humerus	proximal end	none	none	proximal shaft	none
illium	one end of non-long bone	none	none	one end of non-long bone	none
illium	one end of non-long bone	none	none	one end of non-long bone	none
illium	none	none	none	over most of bone	none
illium	one end of non-long bone	none	none	over most of bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
mandible	one end of non-long bone	none	none	mandibular heal	none
mandible	mandibular heal	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	one end of non-long bone	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	one end of non-long bone	none
metacarpal	distal shaft	none	none	none	none
metacarpal	proximal end	none	none	none	none
metacarpal	distal shaft	none	none	none	none
metacarpal	distal end	none	none	distal end	none
metacarpal	distal end	none	none	proximal shaft	none

metacarpal	none	none	none	proximal end	none
metacarpal	none	none	none	proximal shaft	none
metacarpal	proximal shaft	none	none	none	none
metapodial	distal end	none	none	distal end	none
metapodial	none	none	none	distal end	none
metatarsal	distal end	none	none	none	none
metatarsal	none	none	none	proximal shaft	none
metatarsal	none	none	none	none	over most of bone
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	one end of non-long bone	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
phalanx 1	proximal end	none	none	none	none
phalanx 1	proximal end	none	none	none	none
phalanx 1	distal end	none	none	proximal shaft	none
phalanx 1	proximal shaft	none	none	none	none
phalanx 1	proximal end	none	none	none	none
phalanx 2	none	none	none	over most of bone	none
phalanx 2	distal end	none	none	none	none
phalanx 2	over most of bone	none	none	none	none
phalanx 2	none	none	none	none	proximal shaft
radius	none	none	none	distal shaft	none
radius	distal end	none	none	none	none
radius	both prox and dis ends	none	none	none	none
radius	none	none	none	proximal shaft	none
radius	distal shaft	none	none	none	none
radius	none	none	none	distal shaft	none
radius	proximal end	none	none	none	none
radius	none	none	none	distal shaft	none
radius	distal end	none	none	none	none
radius	none	none	none	distal shaft	none
radius	none	none	none	proximal end	none
radius	distal shaft	none	none	none	none
radius/ulna fused	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	over most of bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
sacrum	none	none	none	one end of non-long bone	none

scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	proximal end	none	none	over most of bone	none
scapula	proximal end	none	none	none	none
scapula	none	none	none	distal end	none
scapula	proximal shaft	none	none	distal end	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	one end of non-long bone	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	distal shaft	none
skull	one end of non-long bone	none	none	one end of non-long bone	none
skull	one end of non-long bone	none	none	one end of non-long bone	none
skull	one end of non-long bone	none	none	none	none
skull	none	none	none	one end of non-long bone	none
skull	none	none	none	one end of non-long bone	none
skull	one end of non-long bone	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	one end of non-long bone	none
tarsal	proximal end	none	none	none	none
tibia	proximal end	none	none	proximal shaft	none
tibia	none	none	none	distal shaft	none
tibia	none	none	none	distal shaft	none
tibia	one end of non-long bone	none	none	none	none
tibia	proximal end	none	none	none	none
tibia	proximal end	none	none	both prox and dist ends	none
tibia	none	none	none	proximal end	none
tibia	proximal shaft	none	none	proximal shaft	none
tibia	proximal end	none	none	over most of bone	none
tibia	none	none	none	both prox and dist ends	none
tibia	none	none	none	proximal shaft	none
tibia	proximal end	none	none	none	none
ulna	proximal end	none	none	proximal end	none
ulna	none	none	none	proximal end	none
ulna	proximal end	none	none	distal end	none
ulna	proximal end	none	none	proximal end	none
ulna	proximal end	none	none	proximal end	none
ulna	distal shaft	none	none	distal end	none
ulna	none	none	none	over most of bone	none

unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	none	none
unidentified fragment	one end of non-long bone	none	none	one end of non-long bone	none
unidentified fragment	one end of non-long bone	none	none	none	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	one end of non-long bone	none	none	over most of bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	one end of non-long bone	none	none	none	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	one end of non-long bone	none	none	none	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none

vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none

APPENDIX E: Rietvlei Den R01 Bone Damage

Element	punctates/location	scouring/location	acid etching/location	crenulated edges/location	striations/location
radius/ulna fused	proximal end	none	none	proximal end	over most of bone
radius/ulna fused	proximal end	none	none	proximal end	none
metacarpal	distal end	none	none	proximal shaft	none
metapodial	proximal shaft	none	none	none	none
horn/antler	none	none	none	proximal end	proximal end
femur	proximal end	proximal shaft	none	proximal shaft	over most of bone
radius	none	none	none	none	proximal shaft
atlas	none	none	none	over most of bone	none
atlas	none	none	none	over most of bone	none
cervical vert	one end of non-long bone	none	none	over most of bone	none
metacarpal	none	none	none	over most of bone	none
metapodial	none	none	none	over most of bone	over most of bone
unidentified fragment	none	none	none	both prox and dist ends	none
tibia	none	none	none	both prox and dist ends	none
tibia	none	none	none	both prox and dist ends	none
mandible	none	none	none	mandibular heal	none
scapula	proximal end	none	none	over most of bone	none
ulna	none	none	none	both prox and dist ends	none
skull	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	one end of non-long bone	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	over most of bone
ulna	proximal shaft	none	none	both prox and dist ends	over most of bone
tibia	none	none	none	both prox and dist ends	none

APPENDIX F: Rietvlei Den R02 Bone Damage

Element	damage	punctates/location	scouring/location	acid etching/location	crenulated edges/location	striations/location
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
radius	carnivore gnawed	none	none	none	proximal shaft	over most of bone
horn/antler	carnivore and beattle damage	none	none	none	none	over most of bone
humerus	rodent and carnivore gnawed	none	none	none	proximal end	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
humerus	carnivore gnawed	none	none	none	both prox and dist ends	none
calcaneus	carnivore gnawed	proximal end	none	none	none	proximal end
scapula	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	both prox and dist ends	none
cervical vert	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
cervical vert	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none

APPENDIX G: Rietvlei Den R03 Bone Damage

Element	damage	punctates/location	scouring/location	acid etching/location	crenulated edges/location	striations/location
humerus	carnivore gnawed	distal end	none	none	both prox and dist ends	none
metacarpal	rodent and carnivore gnawed	distal shaft	none	none	proximal end	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	both prox and dist ends	none
pelvis (acetabulum)	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	one end of non-long bone	none	none	both prox and dist ends	none
radius	carnivore gnawed	distal end	none	none	none	none
tibia	carnivore gnawed	none	none	none	distal shaft	none

APPENDIX H: Brown Hyaena Project D-P 1 Bone Damage

Element	punctates/location	scouring/location	acid etching/location	crenulated edges/location	striations/location
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	one end of non-long bone	none
cervical vert	none	none	none	one end of non-long bone	none
cervical vert	none	none	none	one end of non-long bone	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	over most of bone	none
femur	none	none	none	proximal shaft	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	proximal end	none	none	proximal end	none
femur	distal end	none	none	distal shaft	none
humerus	distal shaft	none	none	proximal shaft	none
humerus	none	none	none	distal end	none
humerus	none	none	none	distal shaft	none
illium	none	none	none	one end of non-long bone	none
illium	over most of bone	none	none	both prox and dist ends	none
illium	over most of bone	none	none	one end of non-long bone	none
mandible	mandibular heal	none	none	both prox and dist ends	none
mandible	both prox and dis ends	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	mandibular heal	none
maxilla	one end of non-long bone	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	mandibular heal	none
maxilla	none	none	none	both prox and dist ends	none
maxilla	none	none	none	over most of bone	none
metapodial	none	none	none	none	over most of bone
pelvis (acetabulum)	over most of bone	none	none	over most of bone	none
pelvis (acetabulum)	over most of bone	none	none	over most of bone	none
radius	distal shaft	none	none	distal shaft	none
radius/ulna fused	none	none	none	both prox and dist ends	over most of bone
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none

rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
scapula	proximal end	none	none	proximal end	over most of bone
scapula	none	none	none	over most of bone	none
skull	one end of non-long bone	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	none	none
thoracic vert	one end of non-long bone	none	none	none	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
tibia	proximal shaft	none	none	proximal shaft	none
tibia	distal shaft	none	none	both prox and dist ends	none
tibia	none	none	none	distal shaft	none
tibio-tarsus	proximal shaft	none	none	both prox and dist ends	none
ulna	none	none	none	both prox and dist ends	over most of bone
ulna	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	none	over most of bone
unidentified fragment	proximal shaft	none	none	none	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	none	over most of bone
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	both prox and dis ends	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	distal shaft	none
unidentified fragment	none	none	none	both prox and dist ends	none

APPENDIX I: Brown Hyaena Project D-P 2 Bone Damage

Element	punctates/location	scouring/location	acid etching/location	crenulated edges/location	striations/location
femur	proximal shaft	none	none	proximal shaft	none
femur	none	none	none	both prox and dist ends	proximal shaft
femur	none	none	none	both prox and dist ends	distal shaft
femur	none	none	none	none	none
femur	none	none	none	both prox and dist ends	over most of bone
femur	none	none	none	proximal end	none
horn/antler	none	none	none	one end of non-long bone	none
humerus	proximal shaft	none	none	both prox and dist ends	over most of bone
humerus	none	none	none	one end of non-long bone	none
humerus	none	none	none	both prox and dist ends	none
humerus	proximal end	none	none	none	none
lumbar vert	none	none	none	one end of non-long bone	none
mandible	none	none	none	mandibular heal	none
mandible	one end of non-long bone	none	none	mandibular heal	one end of non-long bone
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandibular hinge	one end of non-long bone	none	none	one end of non-long bone	none
mandibular hinge	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	one end of non-long bone	none	none	none	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
metapodial	none	none	none	proximal shaft	none
metapodial	none	none	none	distal shaft	none
metapodial	none	none	none	over most of bone	none
metapodial	none	none	none	distal shaft	none
pelvis (acetabulum)	over most of bone	none	none	both prox and dist ends	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	over most of bone	none	none	over most of bone	none

phalanx 2	none	none	none	proximal shaft	none
radius	distal end	none	none	proximal shaft	none
radius	none	none	none	distal shaft	distal shaft
radius	none	none	none	both prox and dist ends	none
radius	proximal shaft	none	none	distal shaft	none
radius	none	none	none	distal shaft	none
rib	one end of non-long bone	none	none	none	none
rib	one end of non-long bone	none	none	one end of non-long bone	one end of non-long bone
rib	one end of non-long bone	none	none	none	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	proximal shaft	none	none	distal end	none
scapula	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	one end of non-long bone	none	none	none	none
thoracic vert	one end of non-long bone	none	none	none	none
thoracic vert	one end of non-long bone	none	none	one end of non-long bone	none
thoracic vert	one end of non-long bone	none	none	one end of non-long bone	none
thoracic vert	one end of non-long bone	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none

tibia	none	none	none	both prox and dist ends	distal shaft
tibia	distal shaft	none	none	both prox and dist ends	distal shaft
tibia	none	none	none	distal shaft	none
ulna	proximal end	none	none	proximal end	none
ulna	none	none	none	both prox and dist ends	none
ulna	proximal shaft	none	none	both prox and dist ends	none
ulna	over most of bone	none	none	over most of bone	none
ulna	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	proximal shaft	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	over most of bone	none	none
unidentified fragment	none	none	none	one end of non-long bone	none
vertebra	over most of bone	none	none	over most of bone	none
vertebra	none	none	none	one end of non-long bone	none

APPENDIX J: Brown Hyaena Project D-P 4 Bone Damage

Element	punctates/location	scouring/location	acid etching/location	crenulated edges/location	striations/location
atlas	none	none	none	over most of bone	none
atlas	none	none	none	over most of bone	none
atlas	none	none	none	over most of bone	none
axis	none	none	none	one end of non-long bone	none
axis	one end of non-long bone	none	none	none	none
axis	one end of non-long bone	none	none	none	none
axis	none	none	none	over most of bone	none
axis	none	none	none	one end of non-long bone	none
axis	none	none	one end of non-long bone	none	none
axis	none	none	one end of non-long bone	none	none
axis	none	none	one end of non-long bone	none	none
coracoid	none	none	none	one end of non-long bone	none
femur	none	none	none	proximal shaft	none
femur	none	none	none	over most of bone	none
femur	none	none	none	proximal shaft	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	distal shaft	none	none	none	none
femur	proximal end	none	none	none	none
femur	distal shaft	none	none	proximal end	none
femur	none	none	none	proximal shaft	none
femur	distal end	none	none	proximal shaft	none
femur	distal end	none	none	both prox and dist ends	none
femur	none	none	none	over most of bone	none
femur	distal shaft	none	none	distal shaft	none
femur	proximal end	none	none	distal shaft	none
femur	proximal end	none	none	both prox and dist ends	none
femur	distal end	none	none	none	none
femur	none	none	none	both prox and dist ends	both prox and dist ends
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	proximal end	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
humerus	distal end	none	none	proximal end	none

humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	none	one end of non-long bone
humerus	none	none	none	both prox and dist ends	over most of bone
humerus	none	none	none	over most of bone	none
humerus	none	none	none	over most of bone	none
humerus	none	none	none	over most of bone	none
humerus	none	none	none	proximal shaft	none
humerus	none	none	none	distal shaft	none
humerus	proximal end	none	none	proximal shaft	none
humerus	none	none	none	both prox and dist ends	none
humerus	proximal shaft	none	none	proximal end	none
humerus	distal end	none	none	both prox and dist ends	none
humerus	distal end	distal end	none	proximal shaft	distal end
humerus	distal end	none	none	distal shaft	none
humerus	distal shaft	none	none	distal shaft	distal shaft
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	proximal shaft	none
humerus	none	none	none	proximal end	none
humerus	none	none	none	proximal end	none
humerus	proximal end	none	none	distal shaft	distal shaft
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	over most of bone	over most of bone
humerus	none	none	none	over most of bone	none
humerus	over most of bone	none	none	over most of bone	none
humerus	none	none	none	both prox and dist ends	over most of bone
illium	none	none	none	one end of non-long bone	none
ishium	none	none	none	both prox and dist ends	none
ishium	over most of bone	none	none	none	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	mandibular heal	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none

mandible	none	none	none	over most of bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	over most of bone	none
mandible	over most of bone	none	none	over most of bone	none
mandible	one end of non-long bone	none	none	one end of non-long bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	mandibular heal	none
mandible	mandibular heal	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	one end of non-long bone	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	mandibular heal	none
mandible	one end of non-long bone	none	none	over most of bone	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	one end of non-long bone	none	none	one end of non-long bone	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	over most of bone	none
mandible	mandibular heal	none	none	none	none
mandibular hinge	none	none	none	over most of bone	none
mandibular hinge	one end of non-long bone	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	one end of non-long bone	none	none	one end of non-long bone	none

maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
metacarpal	none	none	none	distal shaft	one end of non-long bone
metacarpal	none	none	none	distal shaft	distal shaft
metapodial	none	none	none	both prox and dist ends	over most of bone
metapodial	none	none	none	distal shaft	none
metapodial	none	none	none	both prox and dist ends	none
metapodial	none	none	none	proximal shaft	proximal shaft
metapodial	none	none	none	over most of bone	over most of bone
metapodial	one end of non-long bone	none	none	none	none
metapodial	proximal end	none	none	proximal end	none
metapodial	none	none	none	proximal end	none
metatarsal	none	none	none	both prox and dist ends	none
metatarsal	none	none	none	distal shaft	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	over most of bone	none	none	one end of non-long bone	none
pelvis (acetabulum)	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	one end of non-long bone	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	one end of non-long bone	none	none	over most of bone	none

pelvis (acetabulum)	none	none	none	one end of non-long bone	none
phalanx 1	proximal end	none	none	none	none
phalanx 1	none	none	none	one end of non-long bone	none
phalanx 1	none	none	none	one end of non-long bone	none
phalanx 1	none	none	none	one end of non-long bone	none
phalanx 1	none	none	none	proximal shaft	none
phalanx 2	none	none	none	one end of non-long bone	none
radius	none	none	none	both prox and dist ends	none
radius	none	none	none	both prox and dist ends	none
radius	proximal end	none	none	both prox and dist ends	none
radius	none	none	none	proximal shaft	none
radius	proximal end	none	none	distal end	none
radius	none	none	none	both prox and dist ends	none
radius	none	none	none	distal end	none
radius	distal end	none	none	distal shaft	none
radius	none	none	none	proximal shaft	none
radius	distal end	none	none	none	none
radius	both prox and dis ends	none	none	none	none
radius	distal end	none	none	proximal shaft	none
radius	none	none	none	both prox and dist ends	over most of bone
radius	over most of bone	none	none	over most of bone	none
radius	distal end	none	none	none	none
radius	none	none	none	distal shaft	none
radius	proximal end	none	none	distal shaft	none
radius	proximal end	none	none	distal shaft	proximal shaft
radius	none	none	none	distal shaft	none
radius	none	none	none	both prox and dist ends	none
radius	none	none	none	both prox and dist ends	none
radius	proximal end	none	none	none	none
radius	distal shaft	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	none	none
rib	one end of non-long bone	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	none	none
rib	one end of non-long bone	none	none	none	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none

rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
sacrum	over most of bone	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	one end of non-long bone	none	none	none	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	proximal end	none	none	distal end	none
scapula	none	none	none	distal end	none
scapula	none	none	none	distal end	none
scapula	none	none	none	distal end	none
scapula	proximal end	none	none	distal end	none
scapula	proximal end	none	none	distal end	none
scapula	proximal end	none	none	distal end	none
scapula	none	none	none	distal end	none
scapula	proximal end	none	none	distal end	none
scapula	proximal end	none	none	distal end	none
scapula	none	none	none	distal end	none
scapula	none	none	none	distal end	none
scapula	proximal end	none	none	distal end	none
scapula	proximal end	none	none	distal end	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none

skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	over most of bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	none	none
skull fragment	one end of non-long bone	none	none	none	none
skull fragment	one end of non-long bone	none	none	none	none
skull fragment	one end of non-long bone	none	none	none	none
skull fragment	one end of non-long bone	none	none	none	none
skull fragment	one end of non-long bone	none	none	none	none

skull fragment	one end of non-long bone	none	none	none	none
skull fragment	one end of non-long bone	none	none	none	none
skull fragment	one end of non-long bone	none	none	none	none
skull fragment	one end of non-long bone	none	none	none	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none

skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none

skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
thoracic vert	none	none	none	over most of bone	none
thoracic vert	over most of bone	none	none	one end of non-long bone	none
thoracic vert	one end of non-long bone	none	none	none	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	one end of non-long bone	none	none	one end of non-long bone	none
tibia	none	none	none	distal shaft	none
tibia	none	none	none	distal shaft	none
tibia	none	none	none	distal shaft	none
tibia	over most of bone	none	none	none	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	both prox and dist ends	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	proximal end	none
tibia	none	none	none	proximal end	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	proximal shaft	proximal shaft
tibia	none	none	none	proximal shaft	proximal shaft
tibia	distal end	none	none	proximal end	over most of bone
tibia	none	none	none	over most of bone	none
tibia	none	none	none	distal shaft	none
tibia	none	none	none	both prox and dist ends	none
tibia	none	none	none	over most of bone	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	both prox and dist ends	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	both prox and dist ends	none
tibia	none	none	none	both prox and dist ends	none
tibia	none	none	none	proximal shaft	none
tibia	distal shaft	none	none	none	none
tibia	proximal end	none	none	distal end	none
tibia	none	none	none	distal shaft	none
tibia	none	none	none	proximal shaft	none
tibio-tarsus	proximal shaft	none	none	none	none
ulna	proximal end	none	none	proximal shaft	none
ulna	proximal end	none	none	proximal end	none
ulna	distal end	none	none	proximal end	none
ulna	proximal end	none	none	none	none
ulna	none	none	none	proximal shaft	none
ulna	proximal end	none	none	none	none

ulna	none	none	none	proximal end	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	distal shaft	none
ulna	none	none	none	both prox and dist ends	distal shaft
ulna	proximal shaft	none	none	both prox and dist ends	none
ulna	proximal end	none	none	both prox and dist ends	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	proximal end	proximal end
ulna	none	none	none	proximal end	none
ulna	proximal shaft	none	none	proximal end	none
ulna	none	none	none	proximal end	proximal shaft
ulna	none	none	none	proximal end	none
ulna	none	none	none	proximal end	none
ulna	none	none	none	proximal end	none
ulna	none	none	none	proximal end	none
ulna	none	none	none	over most of bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	none	over most of bone
unidentified fragment	none	none	none	both prox and dist ends	over most of bone
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	over most of bone	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	one end of non-long bone	none	none	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	over most of bone	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
vertebra	one end of non-long bone	none	none	none	none
zygomatic arch	one end of non-long bone	none	none	one end of non-long bone	none

APPENDIX K: Brown Hyaena Project D-P 9 Bone Damage

Element	gnawing	punctates/location	scouring/location	acid etching	crenulated edges/location	striations/location
atlas	carnivore gnawed	none	none	none	over most of bone	none
atlas	carnivore gnawed	none	none	none	over most of bone	none
atlas	carnivore gnawed	none	none	none	over most of bone	none
atlas	carnivore gnawed	none	none	none	over most of bone	none
atlas	carnivore gnawed	none	none	none	one end of non-long bone	none
atlas	carnivore gnawed	none	none	none	over most of bone	none
atlas	carnivore gnawed	none	none	none	over most of bone	none
axis	carnivore gnawed	none	none	none	one end of non-long bone	none
axis	carnivore gnawed	none	none	none	one end of non-long bone	none
axis	carnivore gnawed	none	none	none	one end of non-long bone	none
axis	carnivore gnawed	none	none	none	one end of non-long bone	none
axis	carnivore gnawed	none	none	none	one end of non-long bone	none
axis	carnivore gnawed	none	none	none	over most of bone	none
axis	carnivore gnawed	none	none	none	over most of bone	none
axis	carnivore gnawed	none	none	none	one end of non-long bone	none
carpal	carnivore gnawed	one end of non-long bone	none	none	none	none
carpal	carnivore gnawed	one end of non-long bone	none	none	none	none
caudal vert	carnivore gnawed	over most of bone	none	none	none	none
caudal vert	carnivore gnawed	over most of bone	none	none	none	none
caudal vert	carnivore gnawed	over most of bone	none	none	none	none
caudal vert	carnivore gnawed	over most of bone	none	none	none	none
caudal vert	carnivore gnawed	over most of bone	none	none	none	none
caudal vert	carnivore gnawed	none	none	none	one end of non-long bone	none
caudal vert	carnivore gnawed	none	none	none	one end of non-long bone	none
caudal vert	carnivore gnawed	none	none	none	one end of non-long bone	none
caudal vert	carnivore gnawed	none	none	none	one end of non-long bone	none
caudal vert	carnivore gnawed	none	none	none	one end of non-long bone	none
caudal vert	carnivore gnawed	none	none	none	one end of non-long bone	none
cervical vert	carnivore gnawed	one end of non-long bone	none	none	none	none
cervical vert	carnivore gnawed	one end of non-long bone	none	none	none	none
cervical vert	carnivore gnawed	one end of non-long bone	none	none	none	none
cervical vert	carnivore gnawed	one end of non-long bone	none	none	none	none
cervical vert	carnivore gnawed	one end of non-long bone	none	none	none	none
cervical vert	carnivore gnawed	one end of non-long bone	none	none	none	none
cervical vert	carnivore gnawed	one end of non-long bone	none	none	none	none
cervical vert	carnivore gnawed	one end of non-long bone	none	none	none	none
cervical vert	carnivore gnawed	one end of non-long bone	none	none	none	none
coracoid	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
disk joints	carnivore gnawed	one end of non-long bone	none	none	none	none
disk joints	carnivore gnawed	one end of non-long bone	none	none	none	none

disk joints	carnivore gnawed	one end of non-long bone	none	none	none	none
femur	carnivore gnawed	proximal end	none	none	none	none
femur	carnivore gnawed	none	none	none	proximal end	proximal end
femur	carnivore gnawed	none	none	none	proximal end	none
femur	carnivore gnawed	none	none	none	proximal end	none
femur	carnivore gnawed	proximal end	none	none	proximal end	none
femur	carnivore gnawed	none	none	none	distal shaft	none
femur	carnivore gnawed	none	none	none	distal end	none
femur	carnivore gnawed	both prox and dis ends	none	none	proximal end	none
femur	carnivore gnawed	none	none	none	distal end	none
femur	carnivore gnawed	proximal shaft	none	none	none	none
femur	carnivore gnawed	distal end	none	none	proximal shaft	none
femur	carnivore gnawed	none	none	none	distal end	distal end
femur	carnivore gnawed	none	none	none	distal end	none
femur	carnivore gnawed	distal end	none	none	proximal shaft	none
femur	carnivore gnawed	distal end	none	none	none	none
femur	carnivore gnawed	none	none	none	both prox and dist ends	over most of bone
femur	carnivore gnawed	none	none	none	both prox and dist ends	over most of bone
femur	carnivore gnawed	distal shaft	none	none	none	none
femur	carnivore gnawed	proximal end	none	none	distal shaft	none
femur	carnivore gnawed	none	none	none	both prox and dist ends	over most of bone
femur	carnivore gnawed	proximal end	none	none	both prox and dist ends	none
femur	carnivore gnawed	proximal shaft	none	none	both prox and dist ends	none
femur	carnivore gnawed	none	none	none	proximal end	none
femur	carnivore gnawed	both prox and dis ends	none	none	none	none
femur	carnivore gnawed	distal shaft	none	none	both prox and dist ends	over most of bone
femur	carnivore gnawed	distal end	none	none	proximal shaft	none
femur	carnivore gnawed	none	none	none	distal shaft	none
femur	carnivore gnawed	none	none	none	none	proximal shaft
femur	carnivore gnawed	both prox and dis ends	none	none	proximal end	none
femur	carnivore gnawed	proximal end	none	none	proximal shaft	proximal shaft
femur	carnivore gnawed	none	none	none	over most of bone	none
femur	carnivore gnawed	none	none	none	over most of bone	over most of bone
femur	carnivore gnawed	proximal end	none	none	proximal shaft	none
femur	carnivore gnawed	none	none	none	distal shaft	none
femur	carnivore gnawed	none	none	none	both prox and dist ends	none
femur	carnivore gnawed	none	none	none	both prox and dist ends	none
femur	carnivore gnawed	proximal end	none	none	both prox and dist ends	over most of bone
femur	carnivore gnawed	none	none	none	over most of bone	none
femur	carnivore gnawed	distal end	none	none	both prox and dist ends	none
femur	carnivore gnawed	none	none	none	over most of bone	none
femur	carnivore gnawed	proximal end	none	none	proximal shaft	none
femur	carnivore gnawed	none	none	none	proximal shaft	none
femur	carnivore gnawed	proximal end	none	none	distal shaft	none
femur	carnivore gnawed	none	none	none	both prox and dist ends	none

femur	carnivore gnawed	none	none	none	proximal shaft	none
femur	carnivore gnawed	distal end	none	none	both prox and dist ends	none
femur	carnivore gnawed	none	none	none	proximal shaft	none
femur	carnivore gnawed	none	none	none	proximal shaft	none
femur	carnivore gnawed	distal end	none	none	none	none
femur	carnivore gnawed	distal end	none	none	none	none
femur	carnivore gnawed	none	none	none	distal shaft	distal shaft
femur	carnivore gnawed	proximal end	none	none	none	none
femur	carnivore gnawed	none	none	none	proximal shaft	none
femur	carnivore gnawed	none	none	none	both prox and dist ends	none
femur	carnivore gnawed	both prox and dis ends	none	none	none	none
femur	carnivore gnawed	distal end	none	none	none	none
femur	carnivore gnawed	none	none	none	proximal shaft	none
femur	carnivore gnawed	distal shaft	none	none	none	none
femur	carnivore gnawed	distal end	none	none	none	none
femur	carnivore gnawed	both prox and dis ends	none	none	none	none
femur	carnivore gnawed	distal end	none	none	proximal shaft	none
femur	carnivore gnawed	none	none	none	proximal shaft	none
femur	carnivore gnawed	none	none	none	proximal shaft	none
femur	carnivore gnawed	none	none	none	distal end	none
femur	carnivore gnawed	proximal end	none	none	distal shaft	none
femur	carnivore gnawed	none	none	none	proximal shaft	none
femur	carnivore gnawed	none	none	none	both prox and dist ends	none
femur	carnivore gnawed	none	none	none	both prox and dist ends	none
femur	carnivore gnawed	proximal end	none	none	none	none
femur	carnivore gnawed	proximal end	none	none	none	none
femur	carnivore gnawed	proximal shaft	none	none	none	none
femur	carnivore gnawed	proximal shaft	none	none	proximal shaft	none
fibula	carnivore gnawed	none	none	none	distal shaft	none
fibula	carnivore gnawed	none	none	none	none	none
fibula	carnivore gnawed	none	none	none	none	none
fibula	carnivore gnawed	none	none	none	distal shaft	distal shaft
fibula	carnivore gnawed	distal end	none	none	proximal shaft	none
fibula	carnivore gnawed	distal end	none	none	proximal shaft	none
fibula	carnivore gnawed	none	none	none	distal shaft	distal shaft
fibula	carnivore gnawed	none	none	none	proximal shaft	none
fibula	carnivore gnawed	none	none	none	distal shaft	none
fibula	carnivore gnawed	none	none	none	both prox and dist ends	none
horn/antler	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
humerus	carnivore gnawed	both prox and dis ends	none	none	proximal shaft	none
humerus	carnivore gnawed	proximal end	none	none	proximal shaft	none
humerus	carnivore gnawed	proximal end	none	none	proximal end	none
humerus	carnivore gnawed	none	none	none	proximal end	none
humerus	carnivore gnawed	distal end	none	none	none	none
humerus	carnivore gnawed	proximal end	none	none	none	none

humerus	carnivore gnawed	none	none	none	proximal end	none
humerus	carnivore gnawed	proximal end	none	none	none	none
humerus	carnivore gnawed	proximal end	none	none	none	none
humerus	carnivore gnawed	none	none	none	distal shaft	none
humerus	carnivore gnawed	none	none	none	none	none
humerus	carnivore gnawed	proximal end	none	none	distal shaft	none
humerus	carnivore gnawed	distal end	none	none	none	none
humerus	carnivore gnawed	distal end	none	none	proximal shaft	over most of bone
humerus	carnivore gnawed	distal end	none	none	proximal shaft	none
humerus	carnivore gnawed	none	none	none	distal end	none
humerus	carnivore gnawed	proximal end	none	none	distal shaft	none
humerus	carnivore gnawed	proximal shaft	none	none	proximal shaft	none
humerus	carnivore gnawed	none	none	none	distal end	none
humerus	carnivore gnawed	proximal end	none	none	none	none
humerus	carnivore gnawed	proximal end	none	none	none	none
humerus	carnivore gnawed	none	none	none	proximal shaft	none
humerus	carnivore gnawed	distal end	none	none	proximal shaft	none
humerus	carnivore gnawed	proximal end	none	none	distal shaft	none
humerus	carnivore gnawed	distal shaft	none	none	proximal end	none
humerus	carnivore gnawed	both prox and dis ends	none	none	none	none
humerus	carnivore gnawed	none	none	none	proximal shaft	none
humerus	carnivore gnawed	none	none	none	both prox and dist ends	none
humerus	carnivore gnawed	none	none	none	distal shaft	none
humerus	carnivore gnawed	none	none	none	both prox and dist ends	none
humerus	carnivore gnawed	distal end	none	none	proximal shaft	none
humerus	carnivore gnawed	proximal end	none	none	none	proximal end
humerus	carnivore gnawed	none	none	none	proximal shaft	none
humerus	carnivore gnawed	both prox and dis ends	none	none	proximal end	none
humerus	carnivore gnawed	both prox and dis ends	none	none	none	none
humerus	carnivore gnawed	none	none	none	proximal shaft	none
humerus	carnivore gnawed	none	none	none	distal end	none
humerus	carnivore gnawed	both prox and dis ends	none	none	proximal shaft	none
humerus	carnivore gnawed	none	none	none	proximal shaft	none
humerus	carnivore gnawed	none	none	none	distal shaft	none
humerus	carnivore gnawed	proximal shaft	none	none	proximal shaft	none
humerus	carnivore gnawed	both prox and dis ends	none	none	both prox and dist ends	none
humerus	carnivore gnawed	proximal end	none	none	proximal end	none
humerus	carnivore gnawed	none	none	none	both prox and dist ends	none
humerus	carnivore gnawed	over most of bone	none	none	both prox and dist ends	none
humerus	carnivore gnawed	both prox and dis ends	none	none	both prox and dist ends	over most of bone
humerus	carnivore gnawed	distal end	none	none	proximal shaft	over most of bone
humerus	carnivore gnawed	none	none	none	over most of bone	none
humerus	carnivore gnawed	distal shaft	none	none	both prox and dist ends	none
humerus	carnivore gnawed	proximal end	none	none	distal end	none
humerus	carnivore gnawed	distal end	none	none	both prox and dist ends	none

humerus	carnivore gnawed	proximal shaft	none	none	proximal shaft	none
humerus	carnivore gnawed	none	none	none	both prox and dist ends	over most of bone
humerus	carnivore gnawed	none	none	none	proximal shaft	none
humerus	carnivore gnawed	none	none	none	distal end	none
humerus	carnivore gnawed	proximal shaft	none	none	both prox and dist ends	none
humerus	carnivore gnawed	distal end	none	none	none	none
humerus	carnivore gnawed	distal end	none	none	none	none
humerus	carnivore gnawed	none	none	none	distal end	none
humerus	carnivore gnawed	proximal end	none	none	none	none
humerus	carnivore gnawed	proximal end	none	none	none	none
humerus	carnivore gnawed	proximal end	none	none	none	none
humerus	carnivore gnawed	none	none	none	proximal shaft	none
humerus	carnivore gnawed	distal end	none	none	none	distal shaft
humerus	carnivore gnawed	both prox and dis ends	none	none	none	none
humerus	carnivore gnawed	none	none	none	proximal shaft	none
humerus	carnivore gnawed	proximal end	none	none	none	none
humerus	carnivore gnawed	none	none	none	proximal shaft	none
humerus	carnivore gnawed	distal end	none	none	proximal shaft	none
humerus	carnivore gnawed	distal end	none	none	proximal shaft	none
humerus	carnivore gnawed	distal end	none	none	proximal shaft	none
humerus	carnivore gnawed	none	none	none	proximal shaft	none
humerus	carnivore gnawed	none	none	none	proximal shaft	none
humerus	carnivore gnawed	none	none	none	proximal shaft	none
humerus	carnivore gnawed	none	none	none	proximal shaft	none
humerus	carnivore gnawed	distal end	none	none	proximal shaft	none
humerus	carnivore gnawed	distal end	none	none	proximal shaft	over most of bone
humerus	carnivore gnawed	proximal end	none	none	distal end	none
humerus	carnivore gnawed	proximal end	none	none	proximal end	none
humerus	carnivore gnawed	distal end	none	none	distal shaft	none
humerus	carnivore gnawed	none	none	none	proximal end	none
humerus	carnivore gnawed	proximal end	none	none	distal end	none
humerus	carnivore gnawed	distal end	none	none	distal shaft	none
humerus	carnivore gnawed	proximal end	none	none	distal shaft	none
humerus	carnivore gnawed	both prox and dis ends	none	none	none	none
humerus	carnivore gnawed	none	none	none	both prox and dist ends	none
humerus	carnivore gnawed	proximal end	none	none	distal shaft	none
humerus	carnivore gnawed	none	none	none	distal shaft	none
humerus	carnivore gnawed	none	none	none	both prox and dist ends	over most of bone
humerus	carnivore gnawed	over most of bone	none	none	over most of bone	over most of bone
humerus	carnivore gnawed	distal shaft	none	none	both prox and dist ends	over most of bone
humerus	carnivore gnawed	none	none	none	both prox and dist ends	none
humerus	carnivore gnawed	none	none	none	distal shaft	none
humerus	carnivore gnawed	proximal shaft	none	none	proximal shaft	none
humerus	carnivore gnawed	none	none	none	both prox and dist ends	none
humerus	carnivore gnawed	proximal shaft	none	none	both prox and dist ends	none

humerus	carnivore gnawed	none	none	none	over most of bone	none
humerus	carnivore gnawed	none	none	none	proximal end	none
humerus	carnivore gnawed	none	none	none	over most of bone	none
humerus	carnivore gnawed	distal end	none	none	proximal shaft	none
humerus	carnivore gnawed	proximal end	none	none	none	none
humerus	carnivore gnawed	none	none	none	distal end	none
humerus	carnivore gnawed	none	none	none	both prox and dist ends	none
humerus	carnivore gnawed	none	none	none	both prox and dist ends	none
humerus	carnivore gnawed	none	none	none	distal shaft	none
humerus	carnivore gnawed	none	none	none	distal shaft	none
humerus	carnivore gnawed	none	none	none	both prox and dist ends	none
humerus	carnivore gnawed	none	none	none	both prox and dist ends	none
humerus	carnivore gnawed	none	none	none	proximal shaft	none
humerus	carnivore gnawed	none	none	none	distal shaft	none
humerus	carnivore gnawed	none	none	none	distal shaft	none
humerus	carnivore gnawed	none	none	none	both prox and dist ends	none
humerus	carnivore gnawed	none	none	none	both prox and dist ends	none
humerus	carnivore gnawed	none	none	none	distal shaft	none
humerus	carnivore gnawed	none	none	none	proximal shaft	none
humerus	carnivore gnawed	none	none	none	both prox and dist ends	none
humerus	carnivore gnawed	none	none	none	over most of bone	none
humerus	carnivore gnawed	one end of non-long bone	none	none	none	none
humerus	carnivore gnawed	none	none	none	distal shaft	none
humerus	carnivore gnawed	distal end	none	none	proximal shaft	none
humerus	carnivore gnawed	none	none	none	distal shaft	none
humerus	carnivore gnawed	one end of non-long bone	none	none	none	none
humerus	carnivore gnawed	one end of non-long bone	none	none	none	none
humerus	carnivore gnawed	one end of non-long bone	none	none	none	none
humerus	carnivore gnawed	one end of non-long bone	none	none	none	none
illium	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
illium	carnivore gnawed	one end of non-long bone	none	none	none	none
illium	carnivore gnawed	one end of non-long bone	none	none	none	none
illium	carnivore gnawed	none	none	none	one end of non-long bone	none
lumbar vert	carnivore gnawed	one end of non-long bone	none	none	none	none
lumbar vert	carnivore gnawed	one end of non-long bone	none	none	none	none
mandible	carnivore gnawed	none	none	none	both prox and dist ends	mandibular heal
mandible	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	both prox and dist ends	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	over most of bone	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none

mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	mandibular heal	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	one end of non-long bone	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	one end of non-long bone	none	none	mandibular heal	none
mandible	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	mandibular heal	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	mandibular heal	none	none	one end of non-long bone	none
mandible	carnivore gnawed	mandibular heal	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	mandibular heal	none	none	none	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	one end of non-long bone	none	none	none	none
mandible	carnivore gnawed	one end of non-long bone	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	over most of bone	none

mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
mandible	carnivore gnawed	mandibular heal	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	mandibular heal	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	mandibular heal	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	mandibular heal	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	one end of non-long bone	none	none	none	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	mandibular heal	none	none	none	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	one end of non-long bone	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	over most of bone	none

mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	mandibular heal	none	none	none	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	rodent and carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	mandibular heal	over most of bone
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	mandibular heal	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	one end of non-long bone	none	none	none	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandibular hinge	carnivore gnawed	none	none	none	over most of bone	none
mandibular hinge	carnivore gnawed	none	none	none	one end of non-long bone	none
mandibular hinge	carnivore gnawed	none	none	none	one end of non-long bone	none
mandibular hinge	carnivore gnawed	none	none	none	one end of non-long bone	none
mandibular hinge	carnivore gnawed	none	none	none	one end of non-long bone	none
mandibular hinge	carnivore gnawed	none	none	none	one end of non-long bone	none
mandibular hinge	carnivore gnawed	none	none	none	one end of non-long bone	none
mandibular hinge	carnivore gnawed	none	none	none	one end of non-long bone	none
mandibular hinge	carnivore gnawed	none	none	none	one end of non-long bone	none

mandibular hinge	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none

maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
metacarpal	carnivore gnawed	proximal end	none	none	distal shaft	over most of bone
metacarpal	carnivore gnawed	proximal end	none	none	none	proximal shaft

metacarpal	carnivore gnawed	proximal shaft	none	none	proximal shaft	none
metacarpal	carnivore gnawed	proximal shaft	none	none	proximal shaft	none
metapodial	carnivore gnawed	none	none	none	both prox and dist ends	over most of bone
metapodial	carnivore gnawed	proximal end	none	none	both prox and dist ends	over most of bone
metapodial	carnivore gnawed	none	none	none	both prox and dist ends	over most of bone
metapodial	carnivore gnawed	none	none	none	none	over most of bone
metapodial	carnivore gnawed	none	none	none	none	over most of bone
metapodial	carnivore gnawed	none	none	none	over most of bone	none
metapodial	carnivore gnawed	none	none	none	distal end	none
metapodial	carnivore gnawed	proximal end	none	none	distal shaft	none
metapodial	carnivore gnawed	none	none	none	proximal shaft	none
metapodial	carnivore gnawed	distal shaft	none	none	distal shaft	none
metapodial	carnivore gnawed	none	none	none	over most of bone	none
metapodial	carnivore gnawed	none	none	none	proximal shaft	none
metapodial	carnivore gnawed	none	none	none	proximal shaft	none
metapodial	carnivore gnawed	none	none	none	over most of bone	none
metapodial	carnivore gnawed	one end of non-long bone	none	none	none	none
metapodial	carnivore gnawed	none	none	none	one end of non-long bone	none
metapodial	carnivore gnawed	none	none	none	one end of non-long bone	none
metapodial	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
metapodial	carnivore gnawed	none	none	none	proximal shaft	none
metapodial	carnivore gnawed	none	none	none	proximal shaft	none
metapodial	carnivore gnawed	none	none	none	proximal shaft	none
metapodial	carnivore gnawed	none	none	none	proximal shaft	none
metapodial	carnivore gnawed	none	none	none	proximal shaft	none
metapodial	carnivore gnawed	none	none	none	proximal shaft	none
metapodial	carnivore gnawed	none	none	none	proximal shaft	none
metapodial	carnivore gnawed	none	none	none	proximal shaft	none
metapodial	carnivore gnawed	none	none	none	proximal shaft	none
occipital condyle	carnivore gnawed	none	none	none	over most of bone	none
occipital condyle	carnivore gnawed	none	none	none	over most of bone	none
occipital condyle	carnivore gnawed	none	none	none	over most of bone	none
occipital condyle	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none

pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	one end of non-long bone	none	none	none	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	over most of bone	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	none	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	none	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	over most of bone	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	over most of bone	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
pelvis (acetabulum)	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	over most of bone	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none

pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none
phalanx 1	carnivore gnawed	one end of non-long bone	none	none	none	none
phalanx 1	carnivore gnawed	one end of non-long bone	none	none	none	none
phalanx 1	carnivore gnawed	none	none	none	one end of non-long bone	none
phalanx 1	carnivore gnawed	none	none	none	one end of non-long bone	none
phalanx 1	carnivore gnawed	none	none	none	one end of non-long bone	none
phalanx 1	carnivore gnawed	none	none	none	one end of non-long bone	none
phalanx 1	carnivore gnawed	none	none	none	one end of non-long bone	none
phalanx 1	carnivore gnawed	none	none	none	one end of non-long bone	none
phalanx 2	carnivore gnawed	none	none	none	one end of non-long bone	none
phalanx 2	carnivore gnawed	none	none	none	one end of non-long bone	none
phalanx 2	carnivore gnawed	none	none	none	one end of non-long bone	none
phalanx 2	carnivore gnawed	none	none	none	one end of non-long bone	none
phalanx 2	carnivore gnawed	none	none	none	one end of non-long bone	none
phalanx 2	carnivore gnawed	none	none	none	one end of non-long bone	none
phalanx 2	carnivore gnawed	none	none	none	one end of non-long bone	none
phalanx 2	carnivore gnawed	none	none	none	one end of non-long bone	none
phalanx 2	carnivore gnawed	none	none	none	one end of non-long bone	none
phalanx 2	carnivore gnawed	none	none	none	one end of non-long bone	none
phalanx 2	carnivore gnawed	none	none	none	one end of non-long bone	none
phalanx 2	carnivore gnawed	one end of non-long bone	none	none	none	none
phalanx 2	carnivore gnawed	one end of non-long bone	none	none	none	none
phalanx 2	carnivore gnawed	one end of non-long bone	none	none	none	none
radius	carnivore gnawed	none	none	none	proximal shaft	none
radius	carnivore gnawed	none	none	none	both prox and dist ends	over most of bone
radius	carnivore gnawed	none	none	none	distal shaft	none
radius	carnivore gnawed	none	none	none	distal shaft	none
radius	carnivore gnawed	none	none	none	distal shaft	none
radius	carnivore gnawed	distal shaft	none	none	distal shaft	none

radius	carnivore gnawed	none	none	none	distal shaft	none
radius	carnivore gnawed	proximal end	none	none	none	none
radius	carnivore gnawed	distal shaft	none	none	distal end	none
radius	carnivore gnawed	distal end	none	none	distal end	none
radius	carnivore gnawed	none	none	none	distal shaft	none
radius	carnivore gnawed	distal shaft	none	none	distal end	none
radius	carnivore gnawed	none	none	none	distal shaft	none
radius	carnivore gnawed	none	none	none	distal shaft	none
radius	carnivore gnawed	none	none	none	distal shaft	none
radius	carnivore gnawed	proximal end	none	none	distal shaft	none
radius	carnivore gnawed	none	none	none	distal shaft	none
radius	carnivore gnawed	none	none	none	proximal shaft	none
radius	carnivore gnawed	none	none	none	proximal shaft	none
radius	carnivore gnawed	none	none	none	distal end	none
radius	carnivore gnawed	none	none	none	over most of bone	none
radius	carnivore gnawed	proximal end	none	none	distal shaft	none
radius	carnivore gnawed	distal shaft	none	none	distal shaft	none
radius	carnivore gnawed	proximal end	none	none	proximal shaft	none
radius	carnivore gnawed	proximal end	none	none	distal end	none
radius	carnivore gnawed	none	none	none	distal shaft	none
radius	carnivore gnawed	both prox and dis ends	none	none	distal end	none
radius	carnivore gnawed	distal end	none	none	proximal shaft	none
radius	carnivore gnawed	distal shaft	none	none	none	none
radius	carnivore gnawed	distal shaft	none	none	none	none
radius	carnivore gnawed	none	none	none	both prox and dist ends	none
radius	carnivore gnawed	proximal end	none	none	distal shaft	none
radius	carnivore gnawed	distal shaft	none	none	distal shaft	none
radius	carnivore gnawed	over most of bone	none	none	proximal shaft	none
radius	carnivore gnawed	none	none	none	distal shaft	none
radius	carnivore gnawed	none	none	none	proximal shaft	none
radius	carnivore gnawed	over most of bone	none	none	both prox and dist ends	none
radius	carnivore gnawed	proximal shaft	none	none	proximal shaft	none
radius	carnivore gnawed	none	none	none	proximal end	none
radius	carnivore gnawed	proximal shaft	none	none	proximal shaft	none
radius	carnivore gnawed	distal end	none	none	none	none
radius	carnivore gnawed	none	none	none	proximal shaft	none
radius	carnivore gnawed	none	none	none	proximal shaft	none
radius	carnivore gnawed	proximal shaft	none	none	proximal shaft	none
radius	carnivore gnawed	proximal shaft	none	none	none	none
radius	carnivore gnawed	none	none	none	proximal shaft	none
radius	carnivore gnawed	none	none	none	both prox and dist ends	none
radius	carnivore gnawed	none	none	none	distal shaft	none
radius	carnivore gnawed	proximal shaft	none	none	distal shaft	none
radius	carnivore gnawed	distal shaft	none	none	none	none
radius	carnivore gnawed	none	none	none	both prox and dist ends	none

radius	carnivore gnawed	none	none	none	distal shaft	none
radius	carnivore gnawed	none	none	none	proximal shaft	none
radius	carnivore gnawed	distal shaft	none	none	none	none
radius	carnivore gnawed	none	none	none	distal shaft	distal shaft
radius	carnivore gnawed	none	none	none	proximal shaft	none
radius	carnivore gnawed	none	none	none	distal shaft	none
radius	carnivore gnawed	proximal end	none	none	none	none
radius	carnivore gnawed	none	none	none	distal shaft	none
radius	carnivore gnawed	none	none	none	distal shaft	none
radius	carnivore gnawed	none	none	none	distal shaft	none
radius	carnivore gnawed	none	none	none	distal shaft	distal shaft
radius	carnivore gnawed	proximal shaft	none	none	both prox and dist ends	none
radius	carnivore gnawed	distal end	none	none	distal shaft	none
radius	carnivore gnawed	none	none	none	none	none
radius	carnivore gnawed	none	none	none	both prox and dist ends	none
radius	carnivore gnawed	none	none	none	both prox and dist ends	none
radius	carnivore gnawed	none	none	none	distal shaft	none
rib	carnivore gnawed	one end of non-long bone	none	none	none	none
rib	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
rib	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
rib	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	one end of non-long bone
rib	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
rib	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
rib	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
rib	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
rib	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
rib	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
rib	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
rib	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none

rib	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
rib	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
rib	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
rib	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
rib	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
rib	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
rib	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
rib	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
rib	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	one end of non-long bone	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	over most of bone
sacrum	carnivore gnawed	none	none	none	over most of bone	none
sacrum	carnivore gnawed	none	none	none	over most of bone	none
sacrum	carnivore gnawed	none	none	none	over most of bone	none
sacrum	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	one end of non-long bone	none	none	none	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none

scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	proximal end	none	none	one end of non-long bone	none
scapula	carnivore gnawed	proximal end	none	none	one end of non-long bone	none
scapula	carnivore gnawed	proximal end	none	none	one end of non-long bone	none
scapula	carnivore gnawed	proximal end	none	none	one end of non-long bone	none
scapula	carnivore gnawed	proximal end	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	proximal end	none	none	one end of non-long bone	none
scapula	carnivore gnawed	over most of bone	none	none	one end of non-long bone	none
scapula	carnivore gnawed	proximal end	none	none	one end of non-long bone	none
scapula	carnivore gnawed	over most of bone	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none

scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	proximal end	none	none	one end of non-long bone	none
scapula	carnivore gnawed	over most of bone	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
scapula	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none

scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	proximal end	none	none	one end of non-long bone	none
scapula	carnivore gnawed	proximal end	none	none	one end of non-long bone	none
scapula	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
skull	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none

skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none

skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	one end of non-long bone	none	none	none	none
skull fragment	carnivore gnawed	one end of non-long bone	none	none	none	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
skull fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
skull fragment	carnivore gnawed	none	none	none	one end of non-long bone	none

skull fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
skull fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
skull fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
skull fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
skull fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
skull fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
skull fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
skull fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
skull fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
skull fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
skull fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
skull fragment	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
skull fragment	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
skull fragment	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
skull fragment	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
skull fragment	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
skull fragment	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
skull fragment	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
skull fragment	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
skull fragment	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
skull fragment	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
skull fragment	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
skull fragment	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
skull fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
skull fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
skull fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
skull fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
skull fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
skull fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
skull fragment	carnivore gnawed	none	none	none	none	proximal shaft
skull fragment	carnivore gnawed	none	none	none	none	proximal shaft
sternum	carnivore gnawed	over most of bone	none	none	none	none
sternum	carnivore gnawed	none	none	none	one end of non-long bone	none
sternum	carnivore gnawed	none	none	none	one end of non-long bone	none
sternum	carnivore gnawed	none	none	none	one end of non-long bone	none
sternum	carnivore gnawed	none	none	none	one end of non-long bone	none
sternum	carnivore gnawed	none	none	none	one end of non-long bone	none
sternum	carnivore gnawed	none	none	none	one end of non-long bone	none
sternum	carnivore gnawed	none	none	none	one end of non-long bone	none
sternum	carnivore gnawed	none	none	none	one end of non-long bone	none
sternum	carnivore gnawed	none	none	none	one end of non-long bone	none
sternum	carnivore gnawed	none	none	none	one end of non-long bone	none

sternum	carnivore gnawed	none	none	none	one end of non-long bone	none
sternum	carnivore gnawed	one end of non-long bone	none	none	none	none
sternum	carnivore gnawed	none	none	none	both prox and dist ends	none
thoracic vert	carnivore gnawed	one end of non-long bone	none	none	none	none
thoracic vert	carnivore gnawed	one end of non-long bone	none	none	none	none
thoracic vert	carnivore gnawed	one end of non-long bone	none	none	none	none
thoracic vert	carnivore gnawed	one end of non-long bone	none	none	none	none
thoracic vert	carnivore gnawed	one end of non-long bone	none	none	none	none
thoracic vert	carnivore gnawed	one end of non-long bone	none	none	none	none
thoracic vert	carnivore gnawed	one end of non-long bone	none	none	none	none
thoracic vert	carnivore gnawed	one end of non-long bone	none	none	none	none
thoracic vert	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
thoracic vert	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
thoracic vert	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
thoracic vert	carnivore gnawed	over most of bone	none	none	none	none
tibia	carnivore gnawed	none	none	none	distal shaft	none
tibia	carnivore gnawed	none	none	none	distal shaft	none
tibia	carnivore gnawed	none	none	none	distal end	none
tibia	carnivore gnawed	none	none	none	proximal end	none
tibia	carnivore gnawed	distal shaft	none	none	none	none
tibia	carnivore gnawed	none	none	none	distal shaft	none
tibia	carnivore gnawed	none	none	none	proximal shaft	none
tibia	carnivore gnawed	proximal shaft	none	none	proximal shaft	none
tibia	carnivore gnawed	none	none	none	distal shaft	none
tibia	carnivore gnawed	none	none	none	proximal shaft	none
tibia	carnivore gnawed	none	none	none	distal shaft	none
tibia	carnivore gnawed	none	none	none	proximal shaft	none
tibia	carnivore gnawed	none	none	none	proximal end	none
tibia	carnivore gnawed	none	none	none	both prox and dist ends	none
tibia	carnivore gnawed	distal shaft	none	none	distal end	none
tibia	carnivore gnawed	distal shaft	none	none	none	none
tibia	carnivore gnawed	proximal end	none	none	none	none
tibia	carnivore gnawed	distal shaft	none	none	none	none
tibia	carnivore gnawed	none	none	none	distal shaft	none
tibia	carnivore gnawed	none	none	none	distal shaft	none
tibia	carnivore gnawed	proximal shaft	none	none	proximal shaft	none
tibia	carnivore gnawed	none	none	none	proximal shaft	none
tibia	carnivore gnawed	none	none	none	distal shaft	none
tibia	carnivore gnawed	both prox and dis ends	none	none	both prox and dist ends	none
tibia	carnivore gnawed	none	none	none	both prox and dist ends	proximal shaft
tibia	carnivore gnawed	none	none	none	distal shaft	distal shaft
tibia	carnivore gnawed	none	none	none	proximal shaft	none
tibia	carnivore gnawed	none	none	none	distal shaft	none
tibia	carnivore gnawed	none	none	none	both prox and dist ends	none
tibia	carnivore gnawed	none	none	none	both prox and dist ends	none

tibia	carnivore gnawed	proximal shaft	none	none	proximal shaft	none
tibia	carnivore gnawed	none	none	none	proximal shaft	none
tibia	carnivore gnawed	none	none	none	proximal shaft	over most of bone
tibia	carnivore gnawed	proximal end	none	none	distal shaft	none
tibia	carnivore gnawed	none	none	none	proximal shaft	none
tibia	carnivore gnawed	distal end	none	none	proximal shaft	none
tibia	carnivore gnawed	distal shaft	none	none	distal shaft	none
tibia	carnivore gnawed	proximal end	none	none	none	none
tibia	carnivore gnawed	proximal shaft	none	none	proximal shaft	none
tibia	carnivore gnawed	none	none	none	proximal shaft	none
tibia	carnivore gnawed	none	none	none	proximal shaft	none
tibia	carnivore gnawed	none	none	none	distal shaft	none
tibia	carnivore gnawed	none	none	none	proximal end	none
tibia	carnivore gnawed	none	none	none	proximal shaft	none
tibia	carnivore gnawed	none	none	none	proximal shaft	none
tibia	carnivore gnawed	none	none	none	proximal shaft	none
tibia	carnivore gnawed	distal end	none	none	none	none
tibia	carnivore gnawed	none	none	none	proximal shaft	none
tibia	carnivore gnawed	none	none	none	proximal end	none
tibia	carnivore gnawed	none	none	none	proximal shaft	none
tibia	carnivore gnawed	none	none	none	proximal shaft	none
tibia	carnivore gnawed	proximal end	none	none	none	none
tibia	carnivore gnawed	none	none	none	proximal shaft	proximal shaft
tibia	carnivore gnawed	none	none	none	proximal shaft	none
tibia	carnivore gnawed	none	none	none	proximal shaft	none
tibia	carnivore gnawed	none	none	none	distal shaft	none
tibia	carnivore gnawed	none	none	none	proximal shaft	none
tibia	carnivore gnawed	none	none	none	proximal shaft	none
tibia	carnivore gnawed	none	none	none	proximal shaft	none
tibia	carnivore gnawed	none	none	none	proximal shaft	none
tibia	carnivore gnawed	distal end	none	none	proximal shaft	none
tibia	carnivore gnawed	proximal shaft	none	none	none	none
tibia	carnivore gnawed	none	none	none	both prox and dist ends	none
tibia	carnivore gnawed	none	none	none	both prox and dist ends	none
tibia	carnivore gnawed	none	none	none	both prox and dist ends	over most of bone
tibia	carnivore gnawed	none	none	none	both prox and dist ends	none
tibia	carnivore gnawed	distal shaft	none	none	distal shaft	none
tibia	carnivore gnawed	none	none	none	proximal end	none
tibia	carnivore gnawed	none	none	none	both prox and dist ends	none
tibia	carnivore gnawed	none	none	none	both prox and dist ends	none
tibia	carnivore gnawed	none	none	none	both prox and dist ends	none
tibia	carnivore gnawed	none	none	none	both prox and dist ends	none
tibia	carnivore gnawed	none	none	none	over most of bone	none
tibia	carnivore gnawed	none	none	none	both prox and dist ends	none
tibia	carnivore gnawed	proximal shaft	none	none	proximal shaft	none

tibia	carnivore gnawed	none	none	none	proximal shaft	none
tibia	carnivore gnawed	none	none	none	both prox and dist ends	none
tibia	carnivore gnawed	distal shaft	none	none	none	none
tibia	carnivore gnawed	none	none	none	over most of bone	none
tibia	carnivore gnawed	proximal shaft	none	none	both prox and dist ends	none
tibia	carnivore gnawed	distal end	none	none	distal shaft	none
tibia	carnivore gnawed	none	none	none	both prox and dist ends	none
tibia	carnivore gnawed	none	none	none	distal shaft	none
tibia	carnivore gnawed	distal shaft	none	none	distal shaft	none
tibia	carnivore gnawed	none	none	none	proximal shaft	none
tibia	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	distal end	none	none	none	none
ulna	carnivore gnawed	none	none	none	proximal end	none
ulna	carnivore gnawed	proximal end	none	none	proximal shaft	none
ulna	carnivore gnawed	proximal end	none	none	none	none
ulna	carnivore gnawed	none	none	none	proximal shaft	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	proximal shaft	none
ulna	carnivore gnawed	none	none	none	proximal end	none
ulna	carnivore gnawed	none	none	none	proximal end	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	proximal end	none	none	none	none
ulna	carnivore gnawed	distal shaft	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	proximal end	none
ulna	carnivore gnawed	none	none	none	proximal shaft	none
ulna	carnivore gnawed	none	none	none	proximal shaft	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	proximal shaft	none
ulna	carnivore gnawed	distal shaft	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	proximal shaft	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	proximal shaft	none
ulna	carnivore gnawed	proximal shaft	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	over most of bone	none
ulna	carnivore gnawed	proximal end	none	none	proximal end	none
ulna	carnivore gnawed	proximal shaft	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	distal shaft	none
ulna	carnivore gnawed	none	none	none	distal shaft	none
ulna	carnivore gnawed	none	none	none	distal shaft	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none

ulna	carnivore gnawed	proximal shaft	none	none	distal shaft	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	distal shaft	none
ulna	carnivore gnawed	proximal shaft	none	none	over most of bone	none
ulna	carnivore gnawed	none	none	none	proximal shaft	none
ulna	carnivore gnawed	none	none	none	proximal shaft	none
ulna	carnivore gnawed	proximal shaft	none	none	proximal shaft	none
ulna	carnivore gnawed	proximal shaft	none	none	both prox and dist ends	none
ulna	carnivore gnawed	proximal shaft	none	none	proximal shaft	none
ulna	carnivore gnawed	none	none	none	over most of bone	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	proximal end	none
ulna	carnivore gnawed	proximal end	none	none	none	none
ulna	carnivore gnawed	none	none	none	proximal end	none
ulna	carnivore gnawed	none	none	none	proximal end	none
ulna	carnivore gnawed	proximal end	none	none	none	none
ulna	carnivore gnawed	proximal shaft	none	none	distal shaft	none
ulna	carnivore gnawed	proximal shaft	none	none	proximal shaft	none
ulna	carnivore gnawed	none	none	none	over most of bone	over most of bone
ulna	carnivore gnawed	proximal shaft	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	proximal shaft	none
ulna	carnivore gnawed	proximal end	none	none	proximal end	none
ulna	carnivore gnawed	none	none	none	over most of bone	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	over most of bone	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	proximal end	none

ulna	carnivore gnawed	none	none	none	proximal shaft	none
ulna	carnivore gnawed	proximal shaft	none	none	none	none
ulna	carnivore gnawed	none	none	none	one end of non-long bone	none
ulna	carnivore gnawed	proximal end	none	none	distal shaft	none
ulna	carnivore gnawed	proximal end	none	none	distal shaft	none
ulna	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	over most of bone	none
unidentified fragment	carnivore gnawed	none	none	none	over most of bone	none
unidentified fragment	carnivore gnawed	none	none	none	none	over most of bone
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	none	over most of bone
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	over most of bone	none
unidentified fragment	carnivore gnawed	none	none	none	over most of bone	none
unidentified fragment	carnivore gnawed	none	none	none	over most of bone	none
unidentified fragment	carnivore gnawed	none	none	none	over most of bone	none
unidentified fragment	carnivore gnawed	none	none	none	over most of bone	none
unidentified fragment	carnivore gnawed	none	none	none	over most of bone	over most of bone
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	one end of non-long bone
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	one end of non-long bone
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	one end of non-long bone
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	over most of bone
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	over most of bone
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	one end of non-long bone
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	one end of non-long

						bone
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	one end of non-long bone
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	one end of non-long bone
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	one end of non-long bone
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	one end of non-long bone
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	one end of non-long bone
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	one end of non-long bone
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	one end of non-long bone
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	one end of non-long bone
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	one end of non-long bone
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	one end of non-long bone
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	one end of non-long bone
unidentified fragment	carnivore gnawed	one end of non-long bone	none	none	none	none
unidentified fragment	carnivore gnawed	one end of non-long bone	none	none	none	none
unidentified fragment	rodent and carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	one end of non-long bone	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	over most of bone	none	none	over most of bone	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none

unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
vertebra	carnivore gnawed	none	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	none	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	none	none	none	one end of non-long bone	one end of non-long bone
vertebra	carnivore gnawed	none	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	none	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	none	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	one end of non-long bone	none	none	none	none
vertebra	carnivore gnawed	one end of non-long bone	none	none	none	none

APPENDIX L: Brown Hyaena Project D-P 11 Bone Damage

Element	punctates/location	scouring/location	acid etching/location	crenulated edges/location	striations/location
atlas	none	none	none	over most of bone	none
carpo-metacarpus	none	none	none	none	over most of bone
femur	none	none	none	both prox and dist ends	none
fibula	none	none	none	proximal shaft	none
fibula	none	none	none	distal shaft	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	proximal shaft	none
lumbar vert	one end of non-long bone	none	none	none	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	both prox and dist ends	none
mandible	one end of non-long bone	none	none	both prox and dist ends	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none
metapodial	none	none	none	both prox and dist ends	none
metapodial	none	none	none	proximal shaft	none
occipital condyle	one end of non-long bone	none	none	over most of bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	none	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none

skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
sternum	none	none	none	one end of non-long bone	none
tibia	none	none	none	distal shaft	none
tibia	distal end	none	none	none	none
tibia	none	none	none	over most of bone	none
tibia	none	none	none	over most of bone	none
tibia	none	none	none	proximal shaft	none
tibio-tarsus	none	none	none	distal shaft	none
ulna	proximal end	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	over most of bone
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
zygomatic arch	none	none	none	one end of non-long bone	none

APPENDIX M: Brown Hyaena Project D-P 16 Bone Damage

Element	damage	punctates/location	scouring/location	acid etching/location	crenulated edges/location	striations/location
atlas	carnivore gnawed	none	none	none	one end of non-long bone	none
atlas	carnivore gnawed	none	none	none	one end of non-long bone	none
atlas	carnivore gnawed	none	none	none	over most of bone	none
atlas	carnivore gnawed	none	none	none	over most of bone	none
atlas	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
axis	carnivore gnawed	none	none	none	both prox and dist ends	none
axis	carnivore gnawed	none	none	none	both prox and dist ends	none
axis	carnivore gnawed	none	none	none	both prox and dist ends	none
calcaneus	carnivore gnawed	none	none	none	one end of non-long bone	none
carpo-metacarpus	carnivore gnawed	none	none	none	distal shaft	none
coracoid	carnivore gnawed	none	none	none	proximal shaft	none
femur	carnivore gnawed	none	none	none	both prox and dist ends	none
femur	carnivore gnawed	distal end	none	none	none	none
femur	carnivore gnawed	none	none	none	distal shaft	none
femur	carnivore gnawed	none	none	none	distal shaft	none
femur	carnivore gnawed	none	none	none	proximal shaft	none
femur	carnivore gnawed	none	none	none	both prox and dist ends	none
femur	carnivore gnawed	none	none	none	proximal shaft	none
femur	carnivore gnawed	distal shaft	none	none	distal end	none
femur	carnivore gnawed	none	none	none	proximal shaft	none
femur	carnivore gnawed	none	none	none	both prox and dist ends	none
femur	carnivore gnawed	distal shaft	none	none	both prox and dist ends	none
femur	carnivore gnawed	none	none	none	both prox and dist ends	none
femur	carnivore gnawed	distal end	none	none	none	none
femur	carnivore gnawed	proximal end	none	none	distal shaft	none
fibula	carnivore gnawed	both prox and dis ends	none	none	none	none
fibula	carnivore gnawed	none	none	none	distal shaft	none
fibula	carnivore gnawed	distal end	none	none	proximal shaft	none
fibula	carnivore gnawed	none	none	none	proximal shaft	none
fibula	carnivore gnawed	none	none	none	distal shaft	none
humerus	carnivore gnawed	distal end	none	none	distal shaft	none
humerus	carnivore gnawed	none	none	none	both prox and dist ends	none
humerus	carnivore gnawed	none	none	none	both prox and dist ends	none
humerus	carnivore gnawed	none	none	none	both prox and dist ends	none
humerus	carnivore gnawed	proximal end	none	none	proximal shaft	none
humerus	carnivore gnawed	both prox and dis ends	none	none	distal end	none
humerus	carnivore gnawed	none	none	none	proximal shaft	none
humerus	carnivore gnawed	distal end	none	none	distal shaft	none
humerus	carnivore gnawed	none	none	none	both prox and dist ends	none
humerus	carnivore gnawed	none	none	none	both prox and dist ends	none

humerus	carnivore gnawed	proximal end	none	none	none	none
humerus	carnivore gnawed	none	none	none	proximal shaft	none
humerus	carnivore gnawed	none	none	none	proximal shaft	none
humerus	carnivore gnawed	proximal end	none	none	none	none
humerus	carnivore gnawed	proximal shaft	none	none	proximal shaft	none
humerus	carnivore gnawed	none	none	none	proximal shaft	none
humerus	carnivore gnawed	distal end	none	none	distal end	none
humerus	carnivore gnawed	proximal end	none	none	proximal shaft	none
humerus	carnivore gnawed	none	none	none	over most of bone	none
humerus	carnivore gnawed	both prox and dis ends	none	none	none	none
humerus	carnivore gnawed	none	none	none	over most of bone	none
humerus	carnivore gnawed	none	none	none	over most of bone	none
humerus	carnivore gnawed	none	none	none	proximal end	none
humerus	carnivore gnawed	none	none	none	proximal shaft	none
humerus	carnivore gnawed	none	none	none	both prox and dist ends	none
humerus	carnivore gnawed	none	none	none	distal shaft	none
illium	carnivore gnawed	one end of non-long bone	none	none	none	none
illium	carnivore gnawed	none	none	none	one end of non-long bone	none
illium	carnivore gnawed	none	none	none	none	none
illium	carnivore gnawed	none	none	none	one end of non-long bone	none
illium	carnivore gnawed	one end of non-long bone	none	none	none	none
illium	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
illium	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
illium	carnivore gnawed	none	none	none	one end of non-long bone	none
illium	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
illium	carnivore gnawed	none	none	none	one end of non-long bone	none
illium	carnivore gnawed	over most of bone	none	none	one end of non-long bone	none
illium	carnivore gnawed	none	none	none	over most of bone	none
illium	carnivore gnawed	none	none	none	one end of non-long bone	none
illium	carnivore gnawed	none	none	none	one end of non-long bone	none
illium	carnivore gnawed	none	none	none	one end of non-long bone	none
ishium	carnivore gnawed	one end of non-long bone	none	none	none	none
ishium	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
ishium	carnivore gnawed	none	none	none	one end of non-long bone	none
lumbar vert	carnivore gnawed	none	none	none	one end of non-long bone	none
lumbar vert	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	both prox and dist ends	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	over most of bone	none	none	none	none
mandible	carnivore gnawed	none	none	none	both prox and dist ends	none
mandible	rodent and carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none

mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	both prox and dist ends	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	both prox and dist ends	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	both prox and dist ends	none
mandible	carnivore gnawed	mandibular heal	none	none	both prox and dist ends	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	both prox and dist ends	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	both prox and dist ends	none
mandible	carnivore gnawed	none	none	none	both prox and dist ends	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	both prox and dist ends	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	one end of non-long bone	none	none	both prox and dist ends	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	one end of non-long bone	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	both prox and dist ends	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	both prox and dist ends	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	mandibular heal	none
mandible	carnivore gnawed	none	none	none	both prox and dist ends	none
mandible	carnivore gnawed	none	none	none	both prox and dist ends	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	one end of non-long bone	none	none	both prox and dist ends	none
mandible	carnivore gnawed	none	none	none	over most of bone	none
mandible	carnivore gnawed	none	none	none	both prox and dist ends	none
mandibular hinge	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none

maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	one end of non-long bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
maxilla	carnivore gnawed	none	none	none	over most of bone	none
metacarpal	carnivore gnawed	proximal shaft	none	none	over most of bone	none
metacarpal	carnivore gnawed	none	none	none	one end of non-long bone	none
metacarpal	carnivore gnawed	none	none	none	one end of non-long bone	none
metacarpal	carnivore gnawed	one end of non-long bone	none	none	none	none
metapodial	carnivore gnawed	none	none	none	one end of non-long bone	none
metapodial	carnivore gnawed	none	none	none	one end of non-long bone	none
metapodial	carnivore gnawed	none	none	none	both prox and dist ends	none
metapodial	carnivore gnawed	none	none	none	one end of non-long bone	none
metatarsal	carnivore gnawed	none	none	none	distal shaft	none
metatarsal	carnivore gnawed	one end of non-long bone	none	none	none	none
metatarsal	carnivore gnawed	none	none	none	one end of non-long bone	none
metatarsal	carnivore gnawed	none	none	none	one end of non-long bone	none
metatarsal	carnivore gnawed	none	none	none	one end of non-long bone	none
metatarsal	carnivore gnawed	none	none	none	one end of non-long bone	none
occipital condyle	carnivore gnawed	none	none	none	over most of bone	none
occipital condyle	carnivore gnawed	none	none	none	over most of bone	none
occipital condyle	carnivore gnawed	none	none	none	over most of bone	none
occipital condyle	carnivore gnawed	none	none	none	over most of bone	none
occipital condyle	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	over most of bone	none
pelvis (acetabulum)	carnivore gnawed	none	none	none	both prox and dist ends	none
pelvis (acetabulum)	carnivore gnawed	one end of non-long bone	none	none	both prox and dist ends	none
phalanx 1	carnivore gnawed	none	none	none	one end of non-long bone	none

phalanx 1	carnivore gnawed	none	none	none	one end of non-long bone	none
phalanx 1	carnivore gnawed	none	none	none	one end of non-long bone	none
radius	carnivore gnawed	none	none	none	proximal shaft	none
radius	carnivore gnawed	distal end	none	none	proximal shaft	proximal shaft
radius	carnivore gnawed	none	none	none	distal end	distal shaft
radius	carnivore gnawed	none	none	none	distal shaft	distal shaft
radius	carnivore gnawed	none	none	none	distal shaft	none
radius	carnivore gnawed	none	none	none	proximal shaft	none
radius	carnivore gnawed	distal end	none	none	none	none
radius	carnivore gnawed	none	none	none	distal shaft	none
radius	carnivore gnawed	distal end	none	none	none	none
radius	carnivore gnawed	none	none	none	distal shaft	none
radius	carnivore gnawed	none	none	none	distal shaft	none
radius	carnivore gnawed	none	none	none	distal shaft	none
radius	carnivore gnawed	proximal end	none	none	over most of bone	none
radius	carnivore gnawed	none	none	none	distal shaft	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none

rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none

rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
rib	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
rib	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
rib	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none

rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	one end of non-long bone
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	one end of non-long bone	none
rib	carnivore gnawed	none	none	none	both prox and dist ends	none
rib	carnivore gnawed	one end of non-long bone	none	none	both prox and dist ends	none
scapula	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	both prox and dist ends	none
scapula	carnivore gnawed	none	none	none	both prox and dist ends	none
scapula	carnivore gnawed	none	none	none	both prox and dist ends	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	both prox and dist ends	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	both prox and dist ends	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	none	none	none	over most of bone	none
scapula	carnivore gnawed	proximal end	none	none	one end of non-long bone	none
scapula	carnivore gnawed	proximal end	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
scapula	carnivore gnawed	none	none	none	one end of non-long bone	none
skull	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none
skull	carnivore gnawed	one end of non-long bone	none	none	one end of non-long bone	none

skull	carnivore gnawed	none	none	none	both prox and dist ends	none
skull fragment	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none

skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none

skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none

skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
skull fragment	carnivore gnawed	none	none	none	over most of bone	none
sternum	carnivore gnawed	over most of bone	none	none	one end of non-long bone	none
sternum	carnivore gnawed	over most of bone	none	none	one end of non-long bone	none
sternum	carnivore gnawed	over most of bone	none	none	one end of non-long bone	none
sternum	carnivore gnawed	none	none	none	one end of non-long bone	none
thoracic vert	carnivore gnawed	none	none	none	one end of non-long bone	none
thoracic vert	carnivore gnawed	none	none	none	one end of non-long bone	none
thoracic vert	carnivore gnawed	none	none	none	one end of non-long bone	none
thoracic vert	carnivore gnawed	none	none	none	one end of non-long bone	none
thoracic vert	carnivore gnawed	none	none	none	one end of non-long bone	none
thoracic vert	carnivore gnawed	none	none	none	one end of non-long bone	none
thoracic vert	carnivore gnawed	none	none	none	one end of non-long bone	none
thoracic vert	carnivore gnawed	none	none	none	one end of non-long bone	none
tibia	carnivore gnawed	both prox and dis ends	none	none	none	none
tibia	carnivore gnawed	none	none	none	proximal shaft	none
tibia	carnivore gnawed	none	none	none	distal shaft	none
tibia	carnivore gnawed	distal shaft	none	none	proximal shaft	none
tibia	carnivore gnawed	over most of bone	none	none	both prox and dist ends	none
tibia	carnivore gnawed	none	none	none	distal shaft	none
tibia	carnivore gnawed	distal end	none	none	proximal shaft	proximal shaft
tibia	carnivore gnawed	proximal end	none	none	none	none
tibia	carnivore gnawed	none	none	none	proximal shaft	none
tibia	carnivore gnawed	none	none	none	distal shaft	none
tibia	carnivore gnawed	none	none	none	both prox and dist ends	none
tibia	carnivore gnawed	none	none	none	proximal end	none
ulna	carnivore gnawed	proximal end	none	none	both prox and dist ends	none
ulna	carnivore gnawed	proximal shaft	none	none	both prox and dist ends	none
ulna	carnivore gnawed	proximal end	none	none	none	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	proximal shaft	none
ulna	carnivore gnawed	none	none	none	over most of bone	none
ulna	carnivore gnawed	proximal shaft	none	none	proximal shaft	none
ulna	carnivore gnawed	none	none	none	over most of bone	none
ulna	carnivore gnawed	none	none	none	proximal shaft	none
ulna	carnivore gnawed	none	none	none	proximal shaft	none
ulna	carnivore gnawed	none	none	none	over most of bone	none
ulna	carnivore gnawed	none	none	none	proximal shaft	none
ulna	carnivore gnawed	proximal shaft	none	none	both prox and dist ends	none
ulna	carnivore gnawed	proximal shaft	none	none	both prox and dist ends	none

ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	distal shaft	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	both prox and dist ends
ulna	carnivore gnawed	distal end	none	none	distal shaft	none
ulna	carnivore gnawed	none	none	none	proximal end	none
ulna	carnivore gnawed	none	none	none	both prox and dist ends	none
ulna	carnivore gnawed	none	none	none	proximal shaft	none
unidentified fragment	carnivore gnawed	none	none	none	over most of bone	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	over most of bone
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	over most of bone
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	both prox and dist ends
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none

unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	over most of bone
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
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unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
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unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
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unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none

unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
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unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
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unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none

unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	none	none
unidentified fragment	carnivore gnawed	none	none	none	none	none
unidentified fragment	carnivore gnawed	none	none	none	none	none
unidentified fragment	carnivore gnawed	none	none	none	none	none
unidentified fragment	carnivore gnawed	none	none	none	none	none
unidentified fragment	carnivore gnawed	none	none	none	none	none
unidentified fragment	carnivore gnawed	none	none	none	none	none
unidentified fragment	carnivore gnawed	none	none	none	none	none
unidentified fragment	carnivore gnawed	none	none	none	none	none
unidentified fragment	carnivore gnawed	none	none	none	none	none
unidentified fragment	carnivore gnawed	none	none	none	none	none
unidentified fragment	carnivore gnawed	none	none	none	none	none
unidentified fragment	carnivore gnawed	none	none	none	none	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	over most of bone
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none

unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	over most of bone	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	over most of bone
unidentified fragment	carnivore gnawed	none	none	none	over most of bone	over most of bone
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	over most of bone	none
unidentified fragment	carnivore gnawed	none	none	none	over most of bone	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	both prox and dist ends	none
unidentified fragment	carnivore gnawed	none	none	none	proximal shaft	none
unidentified fragment	carnivore gnawed	none	none	none	one end of non-long bone	none
vertebra	carnivore gnawed	none	none	none	over most of bone	none
vertebra	carnivore gnawed	none	none	none	over most of bone	none
vertebra	carnivore gnawed	none	none	none	over most of bone	none
vertebra	carnivore gnawed	none	none	none	over most of bone	none
vertebra	carnivore gnawed	none	none	none	over most of bone	none
vertebra	carnivore gnawed	none	none	none	over most of bone	none
vertebra	carnivore gnawed	none	none	none	over most of bone	none
vertebra	carnivore gnawed	none	none	none	over most of bone	none
vertebra	carnivore gnawed	none	none	none	over most of bone	none
vertebra	carnivore gnawed	none	none	none	over most of bone	none
vertebra	carnivore gnawed	one end of non-long bone	none	none	over most of bone	none
vertebra	carnivore gnawed	one end of non-long bone	none	none	none	none
vertebra	carnivore gnawed	over most of bone	none	none	over most of bone	none
zygomatic arch	carnivore gnawed	none	none	none	one end of non-long bone	none
zygomatic arch	carnivore gnawed	none	none	none	one end of non-long bone	none
zygomatic arch	carnivore gnawed	none	none	none	one end of non-long bone	none
zygomatic arch	carnivore gnawed	none	none	none	one end of non-long bone	none
zygomatic arch	carnivore gnawed	none	none	none	one end of non-long bone	none

zygomatic arch	carnivore gnawed	none	none	none	one end of non-long bone	none

APPENDIX N: Brown Hyaena Project D-P 18 Bone Damage

Element	punctates/location	scouring/location	acid etching/location	crenulated edges/location	striations/location
carpo-metacarpus	none	none	none	distal end	none
carpo-metacarpus	none	none	none	proximal shaft	none
carpo-metacarpus	none	none	none	distal shaft	none
carpo-metacarpus	none	none	none	distal shaft	none
carpo-metacarpus	none	none	none	distal shaft	none
coracoid	none	none	none	one end of non-long bone	none
coracoid	none	none	none	one end of non-long bone	none
coracoid	none	none	none	one end of non-long bone	none
coracoid	none	none	none	over most of bone	none
coracoid	none	none	none	over most of bone	none
coracoid	none	none	none	over most of bone	none
coracoid	none	none	none	over most of bone	none
coracoid	none	none	none	over most of bone	over most of bone
coracoid	none	none	none	over most of bone	over most of bone
coracoid	one end of non-long bone	none	none	over most of bone	none
coracoid	one end of non-long bone	none	none	over most of bone	none
disk joints	none	none	none	over most of bone	none
disk joints	none	none	none	over most of bone	none
femur	distal shaft	none	none	distal end	none
femur	none	none	none	none	over most of bone
femur	distal end	none	none	none	none
femur	none	none	none	distal shaft	none
femur	none	none	none	distal shaft	none
femur	proximal end	none	none	proximal end	none
femur	none	none	none	proximal shaft	none
femur	distal shaft	none	none	proximal shaft	none
femur	none	none	none	proximal end	none
femur	none	none	none	proximal shaft	none
femur	none	none	none	both prox and dist ends	over most of bone
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	over most of bone
femur	none	none	none	over most of bone	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	proximal end	none	none	proximal end	none
femur	proximal end	none	none	proximal shaft	none
femur	proximal shaft	none	none	none	none
fibula	none	none	none	proximal shaft	none

fibula	none	none	none	distal shaft	none
humerus	none	none	none	proximal shaft	none
humerus	distal end	none	none	over most of bone	none
humerus	none	none	none	both prox and dist ends	none
humerus	proximal shaft	none	none	both prox and dist ends	none
humerus	none	none	none	over most of bone	none
humerus	none	none	none	distal shaft	none
humerus	none	none	none	proximal shaft	none
humerus	proximal end	none	none	distal shaft	none
humerus	distal end	none	none	both prox and dist ends	none
humerus	proximal end	none	none	proximal end	none
humerus	proximal end	none	none	distal shaft	none
humerus	both prox and dis ends	none	none	both prox and dist ends	over most of bone
humerus	none	none	none	over most of bone	none
humerus	distal shaft	none	none	distal shaft	none
humerus	distal end	none	none	distal shaft	none
humerus	none	none	none	proximal shaft	none
lumbar vert	one end of non-long bone	none	none	one end of non-long bone	none
lumbar vert	one end of non-long bone	none	none	one end of non-long bone	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	mandibular heal	none
mandible	one end of non-long bone	none	none	none	none
mandible	none	none	none	one end of non-long bone	none
mandible	one end of non-long bone	none	none	one end of non-long bone	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	both prox and dist ends	none
mandibular hinge	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none

maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	one end of non-long bone	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	one end of non-long bone	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	one end of non-long bone	none	none	one end of non-long bone	none
maxilla	one end of non-long bone	none	none	none	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none
metacarpal	proximal end	none	none	proximal shaft	none
metapodial	one end of non-long bone	none	none	none	none
metapodial	none	none	none	distal shaft	none
metapodial	distal shaft	none	none	proximal shaft	none
metapodial	none	none	none	distal shaft	none
metapodial	none	none	none	distal shaft	none
metapodial	none	none	none	distal shaft	none
metapodial	none	none	none	distal shaft	none
metapodial	none	none	none	proximal end	none
metapodial	none	none	none	over most of bone	none
metapodial	none	none	none	distal shaft	none
occipital condyle	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	over most of bone	none	none	over most of bone	none
phalanx 2	proximal end	none	none	none	none
phalanx 2	none	none	none	proximal shaft	none
phalanx 2	none	none	none	proximal shaft	none
phalanx 2	none	none	none	proximal shaft	none
radius	proximal shaft	none	none	none	none
radius	none	none	none	distal shaft	none
radius	proximal shaft	none	none	proximal shaft	none

radius	proximal shaft	none	none	proximal shaft	none
radius	none	none	none	proximal shaft	none
radius	distal end	none	none	none	none
radius	none	none	none	proximal shaft	none
radius	proximal end	none	none	proximal shaft	proximal shaft
radius	none	none	none	proximal end	none
radius	distal end	none	none	proximal shaft	proximal shaft
radius	none	none	none	over most of bone	none
radius	none	none	none	both prox and dist ends	none
radius	none	none	none	proximal end	none
radius	none	none	none	over most of bone	none
radius	none	none	none	proximal shaft	none
radius	none	none	none	proximal shaft	none
radius	none	none	none	distal shaft	none
radius	none	none	none	distal shaft	none
radius	none	none	none	proximal shaft	none
radius	none	none	none	proximal shaft	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
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rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none

rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	over most of bone
sacrum	none	none	none	over most of bone	none
sacrum	none	none	none	over most of bone	none
sacrum	none	none	none	one end of non-long bone	none
sacrum	none	none	none	over most of bone	none
sacrum	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	distal shaft	none
scapula	none	none	none	distal shaft	none
scapula	proximal end	none	none	over most of bone	none
scapula	proximal shaft	none	none	distal shaft	none
scapula	none	none	none	distal shaft	none
scapula	none	none	none	both prox and dist ends	none
scapula	none	none	none	distal shaft	none
scapula	none	none	none	distal shaft	none
scapula	distal shaft	none	none	distal shaft	none
scapula	none	none	none	distal shaft	none
scapula	none	none	none	distal end	none
scapula	proximal shaft	none	none	distal shaft	none
scapula	none	none	none	over most of bone	none
scapula	proximal end	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	proximal shaft	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	distal shaft	none
scapula	none	none	none	distal shaft	none
skull	one end of non-long bone	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none

skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
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skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
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skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
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skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none

skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
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skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	one end of non-long bone	none
sternum	none	none	none	one end of non-long bone	none
sternum	none	none	none	one end of non-long bone	none
tarso metatarsus	none	none	none	proximal shaft	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	one end of non-long bone	none	none	none	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	one end of non-long bone	none	none	none	none
thoracic vert	one end of non-long bone	none	none	none	none
thoracic vert	one end of non-long bone	none	none	none	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	over most of bone	none
tibia	proximal shaft	none	none	over most of bone	over most of bone
tibia	none	none	none	distal shaft	none
tibia	none	none	none	distal shaft	none
tibia	proximal end	none	none	distal shaft	none
tibia	none	none	none	over most of bone	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	over most of bone	none
tibia	none	none	none	over most of bone	none
tibia	none	none	none	over most of bone	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	both prox and dist ends	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	both prox and dist ends	none

tibia	proximal end	none	none	over most of bone	none
tibia	proximal end	none	none	proximal end	none
tibia	none	none	none	distal shaft	none
tibio-tarsus	both prox and dis ends	none	none	none	none
tibio-tarsus	none	none	none	proximal end	none
tibio-tarsus	none	none	none	proximal shaft	none
tibio-tarsus	proximal end	none	none	distal shaft	none
tibio-tarsus	none	none	none	proximal shaft	none
tibio-tarsus	distal end	none	none	distal shaft	none
tibio-tarsus	distal end	none	none	proximal shaft	none
tibio-tarsus	proximal end	none	none	distal shaft	none
ulna	none	none	none	both prox and dist ends	over most of bone
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	proximal end	none
ulna	none	none	none	distal shaft	none
ulna	distal shaft	none	none	proximal shaft	none
ulna	distal shaft	none	none	distal shaft	none
ulna	none	none	none	over most of bone	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	distal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	distal shaft	none
ulna	none	none	none	proximal end	none
ulna	none	none	none	distal shaft	none
ulna	none	none	none	over most of bone	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	distal shaft	none
ulna	none	none	none	distal shaft	none
ulna	none	none	none	distal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	proximal end	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	over most of bone	none
ulna	proximal end	none	none	distal end	none
ulna	proximal end	none	none	distal shaft	none

unidentified fragment	none	none	none	both prox and dist ends	over most of bone
unidentified fragment	none	none	none	none	over most of bone
unidentified fragment	none	none	none	none	over most of bone
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	none	one end of non-long bone
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	over most of bone
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none

unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	over most of bone	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	proximal shaft	none
unidentified fragment	proximal end	none	none	none	none
unidentified fragment	proximal end	none	none	none	none
unidentified fragment	none	none	none	none	over most of bone
unidentified fragment	none	none	none	proximal end	none
unidentified fragment	over most of bone	none	none	proximal end	over most of bone
unidentified fragment	none	none	none	proximal shaft	none
unidentified fragment	distal end	none	none	distal shaft	none
unidentified fragment	none	none	none	distal shaft	none
unidentified fragment	distal end	none	none	distal shaft	none
unidentified fragment	proximal end	none	none	distal shaft	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	proximal end	none	none	proximal end	none
unidentified fragment	none	none	none	both prox and dist ends	none
vertebra	one end of non-long bone	none	none	none	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	one end of non-long bone	none	none	none	none
vertebra	one end of non-long bone	none	none	none	none
vertebra	one end of non-long bone	none	none	none	none
vertebra	one end of non-long bone	none	none	none	none
vertebra	one end of non-long bone	none	none	none	none
vertebra	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none

vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	over most of bone	none	none	over most of bone	none

vertebra	over most of bone	none	none	none	none
vertebra	one end of non-long bone	none	none	none	none

APPENDIX O: Brown Hyaena Project D-SPG 1 Bone Damage

Element	punctates/location	scouring/location	acid etching/location	crenulated edges/location	striations/location
astragalus	one end of non-long bone	none	none	none	none
astragalus	one end of non-long bone	none	none	none	none
astragalus	one end of non-long bone	none	none	none	none
atlas	none	none	none	one end of non-long bone	none
axis	one end of non-long bone	none	none	one end of non-long bone	none
axis	none	none	none	one end of non-long bone	none
carpo-metacarpus	none	none	none	one end of non-long bone	none
coracoid	proximal end	none	none	none	none
coracoid	none	none	none	one end of non-long bone	none
femur	over most of bone	none	none	none	none
femur	over most of bone	none	none	distal shaft	none
femur	distal end	none	none	none	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	distal shaft	none
femur	none	none	none	distal shaft	none
femur	distal end	none	none	over most of bone	none
femur	distal end	none	none	distal shaft	none
femur	none	none	none	distal shaft	none
femur	none	none	none	distal shaft	none
femur	none	none	none	proximal shaft	none
femur	none	none	none	proximal shaft	none
femur	over most of bone	none	none	none	none
femur	none	none	none	proximal shaft	none
femur	proximal end	none	none	none	none
fibula	none	none	none	distal shaft	none
fibula	none	none	none	distal shaft	none
fibula	none	none	none	distal shaft	none
fibula	none	none	none	proximal shaft	none
fibula	none	none	none	proximal shaft	none
fibula	none	none	none	proximal shaft	none
fibula	both prox and dis ends	none	none	none	none
fibula	none	none	none	proximal shaft	none
fibula	none	none	none	distal shaft	none
fibula	distal end	none	none	none	none
fibula	none	none	none	proximal shaft	none
fibula	none	none	none	proximal shaft	none
fibula	none	none	none	proximal shaft	none

humerus	proximal end	none	none	none	none
humerus	proximal end	none	none	none	none
humerus	proximal end	none	none	none	none
humerus	proximal end	none	none	none	none
humerus	distal end	none	none	none	none
humerus	none	none	none	both prox and dist ends	none
humerus	proximal end	none	none	none	none
humerus	both prox and dis ends	none	none	none	none
humerus	both prox and dis ends	none	none	none	none
humerus	distal end	none	none	proximal shaft	none
humerus	both prox and dis ends	none	none	proximal shaft	none
humerus	distal end	none	none	none	none
humerus	distal end	none	none	proximal shaft	none
humerus	proximal end	none	none	none	none
humerus	distal end	none	none	proximal shaft	none
humerus	none	none	none	proximal shaft	none
humerus	both prox and dis ends	none	none	both prox and dist ends	none
humerus	distal end	none	none	distal shaft	none
humerus	proximal end	none	none	none	none
humerus	none	none	none	distal shaft	none
humerus	none	none	none	proximal shaft	none
humerus	proximal end	none	none	none	none
humerus	distal end	none	none	proximal shaft	none
humerus	none	none	none	both prox and dist ends	none
humerus	proximal end	none	none	none	none
humerus	distal end	none	none	both prox and dist ends	none
humerus	distal end	none	none	proximal end	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	over most of bone	none
humerus	proximal end	none	none	none	none
humerus	proximal end	none	none	none	none
humerus	none	none	none	proximal shaft	none
humerus	none	none	none	proximal shaft	none
humerus	none	none	none	distal shaft	none
humerus	both prox and dis ends	none	none	proximal end	none
humerus	none	none	none	proximal shaft	none
humerus	none	none	none	proximal shaft	none
humerus	none	none	none	over most of bone	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	both prox and dist ends	none
humerus	distal end	none	none	proximal shaft	none
humerus	proximal shaft	none	none	proximal shaft	none
humerus	none	none	none	proximal end	none
humerus	proximal end	none	none	none	none

humerus	none	none	none	proximal shaft	none
humerus	distal end	none	none	proximal shaft	none
humerus	distal shaft	none	none	proximal shaft	none
humerus	proximal end	none	none	none	none
humerus	proximal end	none	none	proximal shaft	none
humerus	none	none	none	over most of bone	none
illium	none	none	none	one end of non-long bone	none
illium	none	none	none	one end of non-long bone	none
illium	none	none	none	one end of non-long bone	none
illium	none	none	none	one end of non-long bone	none
illium	none	none	none	one end of non-long bone	none
illium	one end of non-long bone	none	none	none	none
illium	none	none	none	one end of non-long bone	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	one end of non-long bone	none	none	none	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	over most of bone	none
mandible	one end of non-long bone	none	none	over most of bone	none
mandible	none	none	none	over most of bone	none
mandible	one end of non-long bone	none	none	both prox and dist ends	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	mandibular heal	none

mandible	none	none	none	over most of bone	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	one end of non-long bone	none
mandible	one end of non-long bone	none	none	one end of non-long bone	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	one end of non-long bone	none
mandible	one end of non-long bone	none	none	one end of non-long bone	none
mandible	over most of bone	none	none	both prox and dist ends	none
mandible	none	none	none	one end of non-long bone	none
mandible	one end of non-long bone	none	none	none	none
mandible	one end of non-long bone	none	none	one end of non-long bone	none
mandible	one end of non-long bone	none	none	one end of non-long bone	none
mandible	none	none	none	over most of bone	none
mandibular hinge	none	none	none	one end of non-long bone	none
mandibular hinge	one end of non-long bone	none	none	one end of non-long bone	none
mandibular hinge	none	none	none	one end of non-long bone	none
mandibular hinge	none	none	none	over most of bone	none
mandibular hinge	none	none	none	over most of bone	none
mandibular hinge	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	one end of non-long bone	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	one end of non-long bone	none	none	none	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	one end of non-long bone	none	none	one end of non-long bone	none
maxilla	one end of non-long bone	none	none	none	none

maxilla	none	none	none	one end of non-long bone	none
maxilla	one end of non-long bone	none	none	none	none
maxilla	one end of non-long bone	none	none	none	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
metapodial	none	none	none	one end of non-long bone	none
metapodial	none	none	none	one end of non-long bone	none
metapodial	none	none	none	one end of non-long bone	none
metapodial	none	none	none	one end of non-long bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	over most of bone	none
phalanx 1	none	none	none	one end of non-long bone	none
phalanx 1	none	none	none	one end of non-long bone	none
phalanx 1	none	none	none	one end of non-long bone	none
phalanx 1	none	none	none	one end of non-long bone	none
phalanx 1	none	none	none	one end of non-long bone	none
phalanx 1	none	none	none	one end of non-long bone	none
phalanx 1	none	none	none	one end of non-long bone	none
phalanx 2	none	none	none	one end of non-long bone	none
phalanx 2	none	none	none	one end of non-long bone	none
radius	none	none	none	distal shaft	none
radius	distal end	none	none	none	none
radius	proximal shaft	none	none	none	none
radius	both prox and dis ends	none	none	none	none
radius	none	none	none	distal end	none
radius	distal end	none	none	distal end	none
radius	distal shaft	none	none	distal end	none

radius	none	none	none	proximal end	none
radius	distal shaft	none	none	distal shaft	none
radius	none	none	none	distal shaft	none
radius	both prox and dis ends	none	none	none	none
radius	none	none	none	distal shaft	none
radius	none	none	none	distal end	none
radius	none	none	none	proximal end	none
radius	distal end	none	none	proximal shaft	none
radius	none	none	none	over most of bone	none
radius	proximal shaft	none	none	proximal shaft	none
radius	none	none	none	proximal shaft	none
radius	distal end	none	none	over most of bone	none
radius	none	none	none	proximal shaft	none
radius	both prox and dis ends	none	none	none	none
radius	none	none	none	distal shaft	none
radius	proximal shaft	none	none	proximal shaft	none
radius	none	none	none	distal shaft	none
radius	none	none	none	distal shaft	none
radius	none	none	none	proximal shaft	none
radius	distal end	none	none	distal end	none
radius	none	none	none	distal shaft	none
radius	none	none	none	proximal shaft	none
radius	none	none	none	proximal shaft	none
radius	none	none	none	distal shaft	none
radius	none	none	none	none	none
radius	proximal end	none	none	none	none
radius	both prox and dis ends	none	none	none	none
radius	distal end	none	none	proximal shaft	none
radius	none	none	none	proximal shaft	none
radius	proximal end	none	none	proximal shaft	none
radius	distal end	none	none	proximal shaft	none
radius	none	none	none	proximal shaft	none
radius	none	none	none	distal shaft	none
radius	none	none	none	proximal shaft	none
radius	none	none	none	proximal shaft	none
radius	none	none	none	both prox and dist ends	none
radius	none	none	none	distal shaft	none
radius	none	none	none	both prox and dist ends	none
radius	none	none	none	over most of bone	none
radius/ulna fused	proximal end	none	none	over most of bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none

rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
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rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
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rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none

rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
sacrum	none	none	none	over most of bone	none
sacrum	none	none	none	over most of bone	none
scapula	over most of bone	none	none	one end of non-long bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
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scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none

scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
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scapula	none	none	none	one end of non-long bone	none
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scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none
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scapula	one end of non-long bone	none	none	one end of non-long bone	none
scapula	one end of non-long bone	none	none	none	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
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scapula	proximal end	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none
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skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
sternum	none	none	none	one end of non-long bone	none
sternum	none	none	none	one end of non-long bone	none
tarso metatarsus	over most of bone	none	none	none	none
tibia	distal end	none	none	proximal end	none
tibia	distal end	none	none	none	none
tibia	none	none	none	proximal shaft	none
tibia	proximal end	none	none	none	none
tibia	both prox and dis ends	none	none	none	none
tibia	both prox and dis ends	none	none	both prox and dist ends	none
tibia	none	none	none	proximal end	none
tibia	none	none	none	both prox and dist ends	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	distal shaft	none
tibia	distal end	none	none	none	none
tibia	proximal end	none	none	none	none

tibia	distal end	none	none	none	none
tibia	over most of bone	none	none	both prox and dist ends	none
tibia	none	none	none	proximal end	none
tibia	both prox and dis ends	none	none	none	none
tibia	proximal end	none	none	proximal end	none
tibia	proximal end	none	none	distal shaft	none
tibia	none	none	none	distal end	none
tibia	proximal end	none	none	none	none
tibia	none	none	none	distal shaft	none
tibia	distal shaft	none	none	proximal end	none
tibia	both prox and dis ends	none	none	none	none
tibia	proximal end	none	none	none	none
tibia	over most of bone	none	none	both prox and dist ends	none
tibia	both prox and dis ends	none	none	both prox and dist ends	none
tibia	proximal shaft	none	none	both prox and dist ends	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	proximal shaft	none
tibia	proximal shaft	none	none	proximal end	none
tibia	proximal end	none	none	distal shaft	none
tibia	none	none	none	both prox and dist ends	none
tibia	distal end	none	none	proximal shaft	none
tibia	distal shaft	none	none	both prox and dist ends	none
tibia	none	none	none	both prox and dist ends	none
tibia	none	none	none	both prox and dist ends	none
tibia	over most of bone	none	none	both prox and dist ends	none
tibia	none	none	none	both prox and dist ends	none
tibia	none	none	none	both prox and dist ends	none
tibia	none	none	none	distal shaft	none
tibia	none	none	none	proximal end	none
tibia	none	none	none	both prox and dist ends	none
tibia	proximal end	none	none	distal shaft	none
tibia	none	none	none	distal shaft	none
tibia	none	none	none	distal shaft	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	distal shaft	none
tibia	none	none	none	proximal end	none
tibia	none	none	none	proximal end	none
tibia	none	none	none	both prox and dist ends	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	proximal end	none
tibia	none	none	none	distal shaft	none
tibia	over most of bone	none	none	both prox and dist ends	none
tibia	none	none	none	over most of bone	none
tibia	none	none	none	both prox and dist ends	none

tibio-tarsus	none	none	none	proximal shaft	none
tibio-tarsus	none	none	none	proximal shaft	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	proximal end	none
ulna	none	none	none	proximal end	none
ulna	proximal shaft	none	none	proximal end	none
ulna	none	none	none	proximal shaft	none
ulna	proximal end	none	none	none	none
ulna	proximal end	none	none	none	none
ulna	distal end	none	none	none	none
ulna	none	none	none	proximal end	none
ulna	none	none	none	proximal end	none
ulna	proximal end	none	none	none	none
ulna	none	none	none	proximal end	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	both prox and dist ends	none
ulna	proximal shaft	none	none	proximal end	none
ulna	none	none	none	proximal end	none
ulna	proximal end	none	none	none	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	distal shaft	none
ulna	none	none	none	distal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	proximal end	none
ulna	proximal end	none	none	proximal end	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	distal shaft	none
ulna	none	none	none	proximal end	none
ulna	none	none	none	proximal end	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	proximal end	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	proximal end	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	distal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	distal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	both prox and dist ends	none
ulna	distal end	none	none	proximal shaft	none

ulna	distal shaft	none	none	proximal shaft	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	distal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	proximal end	none
ulna	none	none	none	proximal end	none
ulna	none	none	none	proximal end	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	proximal end	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	proximal shaft	none
ulna	proximal end	none	none	proximal end	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	proximal end	none	none	proximal shaft	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	proximal shaft	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	proximal end	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	proximal shaft	none
unidentified fragment	none	none	none	proximal shaft	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none

unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	over most of bone	none	none	both prox and dist ends	none
unidentified fragment	over most of bone	none	none	both prox and dist ends	none
unidentified fragment	over most of bone	none	none	both prox and dist ends	none
unidentified fragment	over most of bone	none	none	both prox and dist ends	none
unidentified fragment	over most of bone	none	none	both prox and dist ends	none
unidentified fragment	over most of bone	none	none	both prox and dist ends	none
unidentified fragment	over most of bone	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	over most of bone	none	none	both prox and dist ends	none
unidentified fragment	over most of bone	none	none	both prox and dist ends	none
unidentified fragment	over most of bone	none	none	both prox and dist ends	none
unidentified fragment	over most of bone	none	none	both prox and dist ends	none
unidentified fragment	over most of bone	none	none	both prox and dist ends	none
vertebra	one end of non-long bone	none	none	over most of bone	none
vertebra	one end of non-long bone	none	none	none	none
vertebra	one end of non-long bone	none	none	none	none
vertebra	one end of non-long bone	none	none	none	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	one end of non-long bone	none	none	none	none

APPENDIX P: Brown Hyaena Project D-BB 1 Bone Damage

Element	punctates/location	scouring/location	acid etching/location	crenulated edges/location	striations/location
atlas	none	none	none	one end of non-long bone	none
atlas	none	none	none	over most of bone	none
atlas	none	none	none	over most of bone	none
atlas	one end of non-long bone	none	none	one end of non-long bone	none
axis	none	none	none	over most of bone	none
axis	none	none	none	one end of non-long bone	none
coracoid	none	none	none	one end of non-long bone	none
coracoid	none	none	none	proximal shaft	none
disk joints	none	none	none	one end of non-long bone	none
disk joints	none	none	none	one end of non-long bone	none
femur	distal end	none	none	proximal shaft	none
femur	distal end	none	none	none	none
femur	none	none	none	proximal end	none
femur	distal end	none	none	distal shaft	none
femur	distal end	none	none	proximal shaft	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	over most of bone	none
femur	none	none	none	proximal shaft	none
femur	distal end	none	none	proximal shaft	none
femur	proximal shaft	none	none	proximal shaft	none
femur	proximal end	none	none	none	none
femur	over most of bone	none	none	none	none
femur	both prox and dis ends	none	none	none	none
femur	none	none	none	proximal end	none
femur	proximal shaft	none	none	distal shaft	none
femur	none	none	none	both prox and dist ends	none
femur	both prox and dis ends	none	none	none	none
femur	proximal end	none	none	proximal end	none
femur	none	none	none	distal shaft	none
femur	none	none	none	proximal shaft	none
femur	none	none	none	distal shaft	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	over most of bone
femur	distal end	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none

femur	none	none	none	both prox and dist ends	none
femur	proximal end	none	none	none	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	distal end	none	none	none	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
fibula	none	none	none	proximal shaft	none
fibula	none	none	none	distal shaft	none
fibula	none	none	none	proximal shaft	none
fibula	none	none	none	proximal shaft	none
fibula	none	none	none	distal end	none
fibula	over most of bone	none	none	both prox and dist ends	none
fibula	over most of bone	none	none	proximal shaft	none
fibula	none	none	none	distal shaft	none
horn/antler	one end of non-long bone	none	none	none	none
horn/antler	none	none	none	one end of non-long bone	none
horn/antler	none	none	none	one end of non-long bone	none
horn/antler	none	none	none	one end of non-long bone	none
horn/antler	none	none	none	one end of non-long bone	none
horn/antler	none	none	none	one end of non-long bone	one end of non-long bone
horn/antler	none	none	none	both prox and dist ends	none
horn/antler	none	none	none	one end of non-long bone	none
horn/antler	none	none	none	one end of non-long bone	none
horn/antler	none	none	none	one end of non-long bone	none
horn/antler	none	none	none	one end of non-long bone	none
horn/antler	none	none	none	one end of non-long bone	none
horn/antler	none	none	none	one end of non-long bone	none
horn/antler	none	none	none	one end of non-long bone	none
horn/antler	none	none	none	one end of non-long bone	none
horn/antler	none	none	none	both prox and dist ends	none
horn/antler	none	none	none	one end of non-long bone	none
horn/antler	none	none	none	one end of non-long bone	none
humerus	proximal end	none	none	none	none
humerus	none	none	none	proximal shaft	none
humerus	proximal end	none	none	none	none
humerus	both prox and dis ends	none	none	none	none
humerus	proximal end	none	none	none	none
humerus	proximal end	none	none	none	none
humerus	none	none	none	over most of bone	none
humerus	both prox and dis ends	none	none	none	none
humerus	none	none	none	proximal shaft	none
humerus	none	none	none	proximal shaft	none
humerus	proximal shaft	none	none	none	none
humerus	proximal shaft	none	none	none	none

humerus	proximal shaft	none	none	none	none
humerus	proximal shaft	none	none	none	none
humerus	both prox and dis ends	none	none	none	none
humerus	over most of bone	none	none	none	none
humerus	proximal end	none	none	distal end	none
humerus	distal end	none	none	proximal shaft	none
humerus	both prox and dis ends	none	none	none	none
humerus	distal end	none	none	proximal shaft	none
humerus	both prox and dis ends	none	none	none	none
humerus	distal end	none	none	proximal shaft	none
humerus	distal end	none	none	proximal end	none
humerus	both prox and dis ends	none	none	proximal shaft	none
humerus	none	none	none	proximal shaft	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	both prox and dist ends	none
humerus	proximal shaft	none	none	proximal shaft	none
humerus	none	none	none	distal end	none
humerus	none	none	none	proximal shaft	none
humerus	proximal end	none	none	proximal end	none
humerus	none	none	none	distal shaft	none
humerus	none	none	none	distal shaft	none
humerus	none	none	none	proximal shaft	none
humerus	distal end	none	none	proximal shaft	none
humerus	none	none	none	both prox and dist ends	none
humerus	one end of non-long bone	none	none	none	none
humerus	one end of non-long bone	none	none	none	none
humerus	proximal end	none	none	none	none
humerus	proximal end	none	none	none	none
humerus	none	none	none	proximal shaft	none
humerus	proximal end	none	none	none	none
humerus	none	none	none	proximal shaft	none
humerus	none	none	none	proximal shaft	none
humerus	none	none	none	over most of bone	none
humerus	none	none	none	over most of bone	none
humerus	none	none	none	over most of bone	none
humerus	none	none	none	over most of bone	none
humerus	none	none	none	over most of bone	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	over most of bone	none
humerus	none	none	none	proximal shaft	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	over most of bone	none
humerus	none	none	none	both prox and dist ends	none
humerus	proximal end	none	none	none	none

humerus	distal end	none	none	proximal shaft	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	proximal shaft	none
humerus	none	none	none	one end of non-long bone	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	distal shaft	none
humerus	none	none	none	distal shaft	none
illium	none	none	none	one end of non-long bone	none
illium	one end of non-long bone	none	none	over most of bone	none
illium	none	none	none	over most of bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
mandible	none	none	none	mandibular heal	none
mandible	one end of non-long bone	none	none	one end of non-long bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	both prox and dist ends	over most of bone
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	one end of non-long bone	none	none	one end of non-long bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	both prox and dist ends	none
mandible	one end of non-long bone	none	none	both prox and dist ends	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	over most of bone	none

mandible	none	none	none	over most of bone	none
mandible	none	none	none	over most of bone	none
mandible	one end of non-long bone	none	none	none	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	over most of bone	none
mandibular hinge	none	none	none	one end of non-long bone	none
mandibular hinge	none	none	none	one end of non-long bone	none
mandibular hinge	none	none	none	one end of non-long bone	none
mandibular hinge	none	none	none	one end of non-long bone	none
mandibular hinge	none	none	none	one end of non-long bone	none
maxilla	one end of non-long bone	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	one end of non-long bone	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	one end of non-long bone	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	one end of non-long bone	none	none	over most of bone	none
maxilla	one end of non-long bone	none	none	over most of bone	none
maxilla	one end of non-long bone	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none

maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	one end of non-long bone	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
metacarpal	none	none	none	distal shaft	none
metacarpal	none	none	none	proximal shaft	proximal shaft
metacarpal	none	none	none	distal shaft	none
metacarpal	none	none	none	over most of bone	none
metapodial	none	none	none	both prox and dist ends	none
metapodial	none	none	none	both prox and dist ends	none
metapodial	none	none	none	both prox and dist ends	none
metapodial	none	none	none	both prox and dist ends	none
metapodial	none	none	none	both prox and dist ends	none
metapodial	none	none	none	both prox and dist ends	none
metapodial	none	none	none	one end of non-long bone	over most of bone
metapodial	one end of non-long bone	none	none	none	over most of bone
metapodial	one end of non-long bone	none	none	none	none
metapodial	none	none	none	one end of non-long bone	none
metapodial	none	none	none	one end of non-long bone	none
metapodial	one end of non-long bone	none	none	one end of non-long bone	none
metapodial	none	none	none	both prox and dist ends	none
metatarsal	none	none	none	distal shaft	none
metatarsal	none	none	none	distal shaft	none
metatarsal	none	none	none	none	over most of bone
metatarsal	none	none	none	distal shaft	none
metatarsal	none	none	none	one end of non-long bone	none
occipital condyle	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none

pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	one end of non-long bone	none	none	one end of non-long bone	none
pelvis (acetabulum)	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	over most of bone	none
phalanx 1	none	none	none	proximal end	none
phalanx 1	proximal end	none	none	none	none
radius	distal end	none	none	none	none
radius	none	none	none	distal shaft	none
radius	none	none	none	distal shaft	none
radius	distal end	none	none	none	none
radius	none	none	none	distal shaft	none
radius	none	none	none	distal shaft	none
radius	none	none	none	distal shaft	none
radius	proximal end	none	none	distal shaft	none
radius	none	none	none	distal shaft	none
radius	none	none	none	both prox and dist ends	none
radius	none	none	none	both prox and dist ends	none
radius	none	none	none	proximal shaft	none
radius	distal end	none	none	none	none
radius	none	none	none	proximal shaft	none
radius	none	none	none	proximal shaft	none
radius	proximal end	none	none	distal shaft	none
radius	distal end	none	none	none	none
radius	one end of non-long bone	none	none	none	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
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rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
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rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
sacrum	none	none	none	one end of non-long bone	none
sacrum	none	none	none	one end of non-long bone	none
sacrum	none	none	none	one end of non-long bone	none
sacrum	none	none	none	one end of non-long bone	none
sacrum	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
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scapula	none	none	none	one end of non-long bone	none

scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
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scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	one end of non-long bone	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
skull	one end of non-long bone	none	none	one end of non-long bone	none
skull	none	none	none	one end of non-long bone	none
skull	none	none	none	one end of non-long bone	none
skull	one end of non-long bone	none	none	one end of non-long bone	none
skull	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
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skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
sternum	none	none	none	one end of non-long bone	none
sternum	none	none	none	one end of non-long bone	none
sternum	none	none	none	one end of non-long bone	none
sternum	one end of non-long bone	none	none	none	none
sternum	none	none	none	one end of non-long bone	none
tarso metatarsus	distal end	none	none	none	none
tarso metatarsus	none	none	none	both prox and dist ends	none
tarso metatarsus	none	none	none	both prox and dist ends	over most of bone
tarso metatarsus	none	none	none	both prox and dist ends	none
tarso metatarsus	distal shaft	none	none	both prox and dist ends	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none

thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	over most of bone	none
thoracic vert	one end of non-long bone	none	none	one end of non-long bone	none
thoracic vert	one end of non-long bone	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
tibia	distal end	none	none	proximal end	none
tibia	proximal end	none	none	distal shaft	none
tibia	both prox and dis ends	none	none	distal end	none
tibia	none	none	none	both prox and dist ends	none
tibia	none	none	none	distal shaft	none
tibia	none	none	none	both prox and dist ends	none
tibia	proximal shaft	none	none	both prox and dist ends	none
tibia	none	none	none	both prox and dist ends	none
tibia	none	none	none	distal shaft	none
tibia	none	none	none	both prox and dist ends	none
tibia	none	none	none	proximal shaft	none
tibia	distal shaft	none	none	proximal shaft	none
tibia	proximal end	none	none	none	none
tibia	none	none	none	distal shaft	none
tibia	both prox and dis ends	none	none	none	none
tibia	none	none	none	proximal shaft	none
tibia	proximal end	none	none	distal shaft	none
tibia	proximal end	none	none	none	none
tibia	proximal end	none	none	distal shaft	none
tibia	proximal end	none	none	distal shaft	none
tibia	none	none	none	distal shaft	none
tibia	proximal end	none	none	none	none
tibia	none	none	none	proximal shaft	none
tibia	proximal end	none	none	none	none
tibia	distal end	none	none	proximal shaft	none
tibia	both prox and dis ends	none	none	none	none
tibia	none	none	none	both prox and dist ends	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	proximal shaft	none
tibia	proximal end	none	none	distal shaft	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	proximal end	none
tibia	none	none	none	proximal end	proximal shaft
tibia	none	none	none	both prox and dist ends	proximal shaft
tibia	distal end	none	none	none	none
tibia	none	none	none	both prox and dist ends	none
tibia	distal end	none	none	proximal shaft	none
tibia	none	none	none	proximal end	none

tibia	none	none	none	proximal end	none
tibia	proximal shaft	none	none	proximal end	none
tibia	none	none	none	both prox and dist ends	none
tibia	none	none	none	both prox and dist ends	none
tibia	proximal end	none	none	over most of bone	none
tibia	none	none	none	proximal shaft	none
tibio-tarsus	distal end	none	none	none	none
tibio-tarsus	none	none	none	distal shaft	none
tibio-tarsus	none	none	none	none	none
ulna	proximal end	none	none	none	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	both prox and dist ends	none
ulna	proximal end	none	none	both prox and dist ends	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	proximal shaft	none
ulna	proximal shaft	none	none	both prox and dist ends	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	distal shaft	none
ulna	none	none	none	distal shaft	none
ulna	proximal end	none	none	distal shaft	none
ulna	none	none	none	both prox and dist ends	distal shaft
ulna	none	none	none	both prox and dist ends	over most of bone
ulna	proximal shaft	none	none	none	none
ulna	none	none	none	distal shaft	none
ulna	proximal shaft	none	none	both prox and dist ends	none
ulna	distal end	none	none	proximal end	none
ulna	none	none	none	both prox and dist ends	none
ulna	distal end	none	none	proximal shaft	none
ulna	proximal end	none	none	none	none
ulna	proximal shaft	none	none	both prox and dist ends	none
ulna	over most of bone	none	none	both prox and dist ends	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	both prox and dist ends	none
ulna	proximal end	none	none	distal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	over most of bone	none
ulna	none	none	none	none	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	none

unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	one end of non-long bone	none	none	none	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	over most of bone
unidentified fragment	none	none	none	both prox and dist ends	over most of bone
unidentified fragment	none	none	none	both prox and dist ends	over most of bone
unidentified fragment	none	none	none	both prox and dist ends	over most of bone
unidentified fragment	none	none	none	both prox and dist ends	over most of bone
unidentified fragment	none	none	none	both prox and dist ends	over most of bone
unidentified fragment	none	none	none	both prox and dist ends	over most of bone
unidentified fragment	none	none	none	both prox and dist ends	over most of bone
unidentified fragment	none	none	none	both prox and dist ends	over most of bone
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none

unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none

unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
vertebra	one end of non-long bone	none	none	none	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none

vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	one end of non-long bone	none	none	one end of non-long bone	none

APPENDIX Q: Skinner Collection Bone Damage

Element	punctates/location	scouring/location	acid etching/location	crenulated edges/location	striations/location
astragalus	over most of bone	none	none	none	none
astragalus	none	none	none	proximal end	none
atlas	none	none	none	one end of non-long bone	none
atlas	none	none	none	over most of bone	none
atlas	none	none	none	both prox and dist ends	none
atlas	none	none	none	both prox and dist ends	none
atlas	none	none	none	one end of non-long bone	none
atlas	none	none	none	over most of bone	none
atlas	none	none	none	over most of bone	none
atlas	none	none	none	both prox and dist ends	none
atlas	none	none	none	both prox and dist ends	none
axis	one end of non-long bone	none	none	one end of non-long bone	none
axis	over most of bone	none	none	over most of bone	none
axis	one end of non-long bone	none	none	none	none
axis	one end of non-long bone	none	none	one end of non-long bone	none
axis	none	none	none	one end of non-long bone	none
axis	none	none	none	over most of bone	none
axis	none	none	none	one end of non-long bone	none
calcaneus	proximal end	none	none	none	none
calcaneus	over most of bone	none	none	none	none
calcaneus	none	none	none	proximal end	none
calcaneus	proximal end	none	none	none	none
calcaneus	proximal end	none	none	none	none
calcaneus	none	none	none	none	proximal shaft
calcaneus	proximal end	none	none	none	none
carpal	none	none	none	distal end	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	none	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	over most of bone	none
caudal vert	one end of non-long bone	none	none	none	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	none	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	one end of non-long bone	none

caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	over most of bone	none
caudal vert	none	none	none	over most of bone	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	one end of non-long bone	none
cervical vert	none	none	none	one end of non-long bone	none
cervical vert	none	none	none	one end of non-long bone	none
cervical vert	none	none	none	one end of non-long bone	none
cervical vert	one end of non-long bone	none	none	none	none
cervical vert	none	none	none	both prox and dist ends	none
cervical vert	one end of non-long bone	none	none	none	none
cervical vert	none	none	none	one end of non-long bone	none
cervical vert	none	none	none	one end of non-long bone	none
femur	distal end	none	none	none	none
femur	proximal end	none	none	none	none
femur	distal shaft	none	none	distal shaft	none
femur	proximal shaft	none	none	none	over most of bone
femur	none	none	none	proximal end	none
femur	distal end	none	none	distal end	distal end
femur	none	none	none	proximal end	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	proximal shaft	none
femur	distal shaft	none	none	none	both prox and dist ends
femur	none	none	none	proximal shaft	proximal shaft
femur	none	none	none	proximal end	none
femur	none	none	none	none	over most of bone
femur	distal shaft	none	none	none	none
femur	distal shaft	none	none	none	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	proximal end	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	proximal shaft
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	both prox and dist ends
femur	none	none	none	distal end	none
fibula	none	none	none	distal shaft	none
fibula	proximal end	none	none	distal shaft	both prox and dist ends
fibula	none	none	none	proximal shaft	none

fibula	none	none	none	distal shaft	none
fibula	none	none	none	proximal shaft	none
fibula	none	none	none	distal shaft	none
fibula	none	none	none	proximal shaft	none
fibula	none	none	none	proximal shaft	none
fibula	none	none	none	distal shaft	none
fibula	none	none	none	distal shaft	none
fibula	distal shaft	none	none	distal shaft	none
fibula	none	none	none	distal shaft	none
fibula	none	none	none	distal shaft	none
fibula	none	none	none	proximal shaft	none
fibula	none	none	none	distal shaft	none
fibula	none	none	none	distal shaft	none
fibula	none	none	none	proximal shaft	none
fibula	proximal shaft	none	none	none	none
fibula	none	none	none	both prox and dist ends	over most of bone
fibula	none	none	none	both prox and dist ends	over most of bone
fibula	none	none	none	distal shaft	none
fibula	none	none	none	both prox and dist ends	none
humerus	none	none	none	proximal shaft	none
humerus	both prox and dis ends	none	none	both prox and dist ends	over most of bone
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	proximal shaft	none
humerus	proximal end	none	none	none	none
humerus	distal end	none	none	none	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	both prox and dist ends	none
humerus	proximal end	none	none	none	none
humerus	distal end	none	none	none	none
humerus	distal end	none	none	both prox and dist ends	none
humerus	none	none	none	distal shaft	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	proximal end	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	distal shaft	none
humerus	none	none	none	distal shaft	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	proximal end	none
humerus	distal end	none	none	proximal end	none
humerus	none	none	none	proximal end	none
humerus	none	none	none	both prox and dist ends	none
humerus	proximal end	none	none	none	none
humerus	none	none	none	none	proximal end

humerus	none	none	none	both prox and dist ends	none
humerus	proximal end	none	none	none	none
humerus	none	none	none	proximal end	none
humerus	proximal shaft	none	none	proximal end	none
humerus	proximal end	none	none	none	none
humerus	proximal shaft	none	none	none	none
humerus	none	none	none	both prox and dist ends	none
humerus	distal end	none	none	none	none
humerus	none	none	none	both prox and dist ends	none
humerus	proximal end	none	none	none	none
humerus	proximal shaft	none	none	proximal end	none
humerus	none	none	none	distal end	none
humerus	proximal shaft	none	none	both prox and dist ends	none
humerus	none	none	none	proximal shaft	none
humerus	both prox and dis ends	none	none	none	none
humerus	none	none	none	proximal shaft	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	proximal shaft	none
humerus	none	none	none	proximal shaft	none
humerus	none	none	none	proximal shaft	none
humerus	over most of bone	none	none	distal shaft	none
humerus	none	none	none	proximal shaft	none
humerus	none	none	none	proximal shaft	none
humerus	distal end	none	none	none	none
humerus	proximal end	none	none	none	none
humerus	none	none	none	both prox and dist ends	none
humerus	distal end	none	none	both prox and dist ends	none
humerus	proximal shaft	none	none	none	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	both prox and dist ends	none
humerus	proximal end	none	none	none	none
humerus	proximal end	none	none	both prox and dist ends	distal shaft
humerus	none	none	none	proximal shaft	none
humerus	none	none	none	proximal shaft	none
humerus	distal end	none	none	distal end	none
humerus	none	none	none	distal end	none
humerus	none	none	none	distal shaft	none
humerus	none	none	none	distal shaft	none
humerus	proximal end	none	none	over most of bone	none
humerus	proximal end	none	none	none	none
humerus	proximal end	none	none	none	none
humerus	proximal end	none	none	proximal end	none
humerus	proximal end	none	none	distal shaft	none
humerus	distal end	none	none	none	none
humerus	none	none	none	distal shaft	none

humerus	none	none	none	proximal end	none
humerus	proximal end	none	none	proximal end	none
humerus	none	none	none	proximal end	none
humerus	none	none	none	distal shaft	none
humerus	none	none	none	none	over most of bone
humerus	none	none	none	both prox and dist ends	over most of bone
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	proximal shaft	none
humerus	none	none	none	both prox and dist ends	none
humerus	proximal end	none	none	both prox and dist ends	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	over most of bone	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	proximal shaft	none
humerus	proximal end	none	none	none	none
humerus	proximal shaft	none	none	proximal end	none
humerus	none	none	none	both prox and dist ends	none
illium	none	none	none	one end of non-long bone	none
illium	one end of non-long bone	none	none	over most of bone	none
illium	over most of bone	none	none	none	none
illium	none	none	none	one end of non-long bone	none
illium	none	none	none	one end of non-long bone	none
illium	none	none	none	over most of bone	none
illium	proximal end	none	none	proximal end	none
illium	none	none	none	both prox and dist ends	none
ishium	over most of bone	none	none	one end of non-long bone	none
ishium	none	none	none	over most of bone	none
lumbar vert	one end of non-long bone	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	over most of bone	none
lumbar vert	one end of non-long bone	none	none	one end of non-long bone	none
lumbar vert	one end of non-long bone	none	none	one end of non-long bone	none
lumbar vert	none	none	none	over most of bone	none
lumbar vert	none	none	none	over most of bone	none
lumbar vert	one end of non-long bone	none	none	one end of non-long bone	none
lumbar vert	over most of bone	none	none	none	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	over most of bone	none

lumbar vert	none	none	none	both prox and dist ends	none
lumbar vert	none	none	none	both prox and dist ends	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	mandibular heal	none
mandible	one end of non-long bone	none	none	none	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	mandibular heal	none
mandible	one end of non-long bone	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	one end of non-long bone	none	none	both prox and dist ends	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	mandibular heal	none	none	none	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	one end of non-long bone	none

mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	over most of bone	over most of bone
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	distal end	none
mandible	none	none	none	proximal shaft	none
mandibular hinge	none	none	none	proximal shaft	none
maxilla	none	none	none	both prox and dist ends	none
maxilla	none	none	none	over most of bone	none
maxilla	one end of non-long bone	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	one end of non-long bone	none	none	none	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	one end of non-long bone	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none

maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	one end of non-long bone	none	none	both prox and dist ends	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	both prox and dist ends	none
maxilla	none	none	none	both prox and dist ends	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	both prox and dist ends	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	both prox and dist ends	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	both prox and dist ends	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
metapodial	none	none	none	proximal shaft	none
metapodial	none	none	none	none	distal shaft
metapodial	proximal shaft	none	none	proximal shaft	none
metapodial	none	none	none	distal shaft	none
metapodial	none	none	none	proximal shaft	none
metapodial	proximal shaft	none	none	distal end	none
metapodial	none	none	none	proximal end	none
metapodial	distal end	none	none	none	distal shaft
metapodial	proximal shaft	none	none	distal shaft	none
metapodial	proximal end	none	none	none	none
metapodial	none	none	none	distal shaft	none
metapodial	none	none	none	proximal shaft	none
metapodial	none	none	none	distal shaft	none
metapodial	none	none	none	distal shaft	none
metapodial	over most of bone	none	none	distal shaft	none
metapodial	distal end	none	none	none	over most of bone
metapodial	none	none	none	proximal shaft	none
metapodial	none	none	none	distal shaft	none
metapodial	none	none	none	proximal shaft	none
metapodial	proximal end	none	none	proximal shaft	none
metapodial	none	none	none	distal shaft	none

metapodial	distal shaft	none	none	proximal shaft	none
metapodial	none	none	none	distal shaft	none
metapodial	none	none	none	distal shaft	none
metapodial	none	none	none	proximal shaft	none
metapodial	none	none	none	proximal shaft	none
metapodial	over most of bone	none	none	both prox and dist ends	none
metapodial	none	none	none	proximal end	none
metapodial	none	none	none	distal shaft	none
metatarsal	none	none	none	proximal shaft	proximal shaft
metatarsal	none	none	none	none	over most of bone
metatarsal	none	none	none	proximal shaft	none
metatarsal	none	none	none	distal shaft	none
metatarsal	none	none	none	both prox and dist ends	none
metatarsal	none	none	none	distal shaft	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	one end of non-long bone	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	one end of non-long bone	none
occipital condyle	over most of bone	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	one end of non-long bone	none	none	over most of bone	none
occipital condyle	none	none	none	one end of non-long bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	both prox and dist ends	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	one end of non-long bone	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	one end of non-long bone	none
occipital condyle	none	none	none	one end of non-long bone	none
occipital condyle	none	none	none	over most of bone	none

pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	proximal end	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	one end of non-long bone
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	one end of non-long bone	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	one end of non-long bone	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	one end of non-long bone	none	none	both prox and dist ends	none
pelvis (acetabulum)	none	none	none	both prox and dist ends	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	both prox and dist ends	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	one end of non-long bone	none	none	one end of non-long bone	none
pelvis (acetabulum)	one end of non-long bone	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	both prox and dist ends	none
pelvis (acetabulum)	none	none	none	both prox and dist ends	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	over most of bone	none	none	both prox and dist ends	none
pelvis (acetabulum)	one end of non-long bone	none	none	over most of bone	one end of non-long bone
pelvis (acetabulum)	one end of non-long bone	none	none	one end of non-long bone	none
pelvis (acetabulum)	one end of non-long bone	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
phalanx 1	both prox and dis ends	none	none	none	distal shaft
phalanx 1	none	none	none	distal shaft	none

phalanx 1	none	none	none	distal shaft	none
phalanx 1	proximal end	none	none	proximal shaft	none
phalanx 1	none	none	none	distal shaft	none
phalanx 1	distal shaft	none	none	none	none
phalanx 1	proximal end	none	none	none	none
phalanx 1	none	none	none	proximal end	none
phalanx 1	over most of bone	none	none	none	none
phalanx 1	none	none	none	proximal shaft	none
phalanx 1	distal end	none	none	proximal shaft	none
phalanx 2	none	none	none	none	proximal shaft
phalanx 2	over most of bone	none	none	proximal end	none
phalanx 2	distal end	none	none	none	none
phalanx 2	none	none	none	proximal end	none
phalanx 2	none	none	none	distal end	none
phalanx 2	none	none	none	both prox and dist ends	none
phalanx 2	none	none	none	proximal shaft	none
phalanx 2	none	none	none	both prox and dist ends	none
phalanx 2	none	none	none	proximal shaft	none
phalanx 2	none	none	none	distal shaft	none
phalanx 2	over most of bone	none	none	none	none
phalanx 2	none	none	none	distal shaft	none
phalanx 3	none	none	none	proximal end	none
phalanx 3	none	none	none	both prox and dist ends	none
phalanx 3	none	none	none	distal shaft	none
phalanx 3	none	none	none	distal shaft	none
phalanx 3	none	none	none	distal shaft	none
phalanx 3	none	none	none	distal end	none
phalanx 3	none	none	none	proximal end	none
phalanx 3	none	none	none	proximal shaft	none
pubis	none	none	none	one end of non-long bone	none
pubis	none	none	none	one end of non-long bone	none
pubis	none	none	none	over most of bone	none
pubis	none	none	none	both prox and dist ends	distal end
radius	none	none	none	distal shaft	none
radius	none	none	none	both prox and dist ends	none
radius	none	none	none	proximal shaft	none
radius	none	none	none	distal shaft	none
radius	none	none	none	proximal shaft	none
radius	proximal end	none	none	none	none
radius	distal shaft	none	none	distal shaft	distal shaft
radius	none	none	none	distal shaft	none
radius	proximal end	none	none	none	none
radius	none	none	none	distal shaft	none
radius	distal shaft	none	none	distal shaft	none
radius	none	none	none	distal shaft	none

radius	none	none	none	distal shaft	over most of bone
radius	none	none	none	distal shaft	distal shaft
radius	none	none	none	distal end	none
radius	none	none	none	distal end	distal end
radius	none	none	none	distal end	none
radius	distal shaft	none	none	both prox and dist ends	none
radius	none	none	none	distal end	none
radius	none	none	none	distal end	none
radius	none	none	none	distal shaft	none
radius	none	none	none	proximal shaft	none
radius	none	none	none	distal shaft	none
radius	none	none	none	distal shaft	none
radius	none	none	none	proximal shaft	proximal shaft
radius	none	none	none	distal shaft	none
radius	none	none	none	proximal shaft	none
radius	none	none	none	proximal shaft	none
radius	none	none	none	distal shaft	none
radius	distal shaft	none	none	distal end	none
radius	none	none	none	none	none
radius	distal shaft	none	none	both prox and dist ends	none
radius	none	none	none	distal end	none
radius	over most of bone	none	none	proximal shaft	over most of bone
radius	proximal shaft	none	none	proximal shaft	none
radius	none	none	none	distal shaft	none
radius	distal end	none	none	none	none
radius	none	none	none	proximal shaft	none
radius	none	none	none	distal shaft	none
radius	distal end	none	none	none	none
radius	none	none	none	distal shaft	none
radius	proximal shaft	none	none	none	none
radius	none	none	none	distal shaft	none
radius	both prox and dis ends	none	none	distal end	none
radius	proximal end	none	none	none	none
radius	none	none	none	distal end	over most of bone
radius	none	none	none	distal end	distal shaft
radius	none	none	none	proximal end	none
radius	none	none	none	proximal shaft	none
radius	none	none	none	proximal shaft	none
radius	proximal end	none	none	none	none
radius	none	none	none	proximal shaft	none
radius	none	none	none	distal shaft	none
radius	none	none	none	distal shaft	none
radius	none	none	none	distal end	none
radius	none	none	none	both prox and dist ends	over most of bone
radius	none	none	none	over most of bone	none

radius	proximal end	none	none	both prox and dist ends	none
radius	none	none	none	both prox and dist ends	none
radius	none	none	none	both prox and dist ends	none
radius	none	none	none	distal end	none
radius	none	none	none	both prox and dist ends	none
radius	proximal shaft	none	none	none	none
radius	proximal shaft	none	none	proximal shaft	none
radius	distal end	none	none	none	none
radius	proximal end	none	none	none	none
radius	none	none	none	proximal shaft	none
radius	distal end	none	none	proximal shaft	none
radius	none	none	none	distal shaft	none
radius	none	none	none	distal shaft	none
radius	none	none	none	distal shaft	none
radius	none	none	none	distal shaft	none
radius	none	none	none	proximal shaft	none
radius	none	none	none	distal shaft	none
radius	proximal end	none	none	none	none
radius	distal end	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none

rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	over most of bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none

rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	over most of bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	none	none
rib	none	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none

rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	over most of bone	none
rib	none	none	none	over most of bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none

rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none

rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	over most of bone	none
rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none

rib	none	none	none	one end of non-long bone	none
rib	none	none	none	over most of bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	over most of bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	over most of bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	over most of bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	over most of bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	over most of bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	over most of bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none

rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	over most of bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	one end of non-long bone
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	over most of bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	one end of non-long bone
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none

rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	over most of bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	none	none
rib	none	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	one end of non-long bone
rib	none	none	none	over most of bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none

rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	none	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	over most of bone

rib	none	none	none	over most of bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	one end of non-long bone
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	over most of bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	both prox and dist ends	one end of non-long bone

rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	none	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	none	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	over most of bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none

rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	over most of bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none

rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	both prox and dist ends	over most of bone
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	over most of bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	over most of bone	none
rib	none	none	none	over most of bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none

rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	none	one end of non-long bone
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	over most of bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	none	none	none	over most of bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	over most of bone	none	none	both prox and dist ends	none
rib	over most of bone	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	one end of non-long bone
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
sacrum	one end of non-long bone	none	none	both prox and dist ends	none
sacrum	none	none	none	over most of bone	none
sacrum	none	none	none	over most of bone	none
sacrum	none	none	none	one end of non-long bone	none
sacrum	none	none	none	over most of bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	proximal end	none	none	both prox and dist ends	none
scapula	none	none	none	one end of non-long bone	none

scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	both prox and dist ends	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	over most of bone
scapula	proximal end	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	over most of bone	none	none	one end of non-long bone	none
scapula	over most of bone	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	over most of bone	none	none	none	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	distal end	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	distal end	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	over most of bone	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	both prox and dis ends	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	both prox and dist ends	none
scapula	distal end	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none

scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	both prox and dist ends	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	over most of bone	none	none	none	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	both prox and dist ends	none
scapula	none	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	proximal end	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none

scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	proximal end	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	both prox and dist ends	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	over most of bone	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	proximal end	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	proximal end	none	none	one end of non-long bone	none

scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	proximal end	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
sesamoid	none	none	none	both prox and dist ends	none
sesamoid	none	none	none	both prox and dist ends	none
skull	none	none	none	over most of bone	none
skull	over most of bone	none	none	none	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	none	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none

skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none

skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
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skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none

skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
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skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
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skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
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skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
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skull fragment	none	none	none	one end of non-long bone	none
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skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
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skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
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skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
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skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none

skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	none	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
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skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
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skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
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skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none

skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	both prox and dist ends	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
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skull fragment	none	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
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skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none

skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	both prox and dist ends	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	both prox and dist ends	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	none	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none

skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	both prox and dist ends	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	both prox and dist ends	none
skull fragment	none	none	none	over most of bone	unknown
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	both prox and dist ends	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	both prox and dist ends	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	both prox and dist ends	none
skull fragment	none	none	none	over most of bone	none
skull fragment	over most of bone	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	both prox and dist ends	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none

skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	none	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	none	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	none	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	one end of non-long bone
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	both prox and dist ends	none
sternum	none	none	none	one end of non-long bone	none
sternum	proximal end	none	none	none	none
sternum	one end of non-long bone	none	none	none	none
sternum	distal end	none	none	none	none
sternum	over most of bone	none	none	none	none
sternum	none	none	none	proximal shaft	none
sternum	none	none	none	distal shaft	none
sternum	none	none	none	distal shaft	none
sternum	proximal end	none	none	distal end	none
sternum	distal end	none	none	distal end	none
sternum	proximal end	none	none	none	none
sternum	none	none	none	distal end	none
sternum	one end of non-long bone	none	none	none	none
sternum	one end of non-long bone	none	none	one end of non-long bone	none
tarsal	proximal shaft	none	none	none	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	none	none
thoracic vert	one end of non-long bone	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none

thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	one end of non-long bone	none	none	over most of bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	one end of non-long bone	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	over most of bone	none
thoracic vert	none	none	none	over most of bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	over most of bone	none
thoracic vert	one end of non-long bone	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	one end of non-long bone	none	none	one end of non-long bone	none
thoracic vert	none	none	none	none	none
thoracic vert	none	none	none	over most of bone	none
tibia	distal shaft	none	none	distal shaft	distal shaft
tibia	distal shaft	none	none	both prox and dist ends	distal shaft
tibia	proximal shaft	none	none	none	none
tibia	none	none	none	proximal shaft	proximal shaft
tibia	over most of bone	none	none	proximal shaft	none
tibia	none	none	none	proximal shaft	none
tibia	proximal shaft	none	none	proximal shaft	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	distal shaft	none
tibia	distal shaft	none	none	proximal shaft	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	none	both prox and dist ends
tibia	none	none	none	distal shaft	none
tibia	proximal shaft	none	none	proximal shaft	none
tibia	none	none	none	proximal shaft	proximal shaft
tibia	none	none	none	both prox and dist ends	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	proximal shaft	none
tibia	distal shaft	none	none	proximal shaft	none
tibia	distal shaft	none	none	distal shaft	none
tibia	none	none	none	distal shaft	none
tibia	distal shaft	none	none	both prox and dist ends	none
tibia	none	none	none	distal shaft	none
tibia	none	none	none	distal shaft	none
tibia	proximal shaft	none	none	proximal shaft	none
tibia	proximal shaft	none	none	both prox and dist ends	none
tibia	distal shaft	none	none	distal shaft	none

tibia	proximal shaft	none	none	both prox and dist ends	none
tibia	none	none	none	distal shaft	none
tibia	none	none	none	none	none
tibia	both prox and dis ends	none	none	both prox and dist ends	none
tibia	none	none	none	distal shaft	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	proximal shaft	none
tibia	distal end	none	none	proximal shaft	none
tibia	proximal shaft	none	none	proximal shaft	none
tibia	none	none	none	proximal shaft	none
tibia	proximal end	none	none	none	none
tibia	none	none	none	distal shaft	none
tibia	both prox and dis ends	none	none	distal end	none
tibia	proximal end	none	none	none	none
tibia	proximal shaft	none	none	distal end	none
tibia	none	none	none	both prox and dist ends	none
tibia	both prox and dis ends	none	none	both prox and dist ends	distal shaft
tibia	distal shaft	none	none	distal shaft	none
tibia	none	none	none	both prox and dist ends	none
tibia	distal shaft	none	none	both prox and dist ends	none
tibia	distal shaft	none	none	none	none
tibia	distal shaft	none	none	both prox and dist ends	none
tibia	none	none	none	distal shaft	none
tibia	proximal end	none	none	proximal shaft	none
tibia	none	none	none	distal shaft	none
tibia	proximal end	none	none	both prox and dist ends	none
tibia	none	none	none	both prox and dist ends	none
tibia	none	none	none	both prox and dist ends	distal shaft
tibia	none	none	none	both prox and dist ends	none
tibia	none	none	none	both prox and dist ends	distal end
tibia	distal shaft	none	none	both prox and dist ends	distal shaft
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	over most of bone	none
tibia	none	none	none	both prox and dist ends	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	proximal shaft	none
tibio-tarsus	distal end	none	none	one end of non-long bone	none
tibio-tarsus	distal end	none	none	proximal shaft	none
tibio-tarsus	distal end	none	none	proximal shaft	none
tibio-tarsus	none	none	none	distal shaft	none
tibio-tarsus	none	none	none	proximal shaft	none
tibio-tarsus	none	none	none	both prox and dist ends	none
tooth fragments	one end of non-long bone	none	none	one end of non-long bone	none
ulna	distal end	none	none	both prox and dist ends	over most of bone

ulna	none	none	none	none	over most of bone
ulna	none	none	none	proximal end	proximal shaft
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	proximal end	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	distal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	proximal end	none
ulna	none	none	none	both prox and dist ends	over most of bone
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	none	none
ulna	proximal shaft	none	none	both prox and dist ends	none
ulna	none	none	none	over most of bone	none
ulna	proximal shaft	none	none	proximal shaft	none
ulna	proximal end	none	none	none	none
ulna	none	none	none	distal shaft	distal shaft
ulna	none	none	none	both prox and dist ends	distal end
ulna	none	none	none	proximal end	none
ulna	over most of bone	none	none	none	none
ulna	proximal shaft	none	none	proximal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	both prox and dist ends	over most of bone
ulna	none	none	none	both prox and dist ends	none
ulna	distal shaft	none	none	distal shaft	none
ulna	proximal shaft	none	none	proximal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	over most of bone	none
ulna	none	none	none	proximal end	none
ulna	proximal end	none	none	distal shaft	none
ulna	proximal end	none	none	both prox and dist ends	none
ulna	proximal end	none	none	both prox and dist ends	none
ulna	both prox and dis ends	none	none	both prox and dist ends	none
ulna	none	none	none	both prox and dist ends	none
ulna	proximal end	none	none	none	none
ulna	none	none	none	proximal end	none
ulna	proximal end	none	none	proximal end	none
ulna	proximal end	none	none	proximal end	none
ulna	none	none	none	proximal shaft	none
ulna	proximal shaft	none	none	both prox and dist ends	none
ulna	none	none	none	proximal end	none
ulna	proximal end	none	none	proximal end	none

ulna	none	none	none	proximal end	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	proximal shaft	none	none	proximal shaft	none
ulna	proximal end	none	none	none	proximal end
ulna	both prox and dis ends	none	none	none	none
ulna	both prox and dis ends	none	none	distal shaft	none
ulna	proximal shaft	none	none	proximal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	proximal shaft	proximal shaft
ulna	none	none	none	both prox and dist ends	none
ulna	distal shaft	none	none	distal shaft	none
ulna	proximal end	none	none	none	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	proximal shaft	none
unidentified fragment	none	none	none	proximal shaft	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	distal shaft	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	unknown
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	proximal shaft	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	over most of bone
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none

unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	over most of bone
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	one end of non-long bone	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none

unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	one end of non-long bone	none	none	one end of non-long bone	none
unidentified fragment	one end of non-long bone	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	distal shaft	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	one end of non-long bone	none	none	none	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	over most of bone	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	one end of non-long bone	none	none	none	none
unidentified fragment	none	none	none	distal shaft	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	proximal end	none	none	none	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	distal shaft	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	one end of non-long bone
unidentified fragment	none	none	none	over most of bone	none

unidentified fragment	none	none	none	none	none
unidentified fragment	none	none	none	both prox and dist ends	over most of bone
unidentified fragment	one end of non-long bone	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	one end of non-long bone	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	over most of bone	none
unknown tooth	one end of non-long bone	none	none	none	none
unknown tooth	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	none	none	none	none	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	over most of bone	none
vertebra	one end of non-long bone	none	none	over most of bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	none	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	none	none
vertebra	none	none	none	over most of bone	none

vertebra	one end of non-long bone	none	none	none	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	over most of bone	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	one end of non-long bone	none
zygomatic arch	none	none	none	both prox and dist ends	none
zygomatic arch	none	none	none	one end of non-long bone	none
zygomatic arch	none	none	none	both prox and dist ends	none
zygomatic arch	none	none	none	one end of non-long bone	none
zygomatic arch	none	none	none	one end of non-long bone	none
zygomatic arch	none	none	none	one end of non-long bone	none
zygomatic arch	none	none	none	both prox and dist ends	none
zygomatic arch	none	none	none	one end of non-long bone	none
zygomatic arch	none	none	none	both prox and dist ends	none
zygomatic arch	none	none	none	both prox and dist ends	none
zygomatic arch	none	none	none	one end of non-long bone	none
zygomatic arch	none	none	none	one end of non-long bone	none
zygomatic arch	none	none	none	one end of non-long bone	none
zygomatic arch	none	none	none	one end of non-long bone	none
Element	punctates/location	scouring/location	acid etching/location	crenulated edges/location	striations/location
astragalus	over most of bone	none	none	none	none
astragalus	none	none	none	proximal end	none
atlas	none	none	none	one end of non-long bone	none
atlas	none	none	none	over most of bone	none
atlas	none	none	none	both prox and dist ends	none
atlas	none	none	none	both prox and dist ends	none
atlas	none	none	none	one end of non-long bone	none
atlas	none	none	none	over most of bone	none
atlas	none	none	none	over most of bone	none
atlas	none	none	none	both prox and dist ends	none
atlas	none	none	none	both prox and dist ends	none
axis	one end of non-long bone	none	none	one end of non-long bone	none
axis	over most of bone	none	none	over most of bone	none
axis	one end of non-long bone	none	none	none	none
axis	one end of non-long bone	none	none	one end of non-long bone	none
axis	none	none	none	one end of non-long bone	none
axis	none	none	none	over most of bone	none
axis	none	none	none	one end of non-long bone	none
calcaneus	proximal end	none	none	none	none

calcaneus	over most of bone	none	none	none	none
calcaneus	none	none	none	proximal end	none
calcaneus	proximal end	none	none	none	none
calcaneus	proximal end	none	none	none	none
calcaneus	none	none	none	none	proximal shaft
calcaneus	proximal end	none	none	none	none
carpal	none	none	none	distal end	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	none	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	over most of bone	none
caudal vert	one end of non-long bone	none	none	none	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	none	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	over most of bone	none
caudal vert	none	none	none	over most of bone	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	one end of non-long bone	none
caudal vert	none	none	none	one end of non-long bone	none
cervical vert	none	none	none	one end of non-long bone	none
cervical vert	none	none	none	one end of non-long bone	none
cervical vert	none	none	none	one end of non-long bone	none
cervical vert	one end of non-long bone	none	none	none	none
cervical vert	none	none	none	both prox and dist ends	none
cervical vert	one end of non-long bone	none	none	none	none
cervical vert	none	none	none	one end of non-long bone	none
cervical vert	none	none	none	one end of non-long bone	none
femur	distal end	none	none	none	none
femur	proximal end	none	none	none	none
femur	distal shaft	none	none	distal shaft	none
femur	proximal shaft	none	none	none	over most of bone
femur	none	none	none	proximal end	none
femur	distal end	none	none	distal end	distal end
femur	none	none	none	proximal end	none
femur	none	none	none	both prox and dist ends	none

femur	none	none	none	proximal shaft	none
femur	distal shaft	none	none	none	both prox and dist ends
femur	none	none	none	proximal shaft	proximal shaft
femur	none	none	none	proximal end	none
femur	none	none	none	none	over most of bone
femur	distal shaft	none	none	none	none
femur	distal shaft	none	none	none	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	proximal end	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	proximal shaft
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	none
femur	none	none	none	both prox and dist ends	both prox and dist ends
femur	none	none	none	distal end	none
fibula	none	none	none	distal shaft	none
fibula	proximal end	none	none	distal shaft	both prox and dist ends
fibula	none	none	none	proximal shaft	none
fibula	none	none	none	distal shaft	none
fibula	none	none	none	proximal shaft	none
fibula	none	none	none	distal shaft	none
fibula	none	none	none	proximal shaft	none
fibula	none	none	none	proximal shaft	none
fibula	none	none	none	distal shaft	none
fibula	none	none	none	distal shaft	none
fibula	distal shaft	none	none	distal shaft	none
fibula	none	none	none	distal shaft	none
fibula	none	none	none	distal shaft	none
fibula	none	none	none	proximal shaft	none
fibula	none	none	none	distal shaft	none
fibula	none	none	none	distal shaft	none
fibula	none	none	none	proximal shaft	none
fibula	proximal shaft	none	none	none	none
fibula	none	none	none	both prox and dist ends	over most of bone
fibula	none	none	none	both prox and dist ends	over most of bone
fibula	none	none	none	distal shaft	none
fibula	none	none	none	both prox and dist ends	none
humerus	none	none	none	proximal shaft	none
humerus	both prox and dis ends	none	none	both prox and dist ends	over most of bone
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	proximal shaft	none
humerus	proximal end	none	none	none	none

humerus	distal end	none	none	none	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	both prox and dist ends	none
humerus	proximal end	none	none	none	none
humerus	distal end	none	none	none	none
humerus	distal end	none	none	both prox and dist ends	none
humerus	none	none	none	distal shaft	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	proximal end	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	distal shaft	none
humerus	none	none	none	distal shaft	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	proximal end	none
humerus	distal end	none	none	proximal end	none
humerus	none	none	none	proximal end	none
humerus	none	none	none	both prox and dist ends	none
humerus	proximal end	none	none	none	none
humerus	none	none	none	none	proximal end
humerus	none	none	none	both prox and dist ends	none
humerus	proximal end	none	none	none	none
humerus	none	none	none	proximal end	none
humerus	proximal shaft	none	none	proximal end	none
humerus	proximal end	none	none	none	none
humerus	proximal shaft	none	none	none	none
humerus	none	none	none	both prox and dist ends	none
humerus	distal end	none	none	none	none
humerus	none	none	none	both prox and dist ends	none
humerus	proximal end	none	none	none	none
humerus	proximal shaft	none	none	proximal end	none
humerus	none	none	none	distal end	none
humerus	proximal shaft	none	none	both prox and dist ends	none
humerus	none	none	none	proximal shaft	none
humerus	both prox and dis ends	none	none	none	none
humerus	none	none	none	proximal shaft	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	proximal shaft	none
humerus	none	none	none	proximal shaft	none
humerus	none	none	none	proximal shaft	none
humerus	over most of bone	none	none	distal shaft	none
humerus	none	none	none	proximal shaft	none
humerus	none	none	none	proximal shaft	none
humerus	distal end	none	none	none	none

humerus	proximal end	none	none	none	none
humerus	none	none	none	both prox and dist ends	none
humerus	distal end	none	none	both prox and dist ends	none
humerus	proximal shaft	none	none	none	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	both prox and dist ends	none
humerus	proximal end	none	none	none	none
humerus	proximal end	none	none	both prox and dist ends	distal shaft
humerus	none	none	none	proximal shaft	none
humerus	none	none	none	proximal shaft	none
humerus	distal end	none	none	distal end	none
humerus	none	none	none	distal end	none
humerus	none	none	none	distal shaft	none
humerus	none	none	none	distal shaft	none
humerus	proximal end	none	none	over most of bone	none
humerus	proximal end	none	none	none	none
humerus	proximal end	none	none	none	none
humerus	proximal end	none	none	proximal end	none
humerus	proximal end	none	none	distal shaft	none
humerus	distal end	none	none	none	none
humerus	none	none	none	distal shaft	none
humerus	none	none	none	proximal end	none
humerus	proximal end	none	none	proximal end	none
humerus	none	none	none	proximal end	none
humerus	none	none	none	distal shaft	none
humerus	none	none	none	none	over most of bone
humerus	none	none	none	both prox and dist ends	over most of bone
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	proximal shaft	none
humerus	none	none	none	both prox and dist ends	none
humerus	proximal end	none	none	both prox and dist ends	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	over most of bone	none
humerus	none	none	none	both prox and dist ends	none
humerus	none	none	none	proximal shaft	none
humerus	proximal end	none	none	none	none
humerus	proximal shaft	none	none	proximal end	none
humerus	none	none	none	both prox and dist ends	none
illium	none	none	none	one end of non-long bone	none
illium	one end of non-long bone	none	none	over most of bone	none
illium	over most of bone	none	none	none	none
illium	none	none	none	one end of non-long bone	none
illium	none	none	none	one end of non-long bone	none
illium	none	none	none	over most of bone	none

illium	proximal end	none	none	proximal end	none
illium	none	none	none	both prox and dist ends	none
ishium	over most of bone	none	none	one end of non-long bone	none
ishium	none	none	none	over most of bone	none
lumbar vert	one end of non-long bone	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	over most of bone	none
lumbar vert	one end of non-long bone	none	none	one end of non-long bone	none
lumbar vert	one end of non-long bone	none	none	one end of non-long bone	none
lumbar vert	none	none	none	over most of bone	none
lumbar vert	none	none	none	over most of bone	none
lumbar vert	one end of non-long bone	none	none	one end of non-long bone	none
lumbar vert	over most of bone	none	none	none	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	one end of non-long bone	none
lumbar vert	none	none	none	over most of bone	none
lumbar vert	none	none	none	both prox and dist ends	none
lumbar vert	none	none	none	both prox and dist ends	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	mandibular heal	none
mandible	one end of non-long bone	none	none	none	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	mandibular heal	none
mandible	one end of non-long bone	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	one end of non-long bone	none	none	both prox and dist ends	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	both prox and dist ends	none

mandible	none	none	none	over most of bone	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	mandibular heal	none
mandible	mandibular heal	none	none	none	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	mandibular heal	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	one end of non-long bone	none
mandible	none	none	none	over most of bone	over most of bone
mandible	none	none	none	both prox and dist ends	none
mandible	none	none	none	distal end	none
mandible	none	none	none	proximal shaft	none
mandibular hinge	none	none	none	proximal shaft	none
maxilla	none	none	none	both prox and dist ends	none
maxilla	none	none	none	over most of bone	none
maxilla	one end of non-long bone	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none

maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	one end of non-long bone	none	none	none	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	one end of non-long bone	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	one end of non-long bone	none	none	both prox and dist ends	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	both prox and dist ends	none
maxilla	none	none	none	both prox and dist ends	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	both prox and dist ends	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	both prox and dist ends	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	both prox and dist ends	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none
maxilla	none	none	none	one end of non-long bone	none

metapodial	none	none	none	proximal shaft	none
metapodial	none	none	none	none	distal shaft
metapodial	proximal shaft	none	none	proximal shaft	none
metapodial	none	none	none	distal shaft	none
metapodial	none	none	none	proximal shaft	none
metapodial	proximal shaft	none	none	distal end	none
metapodial	none	none	none	proximal end	none
metapodial	distal end	none	none	none	distal shaft
metapodial	proximal shaft	none	none	distal shaft	none
metapodial	proximal end	none	none	none	none
metapodial	none	none	none	distal shaft	none
metapodial	none	none	none	proximal shaft	none
metapodial	none	none	none	distal shaft	none
metapodial	none	none	none	distal shaft	none
metapodial	over most of bone	none	none	distal shaft	none
metapodial	distal end	none	none	none	over most of bone
metapodial	none	none	none	proximal shaft	none
metapodial	none	none	none	distal shaft	none
metapodial	none	none	none	proximal shaft	none
metapodial	proximal end	none	none	proximal shaft	none
metapodial	none	none	none	distal shaft	none
metapodial	distal shaft	none	none	proximal shaft	none
metapodial	none	none	none	distal shaft	none
metapodial	none	none	none	distal shaft	none
metapodial	none	none	none	proximal shaft	none
metapodial	none	none	none	proximal shaft	none
metapodial	over most of bone	none	none	both prox and dist ends	none
metapodial	none	none	none	proximal end	none
metapodial	none	none	none	distal shaft	none
metatarsal	none	none	none	proximal shaft	proximal shaft
metatarsal	none	none	none	none	over most of bone
metatarsal	none	none	none	proximal shaft	none
metatarsal	none	none	none	distal shaft	none
metatarsal	none	none	none	both prox and dist ends	none
metatarsal	none	none	none	distal shaft	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	one end of non-long bone	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	one end of non-long bone	none
occipital condyle	over most of bone	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none

occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	one end of non-long bone	none	none	over most of bone	none
occipital condyle	none	none	none	one end of non-long bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	both prox and dist ends	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	one end of non-long bone	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	over most of bone	none
occipital condyle	none	none	none	one end of non-long bone	none
occipital condyle	none	none	none	one end of non-long bone	none
occipital condyle	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	proximal end	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	one end of non-long bone
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	one end of non-long bone	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	one end of non-long bone	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	one end of non-long bone	none	none	both prox and dist ends	none
pelvis (acetabulum)	none	none	none	both prox and dist ends	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none

pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	both prox and dist ends	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	one end of non-long bone	none	none	one end of non-long bone	none
pelvis (acetabulum)	one end of non-long bone	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	both prox and dist ends	none
pelvis (acetabulum)	none	none	none	both prox and dist ends	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	over most of bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
pelvis (acetabulum)	one end of non-long bone	none	none	over most of bone	none
pelvis (acetabulum)	over most of bone	none	none	both prox and dist ends	none
pelvis (acetabulum)	one end of non-long bone	none	none	over most of bone	one end of non-long bone
pelvis (acetabulum)	one end of non-long bone	none	none	one end of non-long bone	none
pelvis (acetabulum)	one end of non-long bone	none	none	one end of non-long bone	none
pelvis (acetabulum)	none	none	none	one end of non-long bone	none
phalanx 1	both prox and dis ends	none	none	none	distal shaft
phalanx 1	none	none	none	distal shaft	none
phalanx 1	none	none	none	distal shaft	none
phalanx 1	proximal end	none	none	proximal shaft	none
phalanx 1	none	none	none	distal shaft	none
phalanx 1	distal shaft	none	none	none	none
phalanx 1	proximal end	none	none	none	none
phalanx 1	none	none	none	proximal end	none
phalanx 1	over most of bone	none	none	none	none
phalanx 1	none	none	none	proximal shaft	none
phalanx 1	distal end	none	none	proximal shaft	none
phalanx 2	none	none	none	none	proximal shaft
phalanx 2	over most of bone	none	none	proximal end	none
phalanx 2	distal end	none	none	none	none
phalanx 2	none	none	none	proximal end	none
phalanx 2	none	none	none	distal end	none
phalanx 2	none	none	none	both prox and dist ends	none
phalanx 2	none	none	none	proximal shaft	none
phalanx 2	none	none	none	both prox and dist ends	none
phalanx 2	none	none	none	proximal shaft	none
phalanx 2	none	none	none	distal shaft	none
phalanx 2	over most of bone	none	none	none	none
phalanx 2	none	none	none	distal shaft	none
phalanx 3	none	none	none	proximal end	none
phalanx 3	none	none	none	both prox and dist ends	none
phalanx 3	none	none	none	distal shaft	none

phalanx 3	none	none	none	distal shaft	none
phalanx 3	none	none	none	distal shaft	none
phalanx 3	none	none	none	distal end	none
phalanx 3	none	none	none	proximal end	none
phalanx 3	none	none	none	proximal shaft	none
pubis	none	none	none	one end of non-long bone	none
pubis	none	none	none	one end of non-long bone	none
pubis	none	none	none	over most of bone	none
pubis	none	none	none	both prox and dist ends	distal end
radius	none	none	none	distal shaft	none
radius	none	none	none	both prox and dist ends	none
radius	none	none	none	proximal shaft	none
radius	none	none	none	distal shaft	none
radius	none	none	none	proximal shaft	none
radius	proximal end	none	none	none	none
radius	distal shaft	none	none	distal shaft	distal shaft
radius	none	none	none	distal shaft	none
radius	proximal end	none	none	none	none
radius	none	none	none	distal shaft	none
radius	distal shaft	none	none	distal shaft	none
radius	none	none	none	distal shaft	none
radius	none	none	none	distal shaft	over most of bone
radius	none	none	none	distal shaft	distal shaft
radius	none	none	none	distal end	none
radius	none	none	none	distal end	distal end
radius	none	none	none	distal end	none
radius	distal shaft	none	none	both prox and dist ends	none
radius	none	none	none	distal end	none
radius	none	none	none	distal end	none
radius	none	none	none	distal shaft	none
radius	none	none	none	proximal shaft	none
radius	none	none	none	distal shaft	none
radius	none	none	none	distal shaft	none
radius	none	none	none	proximal shaft	proximal shaft
radius	none	none	none	distal shaft	none
radius	none	none	none	proximal shaft	none
radius	none	none	none	proximal shaft	none
radius	none	none	none	distal shaft	none
radius	distal shaft	none	none	distal end	none
radius	none	none	none	none	none
radius	distal shaft	none	none	both prox and dist ends	none
radius	none	none	none	distal end	none
radius	over most of bone	none	none	proximal shaft	over most of bone
radius	proximal shaft	none	none	proximal shaft	none
radius	none	none	none	distal shaft	none

radius	distal end	none	none	none	none
radius	none	none	none	proximal shaft	none
radius	none	none	none	distal shaft	none
radius	distal end	none	none	none	none
radius	none	none	none	distal shaft	none
radius	proximal shaft	none	none	none	none
radius	none	none	none	distal shaft	none
radius	both prox and dis ends	none	none	distal end	none
radius	proximal end	none	none	none	none
radius	none	none	none	distal end	over most of bone
radius	none	none	none	distal end	distal shaft
radius	none	none	none	proximal end	none
radius	none	none	none	proximal shaft	none
radius	none	none	none	proximal shaft	none
radius	proximal end	none	none	none	none
radius	none	none	none	proximal shaft	none
radius	none	none	none	distal shaft	none
radius	none	none	none	distal shaft	none
radius	none	none	none	distal end	none
radius	none	none	none	both prox and dist ends	over most of bone
radius	none	none	none	over most of bone	none
radius	proximal end	none	none	both prox and dist ends	none
radius	none	none	none	both prox and dist ends	none
radius	none	none	none	both prox and dist ends	none
radius	none	none	none	distal end	none
radius	none	none	none	both prox and dist ends	none
radius	proximal shaft	none	none	none	none
radius	proximal shaft	none	none	proximal shaft	none
radius	distal end	none	none	none	none
radius	proximal end	none	none	none	none
radius	none	none	none	proximal shaft	none
radius	distal end	none	none	proximal shaft	none
radius	none	none	none	distal shaft	none
radius	none	none	none	distal shaft	none
radius	none	none	none	distal shaft	none
radius	none	none	none	distal shaft	none
radius	none	none	none	proximal shaft	none
radius	none	none	none	distal shaft	none
radius	proximal end	none	none	none	none
radius	distal end	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none

rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	over most of bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none

rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	over most of bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none

rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	none	none
rib	none	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	over most of bone	none
rib	none	none	none	over most of bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none

rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none

rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none

rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	over most of bone	none
rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	over most of bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	over most of bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	over most of bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	over most of bone	none
rib	none	none	none	one end of non-long bone	none

rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	over most of bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	over most of bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	over most of bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	over most of bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	one end of non-long bone
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	over most of bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none

rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	one end of non-long bone
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	over most of bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	none	none
rib	none	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none

rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	one end of non-long bone
rib	none	none	none	over most of bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	none	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	both prox and dist ends	none

rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	over most of bone
rib	none	none	none	over most of bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	one end of non-long bone
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none

rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	over most of bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	both prox and dist ends	one end of non-long bone
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	none	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	none	none
rib	none	none	none	both prox and dist ends	none

rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	over most of bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	over most of bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none

rib	none	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	one end of non-long bone	none	none	both prox and dist ends	over most of bone
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	over most of bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none

rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	over most of bone	none
rib	none	none	none	over most of bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	none	one end of non-long bone
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	over most of bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	none	none	none	over most of bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	none
rib	over most of bone	none	none	both prox and dist ends	none
rib	over most of bone	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none

rib	none	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	both prox and dist ends	none
rib	one end of non-long bone	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	one end of non-long bone	one end of non-long bone
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	both prox and dist ends	none
rib	none	none	none	none	none
rib	none	none	none	one end of non-long bone	none
rib	none	none	none	both prox and dist ends	none
sacrum	one end of non-long bone	none	none	both prox and dist ends	none
sacrum	none	none	none	over most of bone	none
sacrum	none	none	none	over most of bone	none
sacrum	none	none	none	one end of non-long bone	none
sacrum	none	none	none	over most of bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	proximal end	none	none	both prox and dist ends	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	both prox and dist ends	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	over most of bone
scapula	proximal end	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	over most of bone	none	none	one end of non-long bone	none
scapula	over most of bone	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	over most of bone	none	none	none	none

scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	distal end	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	distal end	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	over most of bone	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	both prox and dis ends	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	both prox and dist ends	none
scapula	distal end	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	both prox and dist ends	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none

scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	over most of bone	none	none	none	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	both prox and dist ends	none
scapula	none	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	proximal end	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	proximal end	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	both prox and dist ends	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	over most of bone	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none

scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	proximal end	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	proximal end	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	one end of non-long bone	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	one end of non-long bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	proximal end	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
scapula	none	none	none	over most of bone	none
sesamoid	none	none	none	both prox and dist ends	none
sesamoid	none	none	none	both prox and dist ends	none
skull	none	none	none	over most of bone	none
skull	over most of bone	none	none	none	none
skull fragment	none	none	none	over most of bone	none

skull fragment	none	none	none	none	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none

skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
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skull fragment	none	none	none	over most of bone	none
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skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none

skull fragment	none	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none

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skull fragment	none	none	none	over most of bone	none
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skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none

skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
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skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none

skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
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skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none

skull fragment	over most of bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none

skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	none	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none

skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	both prox and dist ends	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none

skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none

skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none

skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	both prox and dist ends	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none

skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	both prox and dist ends	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	none	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	both prox and dist ends	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	both prox and dist ends	none
skull fragment	none	none	none	over most of bone	unknown
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	both prox and dist ends	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none

skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	both prox and dist ends	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	both prox and dist ends	none
skull fragment	none	none	none	over most of bone	none
skull fragment	over most of bone	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	both prox and dist ends	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	one end of non-long bone	none	none	none	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	none	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	one end of non-long bone	none	none	none	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	one end of non-long bone	none
skull fragment	none	none	none	over most of bone	one end of non-long bone
skull fragment	none	none	none	over most of bone	none
skull fragment	none	none	none	both prox and dist ends	none
sternum	none	none	none	one end of non-long bone	none
sternum	proximal end	none	none	none	none

sternum	one end of non-long bone	none	none	none	none
sternum	distal end	none	none	none	none
sternum	over most of bone	none	none	none	none
sternum	none	none	none	proximal shaft	none
sternum	none	none	none	distal shaft	none
sternum	none	none	none	distal shaft	none
sternum	proximal end	none	none	distal end	none
sternum	distal end	none	none	distal end	none
sternum	proximal end	none	none	none	none
sternum	none	none	none	distal end	none
sternum	one end of non-long bone	none	none	none	none
sternum	one end of non-long bone	none	none	one end of non-long bone	none
tarsal	proximal shaft	none	none	none	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	none	none
thoracic vert	one end of non-long bone	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	one end of non-long bone	none	none	over most of bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	one end of non-long bone	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	over most of bone	none
thoracic vert	none	none	none	over most of bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	over most of bone	none
thoracic vert	one end of non-long bone	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	none	none	none	one end of non-long bone	none
thoracic vert	one end of non-long bone	none	none	one end of non-long bone	none
thoracic vert	none	none	none	none	none
thoracic vert	none	none	none	over most of bone	none
tibia	distal shaft	none	none	distal shaft	distal shaft
tibia	distal shaft	none	none	both prox and dist ends	distal shaft
tibia	proximal shaft	none	none	none	none
tibia	none	none	none	proximal shaft	proximal shaft
tibia	over most of bone	none	none	proximal shaft	none
tibia	none	none	none	proximal shaft	none
tibia	proximal shaft	none	none	proximal shaft	none

tibia	none	none	none	proximal shaft	none
tibia	none	none	none	distal shaft	none
tibia	distal shaft	none	none	proximal shaft	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	none	both prox and dist ends
tibia	none	none	none	distal shaft	none
tibia	proximal shaft	none	none	proximal shaft	none
tibia	none	none	none	proximal shaft	proximal shaft
tibia	none	none	none	both prox and dist ends	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	proximal shaft	none
tibia	distal shaft	none	none	proximal shaft	none
tibia	distal shaft	none	none	distal shaft	none
tibia	none	none	none	distal shaft	none
tibia	distal shaft	none	none	both prox and dist ends	none
tibia	none	none	none	distal shaft	none
tibia	none	none	none	distal shaft	none
tibia	proximal shaft	none	none	proximal shaft	none
tibia	proximal shaft	none	none	both prox and dist ends	none
tibia	distal shaft	none	none	distal shaft	none
tibia	proximal shaft	none	none	both prox and dist ends	none
tibia	none	none	none	distal shaft	none
tibia	none	none	none	none	none
tibia	both prox and dis ends	none	none	both prox and dist ends	none
tibia	none	none	none	distal shaft	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	proximal shaft	none
tibia	distal end	none	none	proximal shaft	none
tibia	proximal shaft	none	none	proximal shaft	none
tibia	none	none	none	proximal shaft	none
tibia	proximal end	none	none	none	none
tibia	none	none	none	distal shaft	none
tibia	both prox and dis ends	none	none	distal end	none
tibia	proximal end	none	none	none	none
tibia	proximal shaft	none	none	distal end	none
tibia	none	none	none	both prox and dist ends	none
tibia	both prox and dis ends	none	none	both prox and dist ends	distal shaft
tibia	distal shaft	none	none	distal shaft	none
tibia	none	none	none	both prox and dist ends	none
tibia	distal shaft	none	none	both prox and dist ends	none
tibia	distal shaft	none	none	none	none
tibia	distal shaft	none	none	both prox and dist ends	none
tibia	none	none	none	distal shaft	none

tibia	proximal end	none	none	proximal shaft	none
tibia	none	none	none	distal shaft	none
tibia	proximal end	none	none	both prox and dist ends	none
tibia	none	none	none	both prox and dist ends	none
tibia	none	none	none	both prox and dist ends	distal shaft
tibia	none	none	none	both prox and dist ends	none
tibia	none	none	none	both prox and dist ends	distal end
tibia	distal shaft	none	none	both prox and dist ends	distal shaft
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	over most of bone	none
tibia	none	none	none	both prox and dist ends	none
tibia	none	none	none	proximal shaft	none
tibia	none	none	none	proximal shaft	none
tibio-tarsus	distal end	none	none	one end of non-long bone	none
tibio-tarsus	distal end	none	none	proximal shaft	none
tibio-tarsus	distal end	none	none	proximal shaft	none
tibio-tarsus	none	none	none	distal shaft	none
tibio-tarsus	none	none	none	proximal shaft	none
tibio-tarsus	none	none	none	both prox and dist ends	none
tooth fragments	one end of non-long bone	none	none	one end of non-long bone	none
ulna	distal end	none	none	both prox and dist ends	over most of bone
ulna	none	none	none	none	over most of bone
ulna	none	none	none	proximal end	proximal shaft
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	proximal end	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	distal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	proximal end	none
ulna	none	none	none	both prox and dist ends	over most of bone
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	none	none
ulna	proximal shaft	none	none	both prox and dist ends	none
ulna	none	none	none	over most of bone	none
ulna	proximal shaft	none	none	proximal shaft	none
ulna	proximal end	none	none	none	none
ulna	none	none	none	distal shaft	distal shaft
ulna	none	none	none	both prox and dist ends	distal end
ulna	none	none	none	proximal end	none
ulna	over most of bone	none	none	none	none
ulna	proximal shaft	none	none	proximal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	both prox and dist ends	none

ulna	none	none	none	proximal shaft	none
ulna	none	none	none	both prox and dist ends	over most of bone
ulna	none	none	none	both prox and dist ends	none
ulna	distal shaft	none	none	distal shaft	none
ulna	proximal shaft	none	none	proximal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	over most of bone	none
ulna	none	none	none	proximal end	none
ulna	proximal end	none	none	distal shaft	none
ulna	proximal end	none	none	both prox and dist ends	none
ulna	proximal end	none	none	both prox and dist ends	none
ulna	both prox and dis ends	none	none	both prox and dist ends	none
ulna	none	none	none	both prox and dist ends	none
ulna	proximal end	none	none	none	none
ulna	none	none	none	proximal end	none
ulna	proximal end	none	none	proximal end	none
ulna	proximal end	none	none	proximal end	none
ulna	none	none	none	proximal shaft	none
ulna	proximal shaft	none	none	both prox and dist ends	none
ulna	none	none	none	proximal end	none
ulna	proximal end	none	none	proximal end	none
ulna	none	none	none	proximal end	none
ulna	none	none	none	both prox and dist ends	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	proximal shaft	none	none	proximal shaft	none
ulna	proximal end	none	none	none	proximal end
ulna	both prox and dis ends	none	none	none	none
ulna	both prox and dis ends	none	none	distal shaft	none
ulna	proximal shaft	none	none	proximal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	proximal shaft	proximal shaft
ulna	none	none	none	both prox and dist ends	none
ulna	distal shaft	none	none	distal shaft	none
ulna	proximal end	none	none	none	none
ulna	none	none	none	proximal shaft	none
ulna	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none

unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	proximal shaft	none
unidentified fragment	none	none	none	proximal shaft	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	distal shaft	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	unknown
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	proximal shaft	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	over most of bone
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	over most of bone
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none

unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	one end of non-long bone	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	one end of non-long bone	none	none	one end of non-long bone	none
unidentified fragment	one end of non-long bone	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	distal shaft	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none

unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	one end of non-long bone	none	none	none	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	over most of bone	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	one end of non-long bone	none	none	none	none
unidentified fragment	none	none	none	distal shaft	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	proximal end	none	none	none	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	distal shaft	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	one end of non-long bone
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	none	none
unidentified fragment	none	none	none	both prox and dist ends	over most of bone
unidentified fragment	one end of non-long bone	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	over most of bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	one end of non-long bone	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	both prox and dist ends	none
unidentified fragment	none	none	none	one end of non-long bone	none
unidentified fragment	none	none	none	over most of bone	none
unknown tooth	one end of non-long bone	none	none	none	none
unknown tooth	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	none	none	none	none	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none

vertebra	none	none	none	over most of bone	none
vertebra	one end of non-long bone	none	none	over most of bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	one end of non-long bone	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	none	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	none	none
vertebra	none	none	none	over most of bone	none
vertebra	one end of non-long bone	none	none	none	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	one end of non-long bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	over most of bone	none	none	over most of bone	none
vertebra	none	none	none	over most of bone	none
vertebra	none	none	none	one end of non-long bone	none
zygomatic arch	none	none	none	both prox and dist ends	none
zygomatic arch	none	none	none	one end of non-long bone	none
zygomatic arch	none	none	none	both prox and dist ends	none
zygomatic arch	none	none	none	one end of non-long bone	none
zygomatic arch	none	none	none	one end of non-long bone	none
zygomatic arch	none	none	none	one end of non-long bone	none
zygomatic arch	none	none	none	both prox and dist ends	none
zygomatic arch	none	none	none	one end of non-long bone	none
zygomatic arch	none	none	none	both prox and dist ends	none
zygomatic arch	none	none	none	both prox and dist ends	none
zygomatic arch	none	none	none	one end of non-long bone	none
zygomatic arch	none	none	none	one end of non-long bone	none
zygomatic arch	none	none	none	one end of non-long bone	none

zygomatic arch	none	none	none	one end of non-long bone	none

APPENDIX R: Gladysvale Bone Damage

Element	punctates/location	scouring/location	acid etching/location	crenulated edges/location	striations
humerus	none	none	none	both prox and dist ends	over most of bone
humerus	proximal end	none	none	over most of bone	over most of bone
mandible	none	none	none	over most of bone	none
mandible	none	none	none	over most of bone	none
mandible	none	none	none	distal end	none
mandible	mandibular heal	none	none	mandibular heal	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	over most of bone	none
maxilla	none	none	none	proximal end	none
pelvis (acetabulum)	none	none	none	over most of bone	none
radius	none	none	none	distal shaft	none
skull	over most of bone	none	none	distal end	none
skull	distal end	none	none	none	none
tibia	none	none	none	proximal end	over most of bone
tibia	none	none	none	both prox and dist ends	over most of bone
tibia	none	none	none	over most of bone	over most of bone

PLATES

Plate 1: Rietvlei Nature Reserve, Den R01

Plate 2: Rietvlei Nature Reserve, Den R02 (arrows show den openings)

Plate 3: Rietvlei Nature Reserve, Den R02

Plate 4: Rietvlei Nature Reserve, Den R03

Plate 5: Rietvlei Nature Reserve, Den R03

Plate 6: Mashatu Den 1 (opening at base of rocks beyond bone scatter)

Plate 7: Mashatu Den 1

Plate 8: Mashatu Den 2

Plate 9: Mashatu Den 3

Plate 10: Mashatu Den 4

Plate 11: Mashatu Den 4, Impala mandible hanging from roof

Plate 12: Brown Hyaena Project D-P 1

Plate 13: Brown Hyaena Project D-P 2

Plate 14: Brown Hyaena Project D-P 4

Plate 15: Brown Hyaena Project D-P 9

Plate 16: Brown Hyaena Project D-P 18

Plate 17: Cape Fur Seal pup carcass with atypical skull damage

Plate 18: Brown Hyaena Project D-P 18

Plate 19: Brown Hyaena Project D-P 16

Plate 20: Brown Hyaena Project D-SPG 1

Plate 21: Brown Hyaena Project D-BB 1

Plate 22: Gobabeb Den NN-1

Plate 23: Gobabeb Den NN-2

Plate 24: Punctate depression

Plate 25: Crenulated edges

Plate 26: Scouring

Plate 27: Punctate & Crenulated edge

Plate 28: Jordan Den, Jawa 4

Plate 29: Jordan Den, Dhahik 32