

Appendix 2 – Faunal Remains

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1 ABSTRACT

A total of 2080 specimens of animal bone were recovered from St Patrick's Church, Cowgate, Edinburgh. The site included both medieval and post-medieval features. The majority of the bones derive from domestic mammals with cattle, sheep/goat, pig and horse being represented in the sample. A number of fish species were identified, among which herring- and cod-related species dominated.

Domestic chicken was the most abundant bird species: red grouse was the only wild bird identified. The species distribution is typical for medieval Scottish urban sites. Bone material derived from both domestic and industrial waste (signs of horn working and disposal of horse carcasses, probably after skinning) were evident.

2 INTRODUCTION

This report presents the results of analysis of animal bones from St Patrick's Church, Cowgate, Edinburgh.

The animal bone specimens were recovered by both hand-picking and sieving. Most of the animal bones analysed for this report derive from medieval ditches (contexts [075/076] and [095]) but material from other medieval and post-medieval

well-stratified layers was examined as well. Bone material from contexts [003] and [007] was evaluated but not analysed closely. The material from these layers was less well preserved than the rest of the material, and very fragmented. It proved to consist of domestic waste, most bones deriving from cattle, sheep and pig.

3 METHODOLOGY

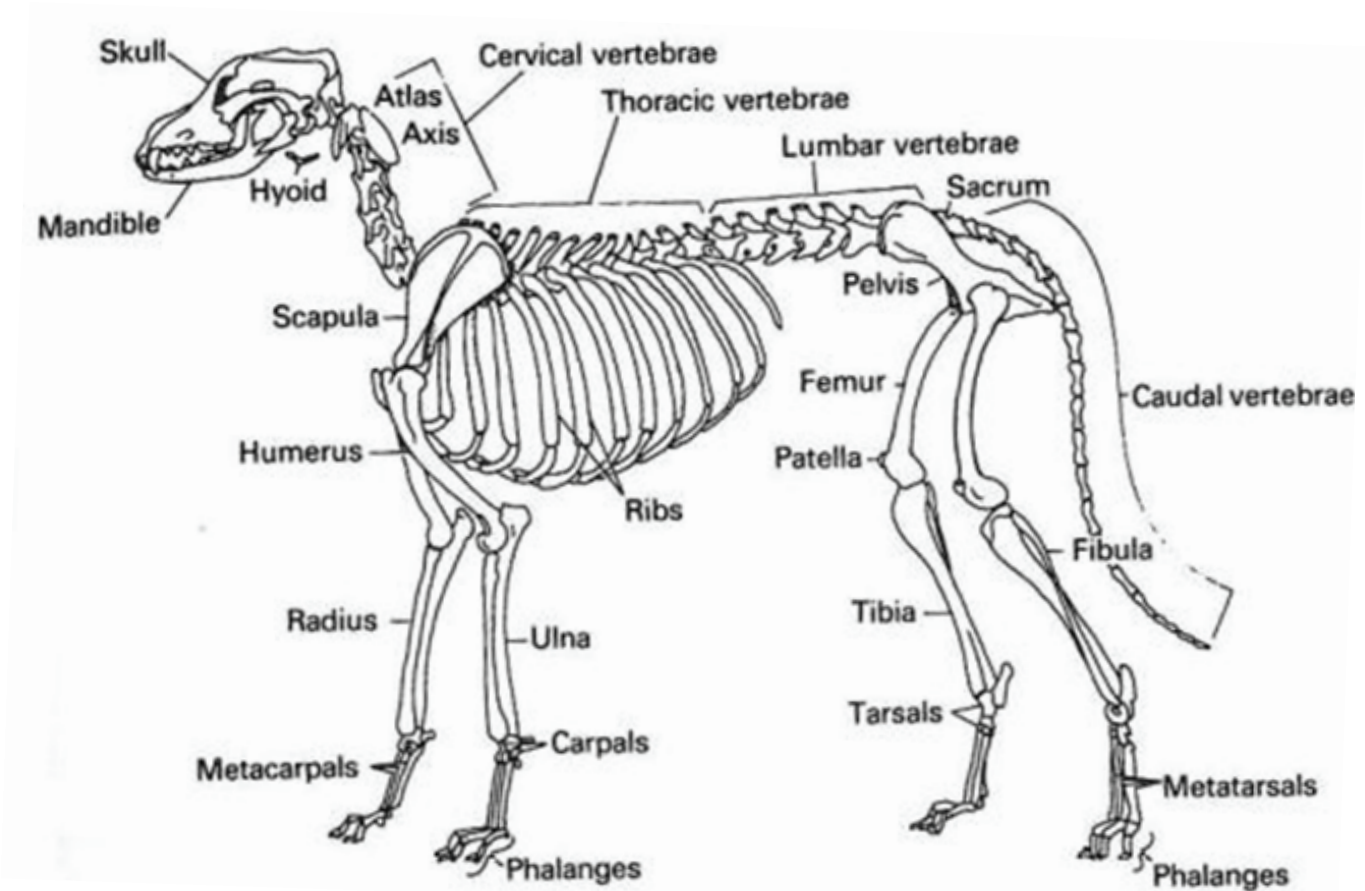
Each specimen was identified according to species and skeletal element, where possible using an animal bone reference collection located in Headland Archaeology Ltd, Unit 1 Wallingstown Business Park, Little Island, Co. Cork. The York System bone database program was used for the recording (Harland *et al* 2003). The bird bones were identified by using the bone collection in the Natural History section of the National Museum of Ireland.

The categories 'large mammal' (LM) and 'medium mammal' (MM) were used for specimens (mainly ribs and vertebrae) that could not be assigned to species. The specimens categorised as large mammal are likely to belong to cattle or horse; red deer was absent in the assemblage. Medium mammal specimens are most likely to consist of sheep and pig bones; however the presence of goat and roe deer is possible. The category 'small mammal' (SM) includes mammal bones from cat-sized animals or smaller.

The material was quantified by using the number

of identified specimens (NISP) and minimum number of elements (MNE). Distinctions made between sheep and goat follow Boessneck (1969) for limb bones. Tooth eruption and wear were recorded according to Grant (1982). Mandibles were further divided into age groups presented by O'Connor (2003, 160). For ages of tooth eruption and epiphyseal fusion Silver's (1969) figures were followed. Division of epiphyses in early, intermediate and late fusing groups was done according to Vretemark (1997) (Appendix 6.1). Measurements were taken following von den Driesch (1976). In addition, the medial edge of pelvis was measured according to Vretemark (1997).

During the analysis pathological changes, carnivore and rodent gnawing, signs of burning and butchery marks were recorded. All data is stored in digital and written form in Headland Archaeology Ltd, Unit 1 Wallingstown Business Park, Little Island, Co. Cork.



Illus A2.1 Location on animal skeleton of terms referred to in text (Davis 1987, 54)

4 RESULTS

Table 2.1 Mammal and amphibian species representation of sample (NISP) * = horn cores

Species	Medieval	Medieval ditches	Post-medieval	Total
Cattle	4	118 (25)*		122
Sheep/goat	3	66		69
Sheep	1	39		40
Horse		23		23
Pig	2	14		16
Shrew		1		1
Rabbit		3		3
Rabbit/hare	1	1		2
Vole		1		1
Mouse			1	1
Vole/mouse		2	2	4
Rat		2	2	4
Large mammal	3	97	1	101
Medium mammal	3	36	2	41
Small mammal		3	28	31
Frog/toad	1	24		25
Unidentified	196	477	226	899
Total	214	907	262	1383

4.1 Species

A total of 2080 bone specimens were analysed from the site. 43.2% of the specimens were unidentified to any taxonomic level, which reflects rather the careful sampling strategy than the high fragmentation rate of material. Most of the bones derive from contexts dated as medieval. However, some specimens were recovered from the soil samples of post-medieval deposits.

Most of the identified mammal specimens derive from domestic animals (Table 2.1). The assemblage is dominated by cattle. However, part of the cattle bones derive from horn cores not relating to normal consumption but craft activities. If horn cores are excluded from the tables, sheep or goat are the most

abundant species. As large animal bones are often found in a higher fragmentary state than the bones of smaller mammals, NISP (number of identified specimens) figures of cattle can be overrepresented compared to sheep and pig. Therefore species abundance was quantified with MNE (minimum number of elements, Table 2.2) as this method is less sensitive to fragmentation. With MNE, sheep or goat dominate over cattle (again excluding the horn cores). However, even taking these factors into account, cattle would have produced the most meat consumed at the site due to the larger size of cattle carcass.

Specimens categorised as large ungulates are likely to derive mainly from cattle: however, some specimens may be those of horse. Sheep and goat bones are very similar and only some parts of their skeletons can be identified to species. No goat bones were identified from the sample and it can be assumed that most of the bones in category 'sheep or goat' are sheep bones. In the assemblage, horse is more abundant than pig. This is due to the high incidence of horse bones in the medieval ditch (see below). Few fragments were identified as rabbit. In addition, material included bones of small mammals and frog or toads that were living on the site. As no mandibles or skulls of mice were found, the species could not be identified. Voles are represented by one tooth (likely to belong to water vole, *Arvicola terrestris*).

Table 2.2 MNE figures of cattle, sheep (and goat) and pig * = excluding horn cores in medieval sample. Large ungulate bones included in cattle numbers.

Species	number	%
cattle	63*	41.4
sheep	76	50.0
pig	13	8.6
total	152	100.0

Table 2.3 Fish species representation of sample (NISP)

Species	Medieval	Medieval ditches	Post-medieval	Total
Thornback ray		4		4
Ray family		1		1
Herring	1	1	10	12
Herring family	2	51	24	77
Pike		3		3
Cyprinid family			1	1
Cod		1		1
Haddock	1	1	2	4
Whiting	1	3		4
Cod family	7	31	13	51
Flatfish		3		3
Unidentified fish	26	179	291	496
Total	38	278	341	657

Table 2.4 Bird species representation of sample (NISP)

Species	Medieval	Medieval ditches	Post-medieval	Total
Domestic chicken	1	2	3	6
Galliformes		2	1	3
Goose		2		2
Duck			1	1
Red grouse	1		1	2
Unidentified bird	5	8	12	25
Total	7	14	18	39

Most of the fish bones derive from the herring family, most likely herring (*Clupea harengus*; Table 2.3). Cod family was well represented in the material. Identified species were cod (*Gadus morhua*), haddock (*Melanogrammus aeglefinus*) and whiting (*Merlangius merlangus*). In addition, a few bones of pike (*Esox lucius*), cyprinid (Cyprinidae), flatfish (Pleuronectiformes) and thornback ray (*Raja clavata*) were found. Most of the unidentified fish bones represent fin or rib bones.

Most of the bird bones derive from domestic chicken (*Gallus gallus*; Table 2.4). Bones categorised as Galliformes are likely to derive from domestic chicken but might belong to other related game birds like capercaillie, black grouse and (for the post-medieval period) pheasant. Few bones belonging to goose (*Anser* sp.) and duck (Anatidae) might belong to wild or domestic birds. Red grouse (*Lagopus lagopus*) was represented in both medieval and post-medieval samples.

Species representation and the anatomical distribution of the hand-picked assemblage are influenced by the method of recovery. Bones of medium-sized and small animals like sheep, fish and birds are regularly missed when sieving is not practised. As can be seen from Table 2.5, in sieved samples sheep or goat bones dominate over cattle bones. All the bone material from post-medieval layers derives from soil samples and thus is not included in the

table. Moreover, bones of shrew, rodent, amphibian and fish were only recovered through sieving.

4.2 Anatomical distribution

Anatomical distribution was studied in order to examine the past activities on the site. Bone elements can be divided into high and low utility parts, representing the body parts relating to primary and secondary butchery. High utility elements include spinal column and ribs and upper parts of the limbs. Low utility elements include the head, tail and lower parts of the limbs.

The bone material from medieval layers excluding ditches, even if small, proved to include remains from all stages of the processing of animal carcasses and is likely to represent domestic waste (Appendix 6.2). The anatomical distribution of the material recovered from the ditches exhibited signs of professional activities. High numbers of cattle horn cores is likely to represent industrial waste from horn working. The horn comb found from context [080] might be related to horn working on the site. However, other elements and species are also present in the sample. As a result, the assemblage is likely to be a mixture of domestic and industrial waste.

Horse bones from at least three different indi-

Table 2.5 Species recovery with different recovery methods (1mm sieve and hand collecting), medieval material

Species	1	HC	Total
Cattle	10	112	122
Sheep/goat	16	53	69
Sheep	3	37	40
Horse		23	23
Pig	3	13	16
Shrew	1		1
Rabbit		3	3
Rabbit/hare	2		2
Vole	1		1
Vole/mouse	2		2
Rat	2		2
Rodent	1		1
Large mammal	15	85	100
Medium mammal	15	24	39
Small mammal	3		3
Bird	15	6	21
Frog/toad	25		25
Fish	316		316
Unidentified	626	47	673
Total	1056	403	1459

viduals were recovered from Ditches 075 and 076. The anatomical distribution of the sample is of interest. Limb bones are well represented and some vertebrae and ribs were found. Skull and mandible are absent as well as scapula and pelvis. The only chop mark was found in the distal femur, probably due to dismemberment of the carcass. The sacrum from Context [093] belongs to the same individual as the lumbar vertebrae found in Context [081]. Thus, it seems likely that the two contexts were deposited at the same time.

Even if the small number of the fish bones hampers any closer analysis of the fish processing on the site, it seems likely that the fish remains represent domestic waste. A wide range of skeletal elements are represented and fish were probably brought to the site relatively unprocessed. It is, however, possible that herring bones derive from cured (salted or smoked) fish.

4.3 Preservation

The material proved to be well preserved, most of the fragments being extremely well or well preserved. It included 91 burnt bone fragments, distributed in various contexts (Table 2.6).

Carnivore gnawing was present in 11 specimens (Table 2.7). No evidence of rodent gnawing was present in the material.

Table 2.6 Burnt bones

Context	Total
015	23
070	3
074	24
078	1
079	1
086	5
092	2
093	1
094	3
124	2
126	5
133	1
141	1
146	19
Total	91

4.4 Age

The best indicators for ageing mammal osteological material are usually obtained from an examination of the wear and eruption of mandibular teeth. The epiphyseal fusion evidence can also be used to age structure analysis, thus it is usually seen as a less reliable method.

Only three cattle mandibles could be divided into age categories (according to O'Connor 2003 method), all of them from adult or elderly animals (Table 2.8). However, according to epiphyseal data part of the cattle bones derive from sub-adult individuals even if mature animals dominate the assemblage (Appendix 6.3). The difference is likely be caused by the small sample size.

The majority of the sheep (or goat) mandibles derive from mature animals. Again, epiphyseal fusion indicates a higher proportion of juvenile animals in the material. One pig mandible available for age determination is from a sub-adult individual. The epiphyseal data for pig is scarce but all the bones derive from animals under the age of three and a half years.

The assemblage included few bones of infant animals. Calf bone from Context [082] might derive from veal consumed at the site, or a stillborn calf. The piglet tibia is likely to derive from a stillborn or neonatal animal, thus representing local animal, breeding and not consumption.

4.5 Sex

Only one cattle pelvis was available for sex determination: the animal is most likely male as indicated by the high value of the medial edge measurement (17.3mm; Vretemark 1997, 103).

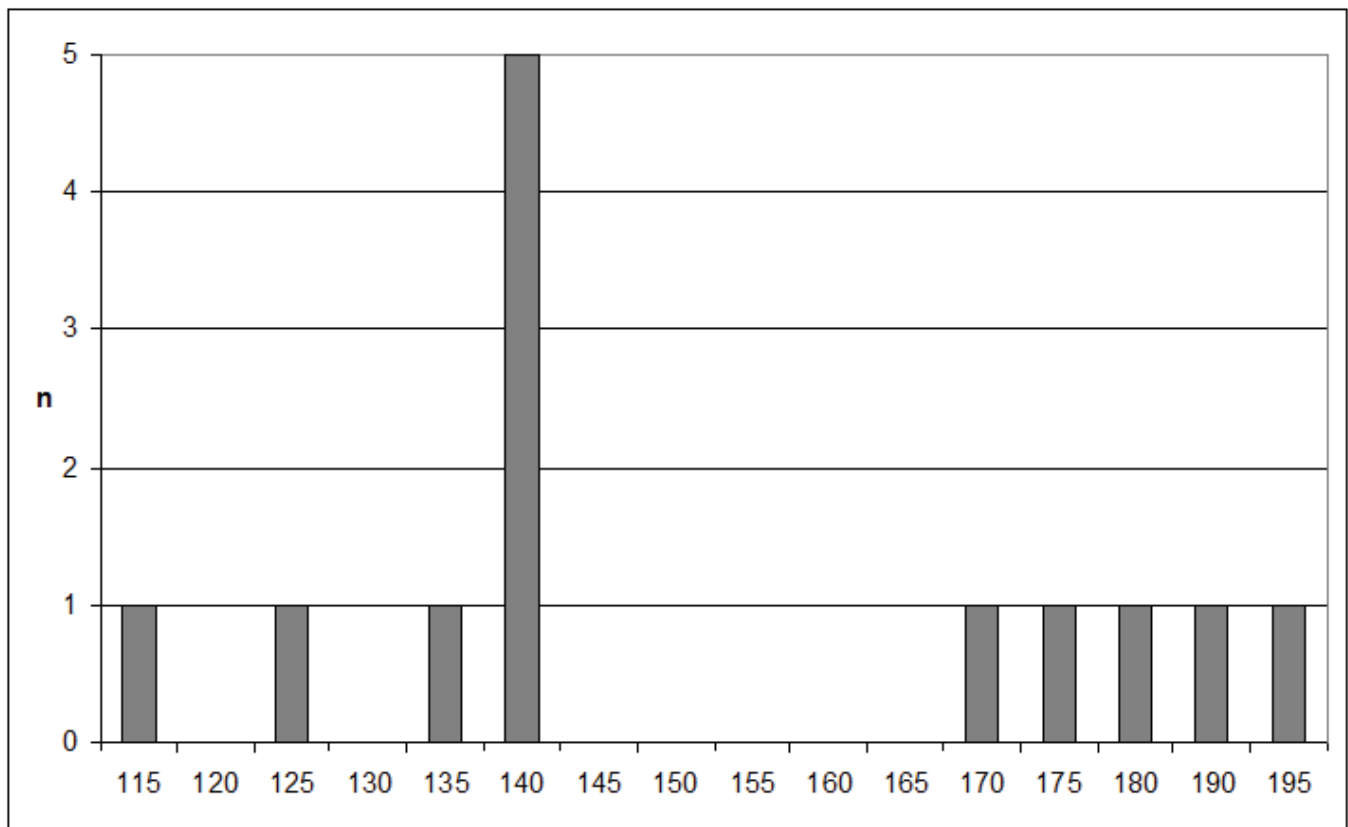
Cattle horn core basal circumference exhibits a

Table 2.7 Gnawing. LM = large mammal

Context	Cattle	Horse	LM	Pig	Sheep/goat	Sheep	Unidentified	Total
023						1		1
074				1	1			2
080	2							2
082	1				1			2
086					1			1
089			1					1
093		1						1
135							1	1
Total	3	1	1	1	3	1	1	11

Table 2.8 Division of mandibles into age categories.
 J = juvenile, SA = sub adult, A = adult, E = elderly (O'Connor 2003, 160)

	J	SA1	SA2	A2	A3	E
Cattle					2	1
Sheep/goat	1	1		1	4	
Pig			1			

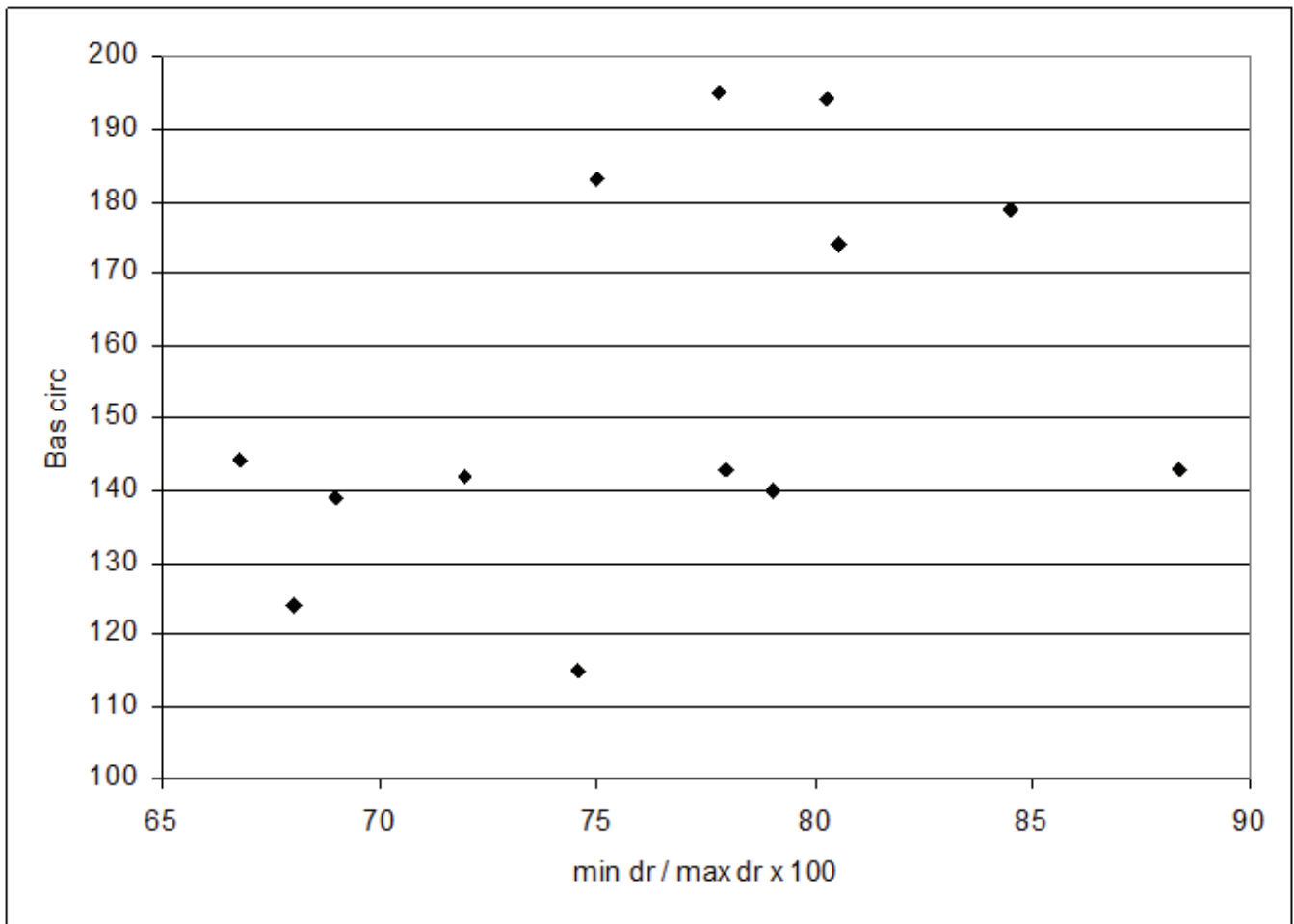


Illus A2.2 Cattle horn core basal circumference (mm)

clear dual distribution of values (illus A2.2). Horn cores with smaller basal circumference are cows, the larger ones males: the threshold between females and males was set to 150mm basal circumference on the basis of the distribution found in St Patrick's

Church material and with reference to other studies (Prillof 2000, 30–4; Vretemark 1997, 106; Wigh 2001, 65). By these criteria, 62% of horn cores derive from females.

The shape of the horn core base exhibits some



Illus A2.3 Cattle horn core minimum diameter / maximum diameter \times 100 compared to basal circumference

sexual variation: thus, the basal circumference was plotted against the index describing the shape of the horn core base (illus A2.3). The horn cores of bulls are rounder in cross-section than the horn cores of oxen (the index being closer to 1 than 0; Benecke 1988). The horn cores with basal circumference over 150mm, thus the likely males, exhibit very uniform shape. However, these horn cores represent more likely oxen than bulls. The one round horn core has a basal circumference under 150mm. It is possible that this specimen represents a small male or natural variation among female horn core shapes.

As these horn cores are likely to derive from craft activities males are likely to be overrepresented: their larger horn cores would have been more attractive for this purpose. Most of the horn cores derive from adult animals (age class 4 or 5 according to Armitage (1982) $n = 12$ and 1 respectively), but a few were those of juvenile ($n = 1$), sub-adult ($n = 1$) or young adult ($n = 3$). The preference of adult males is understandable, as these animals yielded the largest horn sheets.

Four sheep pelvises could be measured for sex estimation (Appendix 6.4). All values are greater than 4.7mm, and thus likely males. One with a medial

edge value of 4.8 was identified as male by morphological criteria. However, the other pelvis (med. edge 4.9mm) was judged to be possibly female in character. It is likely that these pelvises derive from wethers (castrated males; cf Vretemark 1997, 45).

4.6 Measurements

Several measurements were taken from the bones to examine the size of the animals (Appendix 6.4). A withers height of horse could be estimated from nine bones, giving the average height of 132.5cm (range 127.2–140.0cm; according to Kiesevalter 1888). The average withers height of sheep was 55.9cm (range 55.3–56.7cm; Teichert 1975).

4.7 Pathologies

A total of four bones showed pathological changes. Three of these derive from horse and are arthritic in nature. In one case tarsal bones (bones in hock joint: talus, Tc, T1+2, 3 and 4) were fused together (illus A2.4). Articular surfaces towards metatarsals and

Table 2.9 Cut marks in the medieval sample. LM = large mammal, MM = medium mammal

Element	Cattle	Sheep	Sheep/goat	Pig	Horse	LM	MM	Unidentifiable	Total
Horncore	10								10
Skull	4								4
Mandible	1		1	1					3
Atlas	1								1
Axis	1								1
Cervical vertebrae				1		2			3
Thoracic vertebrae						3			3
Lumbar vertebrae						5		1	6
Sacrum	1					3			4
Vertebra							2		2
Rib						3	8		11
Scapula	2	2		1					5
Radius	2		1						3
Pelvis	4		2	1					7
Femur	1		3		1	1			6
Tibia	1			1					2
Calcaneum	1								1
Astragalus	1								1
Metatarsal		2							2
Total	30	4	7	5	1	17	10	1	75



Illus A2.4 Horse tarsal bones fused together

tibia were unaltered. In addition, one horse radius and metatarsal bone exhibited exostosis (extra bone growth) at their proximal end.

One cattle skull had a depression on the frontal bone (*illus A2.5*). The surface was smooth except for one edge and appeared to be a healed trauma caused by some relatively sharp instrument, eg horn.

4.8 Butchery

A total of 75 specimens showed butchery marks. Cattle horn cores and adjacent skull pieces exhibited evidence of horn sheath utilisation. Horn cores were detached from the skull by cutting the nuchal part of the skull with the horn core. One horn core had



Illus A2.5 Cattle skull showing healed fracture on frontal bone

knife marks in its base, indicating horn sheath removal. The tip of the other horn core was removed by sawing, relating also to horn sheath utilisation.

Other cut marks relate to skinning, dismemberment and filleting of the carcass. Cut marks are more common in cattle bones than in sheep/goat or pig, due to the larger size of the cattle carcass. The cattle carcass has been split in two halves through the spine (sagittal plan). One vertebra of medium sized mammal (sheep, goat or pig) exhibited evidence of cutting the carcass into three sections through parasagittal planes.

5 DISCUSSION

5.1 Domestic waste

The assemblage consists mostly of domestic animals. As already noted above, the ‘abundance’ of species is a complex concept requiring careful definition. Part of the bones (cattle horn cores and horse bones) deposited at St Patrick’s Church are likely to derive from craft activities and are not related to human consumption. Therefore, the aim being to examine the importance of different species in diet, these bones should be excluded.

The proportion of cattle, sheep or goat, pig and horse bones (NISP) in different medieval Scottish assemblages was compared to the St Patrick’s Church material ([Appendix 6.5](#)). Before making direct comparisons between the sites a few factors affecting the results should be noted. First, different recovery methods produce different ratios of species. Thus, if only hand-picked assemblages are used, higher proportions of cattle (and other large mammals) are to be expected. Second, the recording of vertebrae and ribs can affect species abundances. These body parts are sometimes identified only as large mammals and medium mammals (or large and small ungulates) as the bones are difficult to identify as cattle, horse and red deer respectively. However, sometimes, especially when horse and red deer are absent in the material, these bones are included in the cattle bone counts. As the bones from the trunk (vertebrae and ribs) can be identified variably to species, the wider categories of large and small ungulates were used to include these elements equally. Cattle and large mammal bones were counted together as well as sheep or goat, pig and medium mammal bones.

Smith (2007) suggested that higher numbers of sheep are found in ecclesial contexts, probably relating to specialised sheep breeding. Thus, the abundance of sheep at the Parliament site was interpreted as being influenced by the Abbey of Holyrood ([Smith 2007](#)). Whether the bone material from St Giles’ Cathedral is actually connected with an ecclesial context is unclear – however it was interpreted to derive from households with a higher than average social standing ([Henderson 2006](#), 63–5). According to written records the house and garden of the Vicar (later the Provost) of St Giles were located on the site ([Collard et al 2006](#), 5).

At first, the comparison of the figures exhibits clear differences between the abundance of cattle and sheep or goat in the materials. However, a closer examination reveals that in some cases the seen pattern is affected by the identification method used – that is, whether or not the trunk elements are included in the cattle counts. The two sites exhibit-

ing the highest levels of cattle bones in the material are Water Street, Edinburgh and Cinemahouse, St Andrews, both of which have the trunk elements counted with the cattle bones. As can be seen in [Appendix 6.5](#), the proportion of cattle is notably higher in St Patrick’s Church, Cowgate, and Parliament material, when counting the category ‘large ungulates’ with the cattle bones. The same effect is seen, although it is less obvious, in Peebles Bridgegate and Perth High Street materials. Thus, in most of the materials the proportion of cattle seems to fall between 50% and 60%, with only the Parliament and St Giles’ Cathedral assemblages having less than 50% cattle. Thus, it seems possible that in these two sites the presence of ecclesial buildings has affected the higher abundance of sheep.

The only wild mammals utilised for their meat in the St Patrick’s Church material were rabbit and possibly hare. Rabbit bones have been found earlier in medieval Edinburgh, but they are scarce and sometimes referred to as possible later intrusions by burrowing animals ([Smith 2007](#)). As the St Patrick’s Church site is located in the city area, the presence of a rabbit community seems unlikely and the rabbit bones are interpreted as food refuse.

No red or roe deer bones were recovered from the site. Even if not abundant, both deer species have been recovered previously from medieval Edinburgh ([Smith 2006](#), [Smith 2007](#)). Their absence in the St Patrick’s Church material is probably caused by the small sample size.

The observed cattle-culling pattern, with most of the animals reaching a mature age, follows that seen in other Scottish burghs ([Smith 1997](#), 769; [Henderson 2001](#); [Smith 2007](#); [Hodgson 1983](#), 111). The pattern has been interpreted to represent stock kept mainly for hides ([Hodgson 1993](#), 11; [Smith 1997](#), 769) with milk and meat production being less important ([Smith 2007](#), but see also [Henderson 2006](#), 64).

According to sheep (and goat) age data from mandibles, most of the animal remains in the St Patrick’s Church assemblage derive from animals over four years of age. This contrasts with the evidence found in Water Street, St Giles’ Cathedral and Cowgate assemblages in Edinburgh ([Henderson 2001](#); [Henderson 2006](#); 64, [Smith 2006](#)), where the majority of sheep were culled at a relatively young age, as well as in the faunal assemblages recovered from Perth ([Smith 1997](#), 769; [Hodgson 1983](#), 206). However, in Peebles most of the sheep were slaughtered at a more mature age ([Smith & Henderson 2002](#), 128). The St Patrick’s Church assemblage is small (n = 7) so it is possible that the discrepancy is caused

by small size of the assemblage. The epiphyseal data exhibits more young individuals than data from mandibles. Culling of young sheep emphasises the importance of meat and hide (woolfells) production (eg [Smith & Henderson 2002](#); [Hodgson 1983](#), 13; [Henderson 2006](#), 64). Keeping sheep to an older age is related to the importance of wool or milk production. As male sheep seem to dominate the sample, wool was likely to be the main product the sheep were kept for. Castration promotes wool production and the presence of castrated animals has been considered an indication of the importance of wool: castrating would also keep the flock steadier, as rams tend to fight ([Clutton-Brock 1976](#), 382; [Ryder 1983a](#), 452, 465).

Both marine and freshwater fish were recovered from the St Patrick's Church assemblage. The marine fish dominated the assemblage: herring family (likely herring) and cod family (cod, haddock and whiting) comprised most of the assemblage, as in the other fish-bone samples from Edinburgh ([Cerón-Carrasco 2010](#), [Henderson 2001](#)). No cod family bones were complete enough for measuring. However, as in the case of the Water Street assemblage ([Henderson 2001](#)), most of them derive from fish small in size. The species representation found at the St Patrick's Church site reflects the abundance of marine resources in Scotland ([Coull 1996](#), 14–15). Commercial herring fishing was already established during the medieval period in Scotland (*ibid.*, 54–5). White fish (cod family and flatfish) was an item of trade as well but to a lesser extent; it was probably caught mostly for local consumption (*ibid.*, 79–80).

A few freshwater fish bones, three pike and one belonging to the carp family, were recovered as well. The all-time British monster pike, weighing almost 33kg, was caught in Loch Ken in Dumfries and Galloway in 1774 ([Buczacki 2002](#), 141); however, the pike bones present in the St Patrick's Church material derive from less impressive small fish.

The bird bone distribution in the St Patrick's Church material is similar to that found in Holyrood and the Cowgate ([Smith 2006](#), [Smith 2007](#)). Domestic chicken dominates the material. Some goose and duck bones were present, possibly belonging to domestic birds as well. The only certainly wild bird in the St Patrick's Church material was the red grouse, previously identified in the Holyrood sample ([Smith 2007](#)).

5.2 Crafts in St Patrick's Church

The ditches included, among domestic waste, cattle horn cores likely to relate to horn working activities. Horn sheaths are used as raw material, and horn cores are deposited in the location where sheaths are separated from the useless cores. This is done at the latest by the horn-worker ([Dobney et al 1996](#), 23). The separation of the sheaths could have been done earlier by either the tanner or the butcher, who would have sold the sheaths forward to the horn-

worker ([Armitage 1990](#), 84). However, as no other signs of tannery and butchery are present in this material (overrepresentation of other parts of the skull, lower parts of the legs, low utility skeletal elements) the horn cores are likely to derive from horn-working activities. Moreover, horn cores with cutmarks and sawn into cylindrical sections can usually be associated with horn-working ([Schibler 1989](#), 151), both of which are present in the St Patrick's Church material. Large collections of cattle and goat horn cores interpreted as industrial waste have previously been found in Perth High Street material ([Hodgson 1983](#), 5, 7).

A number of horse bones were recovered from the same ditch. None of them showed signs of meat removal: one exhibited chop marks consistent with dismemberment. Horseflesh consumption was forbidden by the Church during the medieval period ([Egardt 1962](#), 109). However, butchered horse bones have been recovered in several Scottish medieval sites (eg [Smith 1998](#); [Smith 2007](#)). The human consumption of horseflesh cannot be excluded. However, very few records are available and it is likely that horsemeat consumption was restricted to special circumstances or social groups ([Wilson & Edwards 1993](#), 51; [Smith 1998](#), 876). Some evidence exists, especially from the post-medieval period, that horseflesh was fed to hounds ([Wilson & Edwards 1993](#), 52).

Even if horsemeat was not utilised, horse hides, bones, manes and tails were collected. A number of horse bones found in pits, ditches and waterfront dumps in London have been interpreted as disposals of (probably skinned) horse carcasses ([Rackham 2004](#), 20–21). In medieval London dumping skinned horse carcasses was apparently illegal inside city walls, but the rule was not always obeyed ([Clark 2004](#), 20; [Rackham 2004](#), 20–21).

A bone assemblage recovered from Bedford analysed by Grant (1979, 105–6) exhibits similar features to the St Patrick's Church material from the medieval ditch. Horn cores of cattle in particular, but also from sheep and goat, were well represented. Horse remains were abundant in Bedford and they have been interpreted as a result of disposal of skinned horse carcasses. Skulls and metapodials were underrepresented in the sample, interpreted as being detached with the hides and transported elsewhere. Few butchery marks were present, but were regarded as signs of dismemberment for easier disposal and burial. The St Patrick's Church horse bone sample could represent similar activities. No skulls or mandibles were recovered and bones from the lower extremities were scarce. Bones were complete and no signs of meat utilisation were evident. The ditch could have been used for disposing of unpleasant waste of an industrial nature, for example cattle horn cores and skinned horse carcasses. A sample of horse bones interpreted as carcass dumping has previously been identified in Eyemouth, however here all the anatomical parts were presented ([Henderson 1986](#), 62).



Illus A2.6 Cattle horn size and shape variation found in the Cowgate material

5.3 Animal outer appearance

Unfortunately, only a few cattle bone measurements were available from the St Patrick's Church material and no withers height could be reconstructed. The available measurements do, however, show that the cattle were small in size. Cattle horn cores show variable size and shape. The shortest one is only 95mm long (category 'small' according to Armitage and Clutton-Brock 1976), a curious upward-pointing horn (illus A2.6). Other horn cores were either 'short' (96–150mm, $n = 2$) or 'medium' (between 150

and 200mm, $n = 5$). The observed range and variability of horn core length seems to be in line with the previous results from Scottish medieval assemblages: the shortest horn core from Perth is just 32mm and the longest 237mm (Hodgson 1983, 27).

The average withers height of sheep in the St Patrick's Church material was 55.9cm. Sheep bones from previous studies in Edinburgh and Perth have shown a similar range, however, especially in the Cowgate, Edinburgh, a number of smaller individuals were present (Smith 2006, Hodgson 1983, 29–30). This is probably due to the small sample size of the St Patrick's Church site. No horn cores or polled skulls of sheep were recovered in the St Patrick's Church excavations, but previous studies have shown a great variability from four-horned individuals to polled sheep (Hodgson 1983, 11, Smith 2006).

The average horse withers height in the St Patrick's Church material was only *c* 133cm, with a range of 126–140cm. Thus, these animals are better described as ponies (under 147.3cm or 14.2 hands). This again is in line with previous results (Smith 1998, 871–2). These animals were probably common work animals used as pack and carthorses and for riding (cf Smith 1998, 875). They were likely to form most of the horse population in the medieval town, the larger quality riding horses being in the minority (cf Clark 2004, 32; Smith 1998 871–3). The observed pathologies in the horse bones probably relate to the stress caused by their use.

6 APPENDICES

Appendix 6.1

Division of epiphyses in early, intermediate and late fusing groups (Vretemark 1997)

Cattle, sheep, goat

Early	Intermediate	Late
Scapula tuber	Mc dist	Humerus prox
Humerus dist	Mt dist	Radius dist
Radius prox	Tibia dist	Ulna prox
		Femur prox
		Femur dist
		Tibia prox
		Calcaneus

Pig

Early	Intermediate	Late
Scapula tuber	Mc dist	Humerus prox
Humerus dist	Mt dist	Radius dist
Radius prox	Tibia dist	Ulna prox
	Calcaneus	Femur prox
		Femur dist
		Tibia prox

Appendix 6.2

Anatomical distribution of the animal bones in material (NISP): LM = large mammal, MM = medium mammal, SM = small mammal, sh/g = sheep/goat

See following pages

Medieval ditches

ELEMENT	cattle	sheep	sh/g	pig	horse	rabbit/ hare	rat	shrew	vole	vole/ mouse	rodent	LM	MM	SM	frog/ toad	uniden- tified	Total
horn	25																25
skull	9		4				1									5	19
mandibula	10	3	11	1	1							2				1	29
atlas	1		2	1								1					5
axis	1																1
cerv vert				1	2							5					8
thor vert			1		1						2	9					13
lumb vert			1		2							7					10
sacrum	1				1							3					5
caud vert							1					1					2
vert												6	4				15
rib			5	1	2							41	21			2	72
scapula	4	3	5	1								3	3			2	24
humerus	7	4	5	1	1					1							23
radius	5	4	2		3												14
rad/uln					2												2
ulna	3		1							1							5
carpi	1		1														2
m/c	5	4		1													10
pelvis	8	4	9	1			1								1		24
femur	7		4		1							2					15
tibia	6	4	10	2	2						2						29
calcaneus	3	1															4
astragalus	2			1	2												5
tar	2								1								3
m/t	9	9		1	2												21
phal1	2	2			1											1	6
phal2	3	1															4
phal3			1		1												2
phal															1		1
isoteeth	4		4	2					1							2	13
shaft												15	6	3			24
unidentified												97	36	3	24	477	473
Total	118	39	66	14	23	3	2	1	1	2	1	97	36	3	24	477	908

Other medieval

ELEMENT	cattle	sheep	sh/g	pig	LM	MM	rabbit / hare	frog/toad	unidentified	Total
vert thor					2	1				3
vert lumb									1	1
vert						1				1
rib					1	1				2
radius				1						1
ulna			1							1
femur			1							1
tibia	1									1
m/t	1			1						2
phal1	1	1								2
phal2									1	1
phal3	1									1
isoteeth			1				1			2
unidentified	4	1	3	2	3	3	1	1	194	195
Total									196	214

Appendix 6.3

Cattle, sheep or goat and pig epiphyseal data (medieval sample)

Cattle	O	C	F	Sheep/goat	O	C	F	Pig	O	C	F
Scapula tuber				Scapula tuber	1		3	Scapula tuber			
Humerus dist	1		1	Humerus dist	2		5	Humerus dist			1
Radius prox			1	Radius prox			5	Radius prox			1
Total	1		2	Total	3		13	Total	0		2
Mc dist			3	Mc dist			1	Mc dist	1		
Mt dist	3		2	Mt dist	2	1	5	Mt dist			1
Tibia dist	1		2	Tibia dist			4	Tibia dist	1		
Total	1		7	Total	2		10	Total	2		
Humerus prox		1	1	Humerus prox	2			Total			
Radius dist	1	1	1	Radius dist		1	2	Humerus prox			
Ulna prox				Ulna prox	1			Radius dist			
Femur prox	1		1	Femur prox				Ulna prox			
Femur dist	1		3	Femur dist	1	1		Femur prox			
Tibia prox				Tibia prox	1			Femur dist			
Calcaneus			3	Calcaneus			1	Tibia prox	1		
Total	3		9	Total	5		3	Total	0		

Appendix 6.4

Measurements. According to von den Driesch 1976 and Vretemark 1997 (med edge)

Species	Element	Context	GL/GH	GLI	GLm	Bp	SD	Bd / GB	DD/BT	Ll	med edge	GL*	GLI*
Cattle	Astragalus	94		52.4	48.5			34.8					
	Calcaneus	74	114										
	Mc	74						53.3					
	Mc	80						62.1					
	Mc	80						46.9					
	Mt	81						48.9					
	Mt	82						52.2					
	Pelvis	81									17.3		
	Tibia	89						53.9					
Horse	Astragalus	82	54.6					58.1					
	Femur	80				103.5		83.5					
	Humerus	80							81				
	Mt	23	263			46.6	30.4	46.1		262			
	Mt	82	253			48.5	27.2	47		250			
	Radius	73				78.3	33	68.6		306			
	Radius	74	325			78.5	38.1	72.8		305			
	Radius	74	317			80	34.5	70.8		291			
	Radius-ulna	92				80	34.8	70.2		293			
	Radius-ulna	93	326			77.4	38.6	74.4		308			
	Tibia	74	341			92.2	40	68.2		321			
	Tibia	80								293			376
Sheep	Calcaneus		49.5										
	Humerus	82								27.2			
	Humerus	74								26.2			
	Humerus	80								24.6			
	Mc	80	113			20.5	11.6	23.5		9.4			

Species Element	Context	GL/GH	GLI	GLm	Bp	SD	Bd / GB	DD/BT	Ll	med edge	GL*	GLI*
Mt	23						22.8					
Mt	79						23.8					
Mt	80	122			20.1	11.6	24.1					
Mt	80						23					
Mt	80						21.9					
Pelvis	23									4.8		
Pelvis	74									4.9		
Pelvis	80									4.9		
Pelvis	89									5.4		
Radius	80	139			28.8							
Radius	90	141			31	15.6						
Tibia	73						24.8					
Tibia	79						26.3					
Tibia	80						24					
Tibia	85						26.2					

* measurements for radio-ulna

Appendix 6.5

Comparison of the Scottish medieval samples. * Horncores excluded. Data: Cowgate: **Smith 2006**; Parliament: **Smith 2007**; Water Street: **Henderson 2001**; St Giles Cathedral: **Henderson 2006**; Bridgegate: **Smith & Henderson 2002**; High Street: **Smith 1997** (table 2); Castle Street: **Smith & McCormick 2001**, 272. St Giles' Cathedral, St Andrew and Water Street cattle values include ribs and vertebrae.

Site	dating	cattle	sheep/goat	pig	horse	n	cattle + large ungulate	small ungulate
Edinburgh	St Patrick's Church	39.6 *	44.5	6.5	9.4	245	54.6	45.4
	Cowgate	36.5	57.4	5.8	0.3	329	57.7	42.3
	Parliament	34.1	57.9	1.3	6.8	458	46.8	53.2
	Water Street	61.0	33.7	5.0	0.3	323		
	St Giles' Cathedral	31.1	62.0	6.9	0.0	408		
Peebles	Bridgegate	36.9	56.3	2.5	4.3	279	43.4	56.6
Perth	High Street	51.9	37.3	10.7	0.1	3472	53.8	46.2
St Andrews	Cinemahouse, phase II	60.3	31.9	5.2	2.6	310		
Aberdeen	Castle Street	57.0	36.0	3.5	3.5	na		

Appendix 6.6

Complete list of animal bones

sitecode	context	sample no.	species	element	count	side	GT50	proxfus	distfus	age	modification	notes
SPC02	015	041	bird	fpp	1							
SPC02	015	041	bird	fur	1							tiny
SPC02	015	041	bird	fur	1	b						
SPC02	015	041	bird	humB	1		23	f				tiny
SPC02	015	041	bird	pelB	2							
SPC02	015	041	bird	rib	4							
SPC02	015	041	bird	ulnaB	1		2	u	u			
SPC02	015	041	bird	ulnaB	1		1	u				in 2 pieces
SPC02	015	041	ch	d	1	l	ABC					
SPC02	015	041	ch	d	1	l						
SPC02	015	041	ch	d	2	r	AB					
SPC02	015	041	ch	o	1	r	ABC					
SPC02	015	041	ch	o	1	l	A					
SPC02	015	041	ch	qd	1	l	AB					
SPC02	015	041	ch	qd	1	r	AB					
SPC02	015	041	ch	so	2							
SPC02	015	041	chi	beak	1							
SPC02	015	041	chi	carpo	1		3		f			
SPC02	015	041	chi	ulnaB	1		123	f	f			in 3 pieces
SPC02	015	041	cld	a	1	l	C					
SPC02	015	041	cld	ch	1		AB					
SPC02	015	041	cld	ch	1		A					
SPC02	015	041	cld	ch	7		ABC					
SPC02	015	041	cld	hy	2	r	A					
SPC02	015	041	cld	hy	1	r	AB					
SPC02	015	041	cld	mx	1	l	AB					
SPC02	015	041	cld	mx	1	r	AB					
SPC02	015	041	cld	pt	1	r	ABC					

sitecode	context	sample no.	species	element	count	side	GT50	proxfus	distfus	age	modification	notes
SPC02	015	041	cld	supm	2							
SPC02	015	041	cld	v	6	b						
SPC02	015	041	cpd	v	1	b						
SPC02	015	041	dck	coraB	1		2					
SPC02	015	041	fwl	humB	1		23	f				in 2 pieces
SPC02	015	041	gad	bo	1	b	A					
SPC02	015	041	gad	ch	1		ABC					
SPC02	015	041	gad	d	1	r	AB					
SPC02	015	041	gad	hy	1		A					
SPC02	015	041	gad	v	9	b						
SPC02	015	041	lm	cerv	1	b						
SPC02	015	041	ls	fem	1		1	f				piece of arcus
SPC02	015	041	ma	o	1	l	ABC					
SPC02	015	041	ma	qd	1		AB					
SPC02	015	041	mm1	rib	1							
SPC02	015	041	mm1	st	1	b						
SPC02	015	041	mouse	hum	1			u	f			
SPC02	015	041	rat	phal1	1			f				
SPC02	015	041	rat	rad	1			f	u			
SPC02	015	041	sm	lumb	1	b		u	u	neo		corpus unfused, right half
SPC02	015	041	sm	m/p	1							
SPC02	015	041	sm	phal1	5							
SPC02	015	041	sm	phal2	1							
SPC02	015	041	sm	rib	17							
SPC02	015	041	sm	vert	1	b						
SPC02	015	041	sm	vert	2	b						
SPC02	015	041	ui	ui	1							
SPC02	015	041	ui	ui	286							mostly pins/ribs
SPC02	015	041	ui	v	1	b						
SPC02	015	041	ui	v	3	b						
SPC02	015	041	unid	ui	6							
SPC02	015	041	unid	ui	199							

sitecode	context	sample no.	species	element	count	side	GT50	proxfus	distfus	age	modification	notes
SPC02	015	041	unid	ui	21							
SPC02	015	041	vole/mouse	fem	1	l						
SPC02	015	041	vole/mouse	scap	1	l						
SPC02	023		cow	hum	1	r	12B	f				no meas
SPC02	023		cow	rad	1	l	12	f				
SPC02	023		cow	ulna	1	r	E					
SPC02	023		horse	m/t	1	l	12345678		f			distal ends
SPC02	023		lm	rib	2							distal
SPC02	023		mm1	rib	1							
SPC02	023	041	sh/g	mand	1	r	1BC					
SPC02	023		sheep	m/t	1	r	3478		f			
SPC02	023		sheep	pel	1	l	1234578			c		male
SPC02	023		unid	skull	1							
SPC02	023		unid	ui	5							
SPC02	070	049	gad	px	1	l	ABCDE					very small, c 1.5 cm long
SPC02	070	048	pig	m/t5	1	l	1					
SPC02	070	049	sheep	phal1	1		123		f			
SPC02	070	049	ui	ui	2							
SPC02	070	048	ui	ui	5							
SPC02	070	048	unid	ui	1							
SPC02	070	047	unid	ui	6							
SPC02	070	050	unid	ui	1							
SPC02	070	048	unid	ui	3							
SPC02	070	050	unid	ui	1							
SPC02	070	048	unid	ui	2							
SPC02	072	058	cow	mand	2	r						
SPC02	072	058	cow	pel	1	r	26					
SPC02	072	058	cow	tib	1	l						shaft
SPC02	072	058	fwl	fur	1	b						galliformes
SPC02	072	047	lm	mand	1							piece of corpus
SPC02	072	058	lm	rib	1							prox
SPC02	072	058	lm	scap	1							

sitecode	context	sample no.	species	element	count	side	GT50	proxfus	distfus	age	modification	notes
SPC02	072	047	lm	sha	1							
SPC02	072	058	lm	thor	1	b		u	u			
SPC02	072	058	lm	vert	2	b						
SPC02	072	047	mm1	rib	1							
SPC02	072	058	mm1	thor	1	b						
SPC02	072	058	sh/g	fem	1	r	678		u			max PM
SPC02	072	058	sh/g	isoteeth	1							
SPC02	072	047	sh/g	pel	1	l	57					
SPC02	072	047	sh/g	scap	1							
SPC02	072	058	sh/g	ulna	1	r	BCE	u				
SPC02	072	058	unid	ui	22							
SPC02	073	063	bird	scap	1		1					
SPC02	073		cow	horn	1	r						
SPC02	073		cow	hum	1	r						piece of shaft
SPC02	073		cow	hum	1	l	B					
SPC02	073		cow	m/t	1	l	78		u			
SPC02	073	064	cow	mand	1	r						
SPC02	073		cow	pel	1							ilium piece
SPC02	073		cow	skull	1	b	12345					measurements from the
SPC02	073		cow	tib	1	r	A					lefu horn: 45 47.8 46 40.7
SPC02	073		cow	ulna	1	l	CD					bas 140
SPC02	073	064	gad	v	1	b						
SPC02	073		horse	rad	1	r	123456789K	f	f			and ulna shaft distal part, modern break
SPC02	073		lm	rib	2							prox end
SPC02	073		lm	rib	1							
SPC02	073		lm	rib	3							
SPC02	073		lm	thor	1	b						arcus
SPC02	073		pig	tib	1	r	789A			neo		not newborn but small
SPC02	073		sh/g	mand	1	r	1CDE					in 8 pieces
SPC02	073	064	sh/g	scap	1	l						

sitecode	context	sample no.	species	element	count	side	GT50	proxfus	distfus	age	modification	notes
SPC02	073		sh/g	skull	1	l	3					condyl, base of jugulare, fossa mand
SPC02	073	064	sheep	m/t	1	l	1256					
SPC02	073		sheep	mand	1	r	1356ACD					
SPC02	073		sheep	scap	1	l	12345	f				
SPC02	073		sheep	tib	1	l	56A		f			
SPC02	073	064	shrew	skull	1	b						maxilla
SPC02	073	064	ui	ui	3							
SPC02	073		unid	scap	1							
SPC02	073		unid	ui	2							
SPC02	073	064	unid	ui	10							
SPC02	074	065	amp	phalO	1							
SPC02	074	065	amp	scap	2							
SPC02	074	065	amp	uio	3							
SPC02	074	065	amp	vert	2	b						shafts
SPC02	074		bird	rib	1							
SPC02	074	065	bird	vert	1	b						
SPC02	074	065	cld	bo	1	b	A					
SPC02	074	065	cld	d	1							
SPC02	074	065	cld	mx	1	r	AB					
SPC02	074	065	cld	v	47	b						
SPC02	074		cow	calc	1	r	1235	f				
SPC02	074		cow	calc	1	l	1245	f				
SPC02	074		cow	fem	1	r	89AB		f			
SPC02	074		cow	fem	1	l	9AB			u		
SPC02	074		cow	hum	1	l	3			f		
SPC02	074		cow	m/c	1	l	3478			f		
SPC02	074		cow	m/t	1	r	78				u	
SPC02	074	065	cow	m/t	1							
SPC02	074		cow	pel	1	l	12					
SPC02	074		cow	pel	1							
SPC02	074	065	cow	phal2	1		123	f				

sitecode	context	sample no.	species	element	count	side	GT50	proxfus	distfus	age	modification	notes
SPC02	074		cow	skull	1	l	15					condyl, base of jugulare shaft
SPC02	074	065	cow	skull	1	l						
SPC02	074		cow	tib	1	l						
SPC02	074	065	gad	par	1	b	EFH					
SPC02	074	065	gad	phb	1							
SPC02	074	065	gad	v	14	b						
SPC02	074		gsa/b	tibio	1		1					
SPC02	074		horse	rad	1	l	123456789K	f	f			ulna dist shaft present
SPC02	074		horse	rad	1	r	123456789K	f	f			
SPC02	074	064	horse	tib	1	r	123456789A	f	f			
SPC02	074		lm	cerv	1	b		f	f			horse?
SPC02	074		lm	lumb	3	b						pieces of arcus distal
SPC02	074		lm	rib	1							one in 2 pieces
SPC02	074		lm	rib	4							
SPC02	074		lm	rib	1							
SPC02	074	065	lm	rib	1							
SPC02	074	065	lm	scap	1							
SPC02	074		lm	sha	2							
SPC02	074	065	lm	sha	1							
SPC02	074		lm	thor	1	b		u	u			left side
SPC02	074		lm	vert	1	b						
SPC02	074		mm1	rib	2							
SPC02	074		mm1	rib	1							prox
SPC02	074		mm1	rib	2							
SPC02	074		mm1	rib	1							
SPC02	074	065	mm1	sha	1							
SPC02	074	065	mm1	vert	1							
SPC02	074		pig	astr	1	r	1234					no meas
SPC02	074		pig	hum	1	l	3478AB		f		c	
SPC02	074		pig	isoteeth	1							pd
SPC02	074		pig	tib	1	l	789A	u	u			
SPC02	074	065	rc	dd	1							
SPC02	074	065	rod	hum	1				f			

sitecode	context	sample no.	species	element	count	side	GT50	proxfus	distfus	age	modification	notes
SPC02	074	065	sh/g	carp	1							C2+3
SPC02	074		sh/g	mand	1	r	5					
SPC02	074		sh/g	mand	1	l	123567BCDE					
SPC02	074	065	sh/g	mand	1							
SPC02	074		sh/g	pel	1	l	7A					
SPC02	074	065	sh/g	phal3	1		1					
SPC02	074		sh/g	rad	1	l	678			c		
SPC02	074		sh/g	rib	1							prox
SPC02	074	065	sh/g	thor	1	b		fg	fg			
SPC02	074		sh/g	tib	1	l	789			j		almost inf
SPC02	074		sheep	hum	1	l	345678AB		f			
SPC02	074		sheep	mand	1	r	1234567AC					
SPC02	074		sheep	pel	1	l	1234					
SPC02	074		sheep	scap	1	r	123567	f				
SPC02	074	065	sm	sha	3							
SPC02	074	065	ui	ui	75							
SPC02	074	065	unid	phal1	1							
SPC02	074	065	unid	rib	1					neo		
SPC02	074	065	unid	skull	1							
SPC02	074		unid	ui	6							
SPC02	074	065	unid	ui	23							
SPC02	074	065	unid	ui	2							
SPC02	074	065	unid	ui	22							
SPC02	074	065	unid	ui	102							
SPC02	074	065	vole/mouse	hum	1				f			
SPC02	074	065	vole/mouse	ulna	1							
SPC02	074	065	wt	d	1	l	C					
SPC02	074	065	wt	d	1	r	AB					
SPC02	074	065	wt	mx	1	l	A					
SPC02	077	061	amp	il	1							
SPC02	077	061	amp	vert	1	b						
SPC02	077	061	cow	tib	1	r	5		u			

sitecode	context	sample no.	species	element	count	side	GT50	proxfus	distfus	age	modification	notes
SPC02	077	061	gad	v	1	b						
SPC02	077	061	lm	vert	1	b						
SPC02	077	061	sh/g	isoteeth	1							mand M1/2
SPC02	077	061	sh/g	skull	1	l						premaxilla
SPC02	077	061	ui	ui	1							
SPC02	077	061	unid	ui	6							
SPC02	077	061	unid	ui	1							
SPC02	078	062	amp	tibO	1							
SPC02	078	062	rjd	dd	1							
SPC02	078	062	unid	ui	1							
SPC02	078	062	unid	ui	1							
SPC02	079	062	cow	fem	1	l	235678	u	u	j		in two pieces, immature
SPC02	079	062	cow	horn	1	r						base little broken
SPC02	079	062	cow	horn	1	l						
SPC02	079	062	cow	hum	1	l	78		u			
SPC02	079	062	cow	m/t	1	r	12					
SPC02	079	062	cow	phal1	1		123	f				
SPC02	079	062	cow	phal2	2		123	f				
SPC02	079	062	cow	tcen	1	l						
SPC02	079	062	cow	tib	1	r	7					
SPC02	079		fwl	humB	1		12		u			galliformes
SPC02	079	062	lm	at	1	b						
SPC02	079	062	lm	cerv	1	b		u				
SPC02	079	63	lm	cerv	1	b						
SPC02	079	062	lm	lumb	1	b						
SPC02	079	062	lm	lumb	1	b						
SPC02	079	062	lm	rib	1			u	u			
SPC02	079	062	lm	rib	1							
SPC02	079	062	lm	rib	1							in 2 pieces, distal end
SPC02	079	63	mm1	rib	1							
SPC02	079	062	mm1	rib	1							
SPC02	079	63	mm1	sha	1							

sitecode	context	sample no.	species	element	count	side	GT50	proxfus	distfus	age	modification	notes
SPC02	079	062	mm1	sha	2							other one stained green and has some metal attached
SPC02	079	63	mm1	vert	1							
SPC02	079	063	rc	dd	1							
SPC02	079	062	sh/g	hum	1	l	789AB		u	j		not quite inf
SPC02	079	062	sh/g	hum	1	l	345678		f			
SPC02	079	062	sh/g	mand	1	r	E					
SPC02	079	062	sh/g	pel	1	r	7					
SPC02	079	062	sh/g	pel	1	r	57A					prox
SPC02	079	062	sh/g	rib	1							
SPC02	079	062	sh/g	tib	2	l	7					
SPC02	079	63	sheep	m/c	1	r	12					
SPC02	079	062	sheep	m/t	1	r	3478		f			small patch in the shaft charred
SPC02	079	062	sheep	m/t	1	r	12345678		fg			
SPC02	079	062	sheep	tib	1	l	56A		f			
SPC02	079	062	unid	skull	1							
SPC02	079	63	unid	ui	1							
SPC02	079	63	unid	ui	26							
SPC02	079	062	unid	ui	1							
SPC02	080	066	bird	syn	1	b						
SPC02	080		chi	scap	1		12		f			
SPC02	080		chi	tibio	1		1		f			
SPC02	080		cow	astr	1	r	34					
SPC02	080		cow	carp	1	r						Ci
SPC02	080		cow	fem	1	l	AB		f	c		fairly complete core but broken base and tip, stage 5
SPC02	080		cow	horn	1	l						stage 5, base, some skull attached
SPC02	080		cow	horn	1	r						whole horncore, some skull attached, stage 2
SPC02	080		cow	horn	1	r						

sitecode	context	sample no.	species	element	count	side	GT50	proxfus	distfus	age	modification	notes
SPC02	080		cow	horn	1	r						base, piece of skull attached, stage 3
SPC02	080		cow	horn	1	r						stage 5, some skull attached
SPC02	080		cow	horn	1	l						stage 5, base and skull around
SPC02	080		cow	horn	1	l						almost complete, stage 5
SPC02	080		cow	horn	1	l						stage 5, some skull attached
SPC02	080		cow	horn	1	l						stage 5-6 part of skull attached, half condyl (cut), base of jugulare, pars petrosa
SPC02	080		cow	horn	1	l						whole core, stage 4, piece of skull attached
SPC02	080		cow	hum	1	r						shaft
SPC02	080		cow	isoteeth	1							I
SPC02	080		cow	isoteeth	3							2 M max, 1 Pm mand
SPC02	080		cow	m/c	1	r	34		f			
SPC02	080		cow	m/c	1	l	1256					
SPC02	080		cow	m/c	1	r	34		f			
SPC02	080		cow	m/t	1	l	1					
SPC02	080		cow	m/t	1	r	125678		u			
SPC02	080		cow	mand	1	r	6					
SPC02	080		cow	mand	1	l	2					
SPC02	080		cow	mand	1	r	7					
SPC02	080	63	cow	mand	1	l	E					
SPC02	080		cow	mand	1	l	E					
SPC02	080		cow	pel	1	l						
SPC02	080		cow	pel	1	l	1					
SPC02	080		cow	pel	1	l	12					
SPC02	080		cow	rad	1	r	89K		u			
SPC02	080		cow	rad	1	l	5					c
SPC02	080		cow	scap	1	l	6					

sitecode	context	sample no.	species	element	count	side	GT50	proxfus	distfus	age	modification	notes
SPC02	080		cow	skull	1	b						in 6 pieces, nuchal part of frontale
SPC02	080		cow	tcen	1	l						
SPC02	080		cow	ulna	1	r	C					
SPC02	080	066	gad	bb	1							
SPC02	080		gsa/b	ster	1							in 3 pieces
SPC02	080		horse	astr	1	l	1234					talus, Tc, T1+2, T3 and T4 fused together
SPC02	080		horse	cerv	2	b		f	f			
SPC02	080		horse	fem	1	r	123456789AB	f	f			prox epi broken, no GL
SPC02	080		horse	hum	1	l	45678		f			
SPC02	080		horse	tib	1	r	123456789A	f	f			
SPC02	080		lm	caud	1	b		f	f			
SPC02	080		lm	cerv	1	b		u	u			condyl
SPC02	080		lm	fem	1							condyl
SPC02	080		lm	fem	1							some perhaps horse, prox
SPC02	080		lm	rib	5							
SPC02	080		lm	rib	6							
SPC02	080		lm	rib	1							dist
SPC02	080		lm	sac	1	b						right side of first vert
SPC02	080		lm	sac	1	b		u				
SPC02	080		lm	sac	1	b						
SPC02	080		lm	sha	9							
SPC02	080	066	lm	sha	1							
SPC02	080		lm	thor	4	b						arcus
SPC02	080		lm	vert	1							
SPC02	080		mm1	rib	1							distal
SPC02	080		mm1	rib	1							
SPC02	080		mm1	rib	1							distal
SPC02	080		mm1	sha	2							
SPC02	080		pig	at	1	b		u				right, corpus unfused
SPC02	080		pig	m/c4	1	l	13					

sitecode	context	sample no.	species	element	count	side	GT50	proxfus	distfus	age	modification	notes
SPC02	080		pig	m/t3	1	r	123		f			artefact: holes drilled in shaft transverse plan
SPC02	080		pig	mand	1	l	16E					
SPC02	080		pig	pel	1	r	1					
SPC02	080		pig	rib	1							prox
SPC02	080		rabbit	fem	1	r	2345	fg	u			
SPC02	080		rabbit	hum	1	l	34		f			
SPC02	080		rabbit	mand	1	l	123					
SPC02	080		sh/g	at	1	b						right and upper left
SPC02	080		sh/g	at	1	b						left side
SPC02	080		sh/g	fem	1	l	6					
SPC02	080		sh/g	fem	1	l						
SPC02	080		sh/g	hum	1	r	9A					
SPC02	080		sh/g	hum	1	l	789AB	u	u			
SPC02	080		sh/g	isoteeth	2							mand M, max PM
SPC02	080		sh/g	lumb	1	b		u				upper right epi
SPC02	080		sh/g	mand	1	r	2					
SPC02	080		sh/g	mand	1	l	5					
SPC02	080	066	sh/g	mand	1	l	1267BCDE					in 2 pieces
SPC02	080		sh/g	pel	1	l	7A					
SPC02	080		sh/g	pel	1	r	1234567A					
SPC02	080		sh/g	pel	1	r	1					
SPC02	080		sh/g	pel	1	l	12456					
SPC02	080		sh/g	rib	3							prox
SPC02	080		sh/g	tib	1							
SPC02	080		sh/g	tib	1	l						
SPC02	080		sh/g	tib	1	l	89					in 3 pieces
SPC02	080		sh/g	tib	1	r	89					
SPC02	080		sh/g	tib	1	r	89					
SPC02	080		sheep	hum	1	r	3456789AB	u	f			
SPC02	080		sheep	hum	1	l	3456789A		f			
SPC02	080		sheep	hum	1	r	3456789A		f			

sitecode	context	sample no.	species	element	count	side	GT50	proxfus	distfus	age	modification	notes
SPC02	080		sheep	m/c	1	l	1256					
SPC02	080		sheep	m/t	1	r	3478		f			
SPC02	080		sheep	m/t	1	l	345678		f			
SPC02	080		sheep	m/t	1	l	12345678		f			
SPC02	080		sheep	mand	1	l	1A					in 4 pieces
SPC02	080		sheep	pel	1	r	123456789ABC					f?
SPC02	080		sheep	rad	1	l	125		f			
SPC02	080		sheep	rad	1	r	123456789K		f			
SPC02	080		sheep	tib	1	l	5689A		f			
SPC02	080	066	ui	ui	4							pins
SPC02	080	066	unid	mand	1							
SPC02	080		unid	scap	1							
SPC02	080		unid	skull	1							
SPC02	080		unid	ui	14							
SPC02	080	066	unid	ui	7							
SPC02	081		cow	fem	1	r	2345		f			stage 1
SPC02	081		cow	horn	1	r						stage 5-6, some skull attached, tip broken
SPC02	081		cow	horn	1	l						stage 5, some skull
SPC02	081		cow	horn	1	l						stage 5, base broken, otherwise complete
SPC02	081		cow	horn	1	r						stage 4, some skull
SPC02	081		cow	horn	1	r						stage 5, some skull
SPC02	081		cow	horn	1	r						base, some skull, stage 5 but in 2 pieces
SPC02	081		cow	m/t	1	r	3478		f			
SPC02	081		cow	pel	1	r	135					
SPC02	081		horse	lumb	2	b			f			fused together, two last lumb
SPC02	081		horse	phal1	1		123		f			
SPC02	081		horse	phal3	1		12					
SPC02	081		horse	thor	1	b			f			

sitecode	context	sample no.	species	element	count	side	GT50	proxfus	distfus	age	modification	notes
SPC02	081		lm	rib	1							
SPC02	081		lm	rib	2							prox, the other almost complete, horse?
SPC02	081		lm	tib	2							
SPC02	081		mm1	rib	1							
SPC02	081		sh/g	fem	1	l	2368B		fg			
SPC02	081		sh/g	mand	1							
SPC02	081		sheep	m/c	1	l	12345678		f			
SPC02	081		sheep	scap	1	l	1234567	f				in 2 pieces
SPC02	081		unid	ui	2							
SPC02	082		cow	ax	1	b			u			left side of corpus
SPC02	082		cow	calc	1	r	1235	f				
SPC02	082		cow	horn	1	l						stage 5, in 7 pieces, base
SPC02	082		cow	horn	1	b						part of base of both cores
SPC02	082		cow	horn	1							tiny, stage 5, piece cut off in base! Almost upright position
SPC02	082		cow	horn	1	l						
SPC02	082		cow	hum	1	l	2B	fg		c		
SPC02	082		cow	m/t	1	r	5678	u	u	neo		halves fused
SPC02	082		cow	m/t	1	l	3478		f			
SPC02	082		cow	mand	1	l	1CDE					
SPC02	082		cow	phal1	1		123	f				
SPC02	082		cow	rad	1	l	349K		fg			
SPC02	082		cow	rad	1	l	349K		f			left side of first vert
SPC02	082		cow	sac	1	b		f				
SPC02	082		cow	scap	1	l	3					
SPC02	082		cow	scap	1	r	2345					
SPC02	082		cow	scap	1	l						
SPC02	082		cow	skull	1	l						fossa temp, pars petrosa
SPC02	082		cow	skull	2	b						half, jugulare
SPC02	082		cow	skull	1		3					frontale
SPC02	082		horse	astr	1	l	1234					

sitecode	context	sample no.	species	element	count	side	GT50	proxfus	distfus	age	modification	notes
SPC02	082		horse	m/t	1	l	12345678		f			mt II still attached, IV loose
SPC02	082		lm	rib	1							
SPC02	082		lm	rib	1							distal
SPC02	082		lm	rib	1							prox
SPC02	082		lm	thor	1	b		fg	fg			right side of corpus
SPC02	082		lm	thor	1	b						arcus
SPC02	082		lm	vert	1	b						
SPC02	082		mm1	rib	1							dist
SPC02	082		mm1	vert	1							
SPC02	082		sh/g	mand	1	r	13456BCDE					
SPC02	082		sh/g	rad	1	r	25678	f			c	
SPC02	082		sh/g	scap	1	l	8					
SPC02	082		sheep	calc	1	r	12345	f				
SPC02	082		unid	skull	1							
SPC02	082		unid	ui	2							
SPC02	085		lm	rib	1							
SPC02	085		lm	sha	1							
SPC02	085		sh/g	skull	1	r						max PM 3-4
SPC02	085		sheep	phal1	2		123	f				
SPC02	085		sheep	tib	1	r	56A		f			
SPC02	086	070	amp	ui	1							shat
SPC02	086	070	gad	o	1	r	A					cod/haddock, possibly cut
SPC02	086	070	gad	v	2	b						
SPC02	086	070	gm	qd	1	r	AB					
SPC02	086	070	lm	lumb	1	b						costarius
SPC02	086	070	mm1	vert	1	b						
SPC02	086	070	pig	cerv	1	b		f	u			right upper side
SPC02	086	070	pig	isoteeth	1			u				underdeveloped crown
SPC02	086	070	rc	dd	1							
SPC02	086	070	sh/g	scap	1	l	8					in 2 pieces
SPC02	086	070	sh/g	skull	1	l						premaxilla

sitecode	context	sample no.	species	element	count	side	GT50	proxfus	distfus	age	modification	notes
SPC02	086	070	sh/g	tib	1	r	8					
SPC02	086	070	sheep	phal2	1		123	f		c		
SPC02	086	070	ui	ui	1							
SPC02	086	070	ui	ui	10							
SPC02	086	070	unid	isoteeth	1							
SPC02	086	070	unid	ui	5							
SPC02	086	070	unid	ui	41							
SPC02	089		cow	at	1	b						right half
SPC02	089		cow	fem	1	l	78					
SPC02	089		cow	fem	1	l	B		f			
SPC02	089		cow	m/c	1							
SPC02	089		cow	skull	1	l						Maxilla, M2, 3 pieces
SPC02	089		cow	tib	1	l	56A		f			
SPC02	089		lm	cerv	1	b		f	fg			left side of corpus
SPC02	089		lm	lumb	1	b						costarius
SPC02	089		lm	rib	1							
SPC02	089		lm	rib	3							
SPC02	089		lm	scap	1							
SPC02	089		mm1	rib	1							
SPC02	089		mm1	rib	1							
SPC02	089		sh/g	hum	1	r	9A					
SPC02	089		sh/g	pel	1	r	26B					
SPC02	089		sh/g	scap	1	l	234567	u				
SPC02	089		sheep	m/c	1	r	78					
SPC02	089		sheep	m/t	1	r	78		u			
SPC02	089		sheep	m/t	1	l	125678		u			
SPC02	089		sheep	pel	1	r	1234567					
SPC02	089		sheep	rad	1	r	123456789K	f	fg			
SPC02	089		unid	ui	3							
SPC02	090	068	amp	ui	1							long bone
SPC02	090	068	amp	vert	1	b						
SPC02	090	068	ch	cl	1	l	AB					

sitecode	context	sample no.	species	element	count	side	GT50	proxfus	distfus	age	modification	notes
SPC02	090	068	sh/g	tib	1	r	7	u				
SPC02	090		sheep	rad	1	r	123456789K	f	f			in 2 pieces
SPC02	090	068	unid	ui	1							
SPC02	090	068	unid	ui	3							
SPC02	092	071	amp	tib	2							
SPC02	092	068	horse	rad/uln	1	l		f	f			both complete
SPC02	092		mm1	rib	1							prox
SPC02	092	071	rat	caud	1	b		u	u			pins
SPC02	092	071	ui	ui	2							
SPC02	092	071	unid	isoteeth	1							
SPC02	092	071	unid	ui	2							
SPC02	092	071	unid	ui	13							
SPC02	093	090	amp	hum	1							
SPC02	093	090	amp	vert	1	b						
SPC02	093	090	cld	v	1	b						
SPC02	093	090	el	po	1	l	ABC					tiny!
SPC02	093	090	el	v	2	b						
SPC02	093	090	gad	phb	2							
SPC02	093	090	het	po	1							brill or halibut
SPC02	093	090	het	v	2	b						
SPC02	093	071	horse	rad/uln	1	r		f	f			radius complete, ulna only shaft
SPC02	093	071	horse	rib	2							almost complete, other in 2 pieces
SPC02	093	071	horse	sac	1	b						belongs likely to lumb in 81!
SPC02	093	071	mm1	rib	1							
SPC02	093	090	ui	ui	11							mostly pins
SPC02	093	090	ui	ui	1	b						
SPC02	093	090	ui	ui	1							
SPC02	093	090	unid	ui	7							
SPC02	093	090	unid	ui	1							
SPC02	093	090	unid	ui	5							

sitecode	context	sample no.	species	element	count	side	GT50	proxfus	distfus	age	modification	notes
SPC02	094	073	amp	ui	4							one shaft
SPC02	094		cow	astr	1	r	1234					
SPC02	094		cow	mand	1	l	D					
SPC02	094	073	gad	io	1	l						prox
SPC02	094	073	lm	rib	1							prox
SPC02	094	073	mm1	rib	1							in 2 pieces, some metal attached (melted?) to both pieces, large animal
SPC02	094	073	mm1	rib	1							or hare
SPC02	094		pig	scap	1	l	4					
SPC02	094	073	rabbit	tar	1							
SPC02	094	073	rc	dd	1							
SPC02	094	073	ui	ui	2							
SPC02	094	073	unid	ui	13							
SPC02	094	073	unid	ui	3							
SPC02	094		unid	ui	1							
SPC02	094	073	vole	isoteeth	1							large: bank vole?
SPC02	096	072	amp	hum	1							
SPC02	096	072	amp	scap	1							
SPC02	096	072	bird	ui	1							
SPC02	096	072	rat	pel	1	l						
SPC02	096	072	ui	ui	3							
SPC02	096		unid	rib	1							
SPC02	096	072	unid	ui	2							
SPC02	096		unid	ui	1							
SPC02	124	100	bird	rib	1							
SPC02	124	100	bird	rib	1							
SPC02	124	100	bird	syn	1	b						
SPC02	124	100	bird	vert	1	b						
SPC02	124	100	ch	cl	1	r	AB					
SPC02	124	100	chi	coraB	1		2					
SPC02	124	100	cow	phal3	1		12					f
SPC02	124	100	gad	v	3	b						

sitecode	context	sample no.	species	element	count	side	GT50	proxfus	distfus	age	modification	notes
SPC02	124	100	lm	thor	1	b						arcus
SPC02	124	100	ui	ui	8							
SPC02	124	100	unid	ui	1							
SPC02	124	100	unid	ui	11							
SPC02	124	100	unid	ui	2							
SPC02	125		bird	sha	1							
SPC02	125	100	cow	m/t	1	r	1256					
SPC02	125	100	lm	rib	1							
SPC02	125	100	mm1	vert	1	b						
SPC02	125	100	pig	rad	1	r	2	f				
SPC02	125	100	sh/g	fem	1	l	6					
SPC02	125	100	unid	ui	1							
SPC02	126	109	amp	ui	1							shaft
SPC02	126	109	cld	v	1	b						
SPC02	126	109	ui	ui	2							
SPC02	126	109	ui	ui	1	b						
SPC02	126	109	ui	v	1	b						
SPC02	126	109	unid	ui	3							
SPC02	126	109	unid	ui	5							
SPC02	126	109	unid	ui	126							
SPC02	126	109	wt	d	1	l	AB					
SPC02	131	109	cow	tib	1	r			f			
SPC02	131	109	lm	thor	1	b						arcus
SPC02	131	109	sh/g	ulna	1	l	CD					
SPC02	131	109	unid	ui	2							
SPC02	133	108	gad	v	1	b						
SPC02	133	108	mm1	rib	1							
SPC02	133	108	unid	ui	14							
SPC02	133	108	unid	ui	1							
SPC02	135	102	cld	supm	1							
SPC02	135	101	ls	ster	1							
SPC02	135	102	mm1	thor	1	b						arcus

sitecode	context	sample no.	species	element	count	side	GT50	proxfus	distfus	age	modification	notes
SPC02	135	101	ui	ui	2							
SPC02	135	102	unid	lumb	1	b				c		costarius
SPC02	135	102	unid	ui	5							
SPC02	139	105	gad	v	1	b						
SPC02	139	105	ma	po	1	r	ABC					or hare
SPC02	139	105	rabbit	isoteeth	1							and one perch scale
SPC02	139	105	ui	ui	4							carnivore
SPC02	139	105	unid	phal2	1					neo		
SPC02	139	105	unid	ui	4							
SPC02	139	105	unid	ui	3							
SPC02	140	105	cow	phal1	1		123	f				
SPC02	141	107	gad	epb	1							
SPC02	141	107	sh/g	isoteeth	1							mand M
SPC02	141	107	ui	ui	1							
SPC02	141	107	unid	ui	2							
SPC02	146	116	bird	fdp	2							
SPC02	146	116	bird	fpp	1							
SPC02	146		cow	horn	1	l						stage 5, tip broken, some skull
SPC02	146		cow	horn	1							stage 5, tip broken,
SPC02	146	116	gad	bo	1	b	A					
SPC02	146	116	gad	v	5	b						
SPC02	146	116	lm	mand	1							
SPC02	146	116	ma	eh	1							
SPC02	146	116	mm1	scap	3							
SPC02	146	116	mm1	thor	1	b						arc
SPC02	146	116	ui	ui	56							
SPC02	146	116	ui	v	9	b						
SPC02	146	116	unid	ui	14							
SPC02	146	116	unid	ui	74							
SPC02	146	116	unid	ui	19							