A Preliminary Report of the 2008 Midden Excavation at Skutustadir, N Iceland

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A product of the North Atlantic Biocultural Organisation (NABO) Research Cooperative and the International Polar Year program *Human Ecodynamics* in the North Atlantic.

Abstract: In 2007, midden deposits associated with the 9th-19th c. archaeological site of Skutustadir in the Lake Myvatn District of N. Iceland were located. The remains were first noted by Arni Einarsson of the Myvatn Science Station and later, more extensively surveyed by CUNY archaeologists. In 2008, an international team lead by CUNY and FSI excavated three trenches and located midden deposits which are the subject of this preliminary zoooarchaeological report. The trenches exposed archaeological material which dates from the settlement age (871-930) through the early modern period (17th - 19th c.). This presents an opportunity for analysis of a long term settlement through zooarchaeology. The data thus far indicate that site residents herded sheep and cattle. Very scarce evidence suggests the presence of pigs and goats; however, more data needs to be collected on these species. Evidence of domestic fowl (chicken (*Gallus gallus*)), was found, distinguishing Skutustadir from other Myvatn area farms investigated to date. Migratory waterfowl were found as well as ptarmigan, a local terrestrial bird, and one example of a Sea Eagle. Fish bones recovered in the 2008 field season have not yet been fully analyzed, However, preliminary evidence suggests that both marine and freshwater species are present. In a preliminary check, cranial bones of marine fish were observed, indicating that at least some of the marine fish transported to the inland site at Skutustadir, were fresh (not the common, headless, dried fish product (Perdikaris & McGovern 2006)). Seal bones are found at a low frequency, but consistently throughout the site.

Introduction

Today, Skutustadir consists of a complex of modern farm buildings and a church atop a hill on the southern margin of Lake Myvatn. The area is characterized by wet marshes (framengjar) and unique geological formations – small, cratered, cone-shaped hills called pseudocraters. The natural hill upon which Skutustadir sits, is augmented by a farm mound (an accumulation of cultural material) originating in the Viking age (817-930 CE). Skutustadir is well known as a historic site to archaeologists, local residents and scholars of Icelandic sagas, but its archaeological potential was tested for the first time in 2007 when survey of Skutustadir was conducted after Arni Einarsson of the Myvatn Science Station recognized midden material eroding out of the site's hillside. The following year, in 2008, an archaeological investigation was carried out by a joint CUNY and FSI team. The team also recognized the presence of structural remains though these were not the focus of the investigation. (For more information on the initial survey in 2007, please refer to McGovern in Vesteinsson (2008)).

Lake Myvatn settlements have been studied archaeologically since 1991 and initiation of the 2007 survey aimed to answer long standing questions resulting from over a decade of excavation and analysis. One aim of the survey was to identify sites with evidence of medieval (1000-1550 CE) and early modern (17th – 19th c.) occupation.

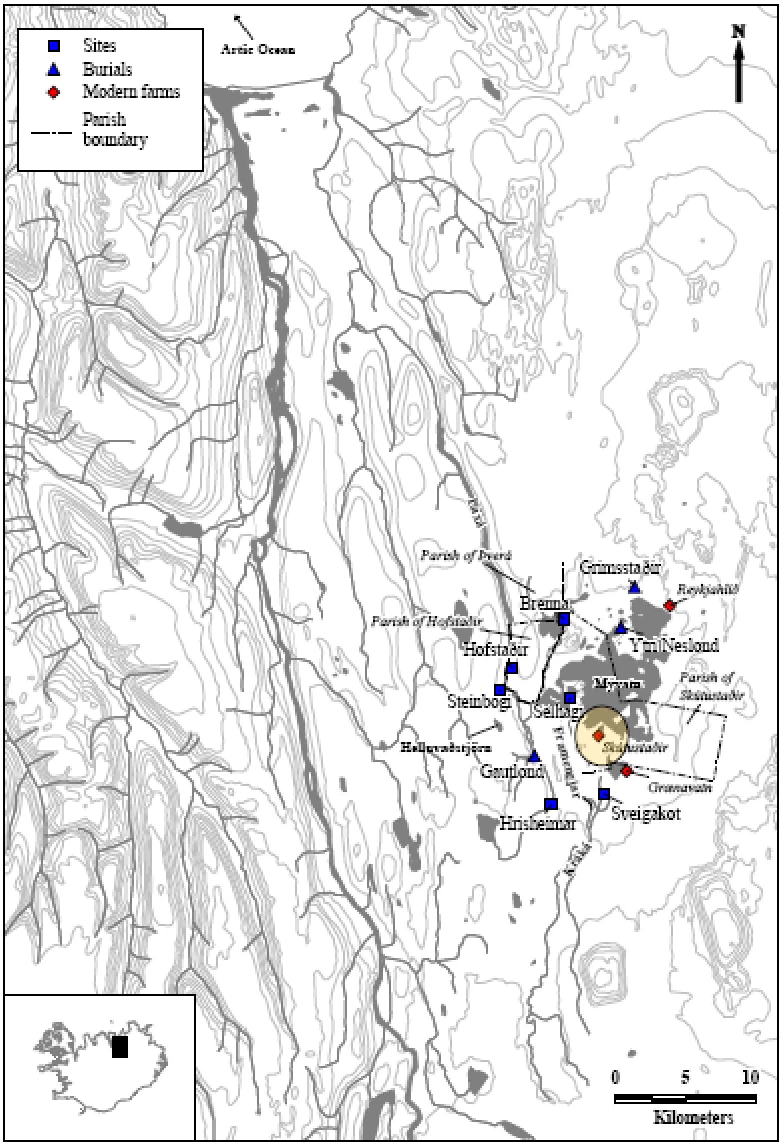


Figure 1 Lake Myvatn's archaeological sites

The discovery that Skutustadir's midden contains evidence of long term occupation from the 9th-19th c. is key to the project's purpose because although the archaeological record in Myvatn is comparatively rich and well studied (See McGovern et al 2007), there has been a relative dearth of archaeological evidence recovered that would indicate the nature of resource use during the late medieval and early modern periods (Vesteinsson 2008).

Excavation and Recovery

The excavation in 2008 focused on three areas: E1 & 2, D and F. Dating of the material was possible in the field by the presence of volcanic tephra layers. Followed the field season, radiocarbon dating of bone recovered from Skutustadir was carried out at the Scottish Universities Environmental Research Centre (SUERC) and the results are presented in the table below.

					C14 BP	1 sigma range	2 sigma range
SUERC 20218	1215 +/- 30 BP	-22.1	5.7	3.6	1215+/-30	770-870 AD	690-890 AD
SUERC 20219	1040 +/- 30 BP	-21.4	2.6	3.4	1040+/-30	985-1025 AD	890-1040 AD
SUERC 20220	785 +/- 30 BP	-20.8	1.6	3.3	785+/-30	1220-1265 AD	1205-1285 AD
SUERC 20225	625 +/- 30 BP	-21.8	2.8	3.3	625+/-30	1295-1395 AD	1280-1400 AD
SUERC 20226	525 +/- 30 BP	-22	4.3	3.3	525+/-30	1395-1435 AD	1320-1450 AD

Trench E1 & 2 was located next to the site's modern habitation. Area E contained the following bone bearing contexts: 019, 006, 059, 063, 060. The results indicate that bone material recovered from contexts in Area E1 & 2 spanned time periods from the 9th century to the 13th and 14th centuries. The lowest layers of area E1 & 2 yielded evidence that the site had been occupied since the first settlement of Iceland in the 9th century. .

Area D was excavated on the southern slope of the farm mound and material here was defined by the presence of the V1477 tephra and the H 1717 tephra with anthropogenic deposits both above and below each, thus dating it to the late medieval and early modern periods in Iceland. Area D contained bone-bearing contexts: 002, 055, 062, 061, 057, 056, 052, 046, 044, 032, and 007. Preservation in area D was excellent, and as a result, excavators were able to recover delicate specimens such as bird egg shell and fish ear otoliths (inner ear bones).

Area F was excavated south- east and down-slope of Area D and the small trench yielded material dating to the 18th and 19th c, the early modern period in Iceland. Area F contains the contexts: 054, 047, 077, 076, 075, 074, 073, 069, 068, 051, 054, 036, 050, 045, 035, 034, and 033. In contrast to area D, the bone recovered from area F frequently was poorly preserved, with specimens showing exfoliation (flaking off of outer layers), eroded bone surfaces, and specimens were generally more fragile.

In order to simplify information in this preliminary report, data will be presented in groups according to relationship to tephra layers and radiocarbon dates as the following table outlines.

Table 1. Ages and Bone- bearing contexts at Skutustadir 2008

Cultural Periods	**SKU08 Context Dates**	**Contexts**
Viking age (*landnam,*870-930*)*	9th c	063
Medieval Period (1000-1550)	1262 – 1300	059, 060
Medieval Period (1000-1550)	14th c	006, 058, 019
Late Medieval to Early Modern period (Early mod. 16th c -19th c)	1477 – 1717	061, 062, 057, 056, 055, 046, 044, 032, 052, 062, 035
Early Modern Period (16th c -19th c)	Post 1717	002, 007, 033, 034, 035, 036 045, 047, 050, 051, 054, 068, 069, 073, 074, 075, 076, 077, 096, 005, 050, 055, 069, 029

The following measures were taken in accordance with NABO and FSI recommendations to ensure excellent recovery in the field: all midden material bearing bone was dry-sieved through 4mm mesh. Regular checking of the resulting back-dirt suggests that few elements were missed by the sieving methods. All articulated elements and *in situ* clusters of bird egg shell fragments were placed in one bag in the field and subsequently recorded as one specimen to reduce interdependence. Thorough recovery of the faunal material was further ensured through the careful excavation approach by several team members with previous zooarchaeological training.

Laboratory Methods

As of May 2009, laboratory analysis of the bird and mammal bones from Skutusatdir is complete. Analysis was carried out at the Hunter College Zooarchaeological Laboratory and made use of the extensive reference collections there. Analysis of the fish bones recovered in

2008 will be carried out at the Brooklyn College and the Hunter College Zoorchaeological Laboratories. All elements were identified as far as taxonomically possible (a selected element approach was not employed) but most mammal ribs, long bone shaft fragments and vertebral fragments were assigned to "Large Terrestrial Mammal" (cattle or horse sized) , "Medium Terrestrial Mammal" (sheep, goat, pig or large dog sized), and "Small Terrestrial Mammal" (small dog-fox sized). Only elements positively identified as *Ovis aries* and *Capra hircus* were assigned to the separate sheep and goat categories respectively while all other sheep/goat element were assigned to the "caprine" category potentially including both sheep and goats. Digital records of all data collected were made following the 8th edition of the NABONE recording package (a Microsoft Access database supplemented with specialized Microsoft Excel spreadsheets). Fish identifications follow the most current *ICAZ Fish Remains Working Group* recommendations, with only positively identified fragments being given species level identification (thus creating the usual large cod-family or salmon-family categories as well as a substantial number of unidentified fish bones). Following NABO Zooarchaeology Working Group recommendations and the established traditions of N Atlantic zooarchaeology we have made a simple fragment count (NISP) the basis for most quantitative presentation. Measurements (Mitoyo digimatic digital caliper, to nearest mm) of fish bones follow Wheeler & Jones (1989), mammal metrics follow Von Den Dreisch (1976) and mammal tooth eruption and wear recording follows Grant (1982). Digital records of all data collected were made following the 7th edition NABONE recording package (Microsoft Access database supplemented with specialized Excel spreadsheets, see discussion and downloadable version at www.geo.ed.ac.uk/nabo) and all digital records (including archival element by element bone records) and the bone samples are permanently curated at the *National Museum of Iceland*. CD R versions of this report and all archived data are also available on request from nabo@voicenet.com.This report, other reports and data are available from nabo@voicenet.com and the NABO website: www.nabohome.org.

Curation followed the NABONE protocols followed for other archaeofauna from Iceland, Faroes, Greenland, and northern Norway (NABONE, 2004, see www.nabohome.org for downloadable version 8). Following widespread North Atlantic tradition, bone fragment quantification makes use of the Number of Identified Specimens (NISP) method (Grayson 1984). Mammal measurements (with a Mituyo Digimatic caliper) followed the approach outlined by von den Driesch (1976), and sheep/goat distinctions follow Boessneck, (1969) and Halstead and Mainland (2005). Tooth-wear stage studies follow Grant (1982) and long-bone fusion stage calibrations follow Reitz and Wing (1999).

SKU 08 An Overview of Species Present, Number of Identified Specimens (NISP) and Total Number of Fragments (TNF)

	Unstrat.	9th c	1262-1300	14th c	pre 1477	1477-1717	post 1717	Total
Cow (*Bos taurus*)	8		110	13		112	84	**327**
Horse (*Equus caballus*)			1			1		**2**
Cat (*Felis domesticus*)								
Dog (*Canis familiaris*)							1	**1**
Pig (*Sus scrofa*)	1						1	**2**
Sheep (*Ovis aries*)	5	2	13	4		78	49	**151**
Goat (*Capra hircus*)							1	**1**
Ovis/Capra sp.	22	5	159	19		467	380	**1,052**
Total Domestic Mammals	**36**	**7**	**283**	**36**		**658**	**516**	**1,536**
SEALS								
Harp seal (*Pag. Groenlandicus*)							2	**2**
Phocid spp. (unident. seals)			1			34	18	**53**
CETACEA (small whales/porpoise)			1					**1**
OTHER MAMMALS								
Arctic fox (*Alopex lagopus*)		1	2				1	**4**
Mouse (*Mus musculus*)						2		**2**
BIRDS	3	9	35	11		62	49	**169**
MOLLUSCA			3	1		14	2	**20**
TOTAL NISP(No. of Ident. Specimens)	**39**	**17**	**325**	**48**		**770**	**588**	**1,787**
MM (Marine mammal)						1	3	**4**
STM (Small terrestrial mammal)								
MTM (Med. terr. mammal)	9	49	322	43		981	517	**1,921**
LTM (Large terr. mammal)	2	25	64	14		120	102	**327**
UNIM (Unidentified mammal)	3	299	905	184	7	2,928	2,277	**6,603**
Total Number of Fragments (fish not included)	**53**	**390**	**1,616**	**289**	**7**	**4,800**	**3,487**	**10,642**
Fish (Preliminary count)	6	175	321	272	2	4,065	1,131	**5,972**
Total Number of Fragments (including fish)	59	565	1,937	561	9	8,865	4,618	**16,614**

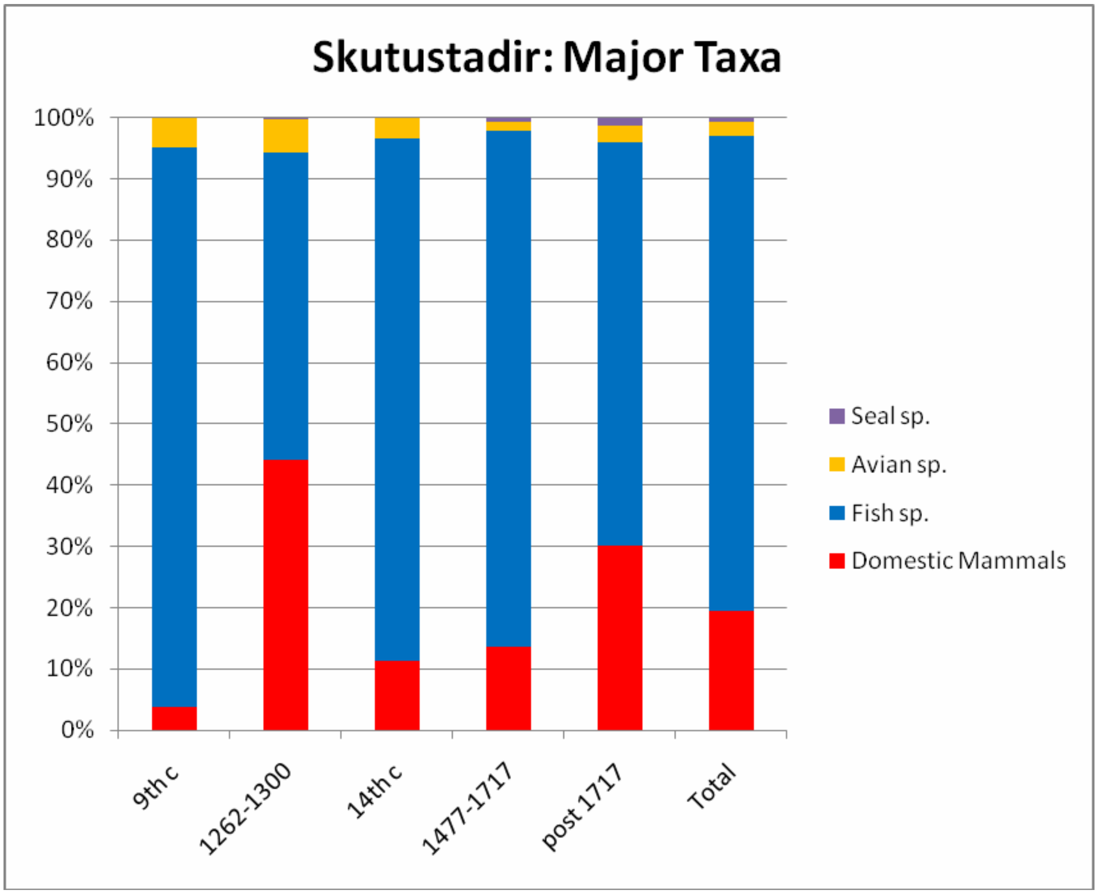


Figure 2 Totals per phase of major taxa

Of the identified fragments in the Skutustadir archaeofauna, fragments of fish bone preliminarily appear to be the most numerous, followed by domesticates, avian species, and last, seals. However, this preliminary result should be viewed with caution as the fish bone includes all fragments of fish tallied in a preliminary count.

Taphonomy

The physical condition of bone transforms multiple times during its journey from a living animal to a laboratory specimen through decay, fragmentation and other processes. This may inhibit our ability to derive information from an archaeofaunal assemblage and may impede its comparison of multiple assemblages (Lyman 1994). It is because of these factors of change that zoooarchaeological evidence is indirect evidence and an assessment of taphonomic (post death) factors is important in any analysis.

Most bone found in middens is significantly fragmented having undergone processes such as butchery by humans, natural decay, trampling and gnawing by carnivores. Burnt bone is especially prone to fragmentation. Specimens analyzed were classed in to size categories to determine the extent of fragmentation of the assemblage. A total sieving regime, as detailed above, often results in a collection with a high proportion of specimens in the smaller size classes. (Fish bone is not included in the following tables as it has not been fully analyzed).

Table 2. TNF in various size categories

Fragment size	<1cm	1-2cm	2-5cm	5-10cm	>11cm	Total
9th c	201(52%)	174(45%)	13(3%)	2(1%)	0(0%)	390
1262-1300	454(28%)	528(32%)	505(31%)	123(8%)	22(1%)	1632
14th c	107(37%)	64(22%)	81(28%)	26(9%)	15(5%)	293
1477-1717	930(20%)	2021(43%)	1394(30%)	218(5%)	95(2%)	4658
post 1717	1025(30%)	1298(37%)	883(25%)	185(5%)	80(2%)	3471

When found in Icelandic domestic contexts, burnt bone is believed to be the result of dining and food preparation activities resulting in bone being casually tossed into a domestic hearth and this activity may have been more common in the Viking age when hearths were characteristically large, open and central (Bigelow 1985). Debris from hearth cleaning is then transferred to the midden as with other household refuse. The observed conditions of burnt bone are categorized here into three types: un-burnt bone, black burnt bone (bone in which the collagen becomes carbonized creating a black appearance), scorched bone (bone which has had brief contact with fire and heat, creating a black mottle on an otherwise un-burnt specimen), and white burnt bone (bone which has white, chalky, texture). Bone can become white and calcined quickly when exposed to fire, so black and scorched bone is likely the product of only brief and non- intense contact with fire. Calcined bone is often preserved (along with teeth) even when preservation conditions are at their worst. Poor condition for bone preservation often results in contexts containing only calcined bone and teeth. Below, burnt bone at Skutustadir is charted. The most common type is unburnt, followed by white, then black burnt. There are very few scorched bones in the assemblage.

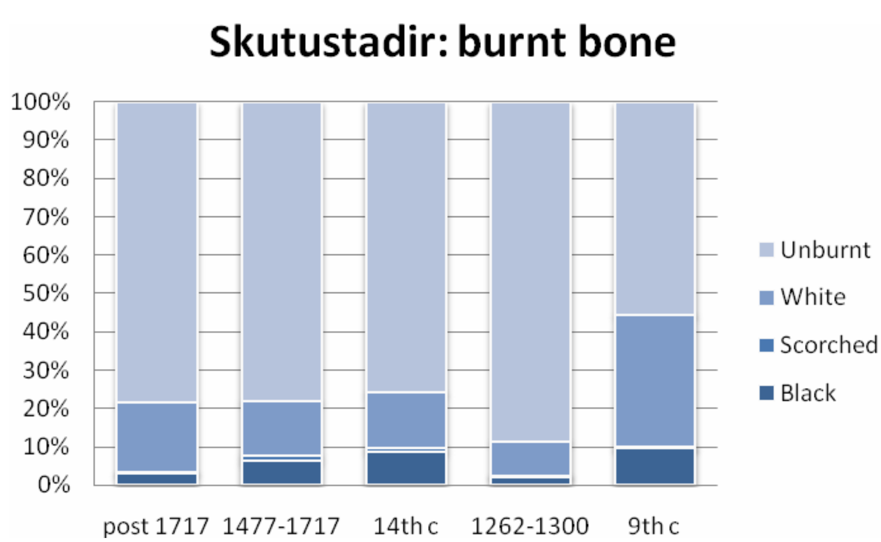


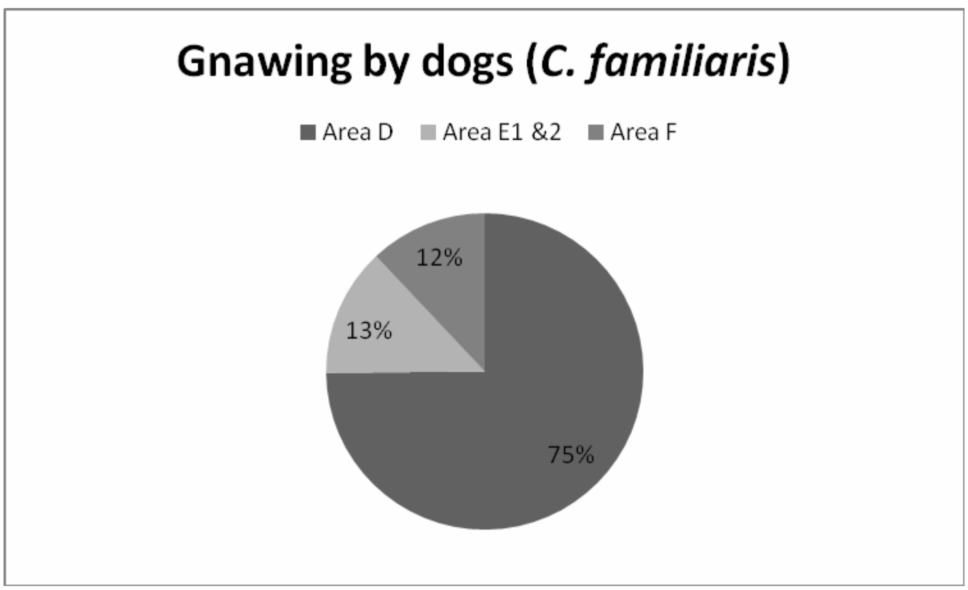
Figure 3. Burnt bone frequency throughout Skutustadir

Assemblages often undergo extensive gnawing by scavengers, carnivores, domestic pets such as dogs, and pests such as rodents. Only one bone specimen recovered showed evidence of gnawing by rodents, while several showed evidence of chewing by dogs. The frequency of bone gnawed by dogs seems to vary widely across sites and regions. Faunal assemblages from Norse sites in Greenland sometimes contain bone of which 30 % has been gnawed by dogs indicating perhaps a difference in the number or diet of dogs kept in Iceland and Greenland. The fact that dogs ingest and transport bone in addition to gnawing it complicates the analysis of the taphonomic effects of their activities.

The nearby Icelandic site of Steinbogi produced a medieval archaeofauna (ca 13th c) in which .06% of the total assemblage shows evidence of being gnawed by dogs (Brewington et al 2004). Skutustadir's fauna contains around 0-2% of bone (mammal and bird bone analyzed at this point) which shows dog toothmarks and appears to be within a familiar range for Icelandic sites. Overall, the assemblage did not seem to be overwhelmingly disturbed by such processes.

Table 3. Gnawing by dogs (*Canis familiaris*)

SKU Phase	# Gnawed bones	% Gnawed of Total Number of Fragments (TNF)
9th c	0	0
1262-1300	20	1.23%
1477-1717	128	2.66%
14th c	2	0.06%
post 1717	38	1.08%



Though the overall low frequency of gnawed bone is normal when compared to other Icelandic archaeofaunas, the vast majority of gnawed bone found at Skutustadir was found in Area D. This may hint at use of space by the site's past inhabitants and domestic pets.

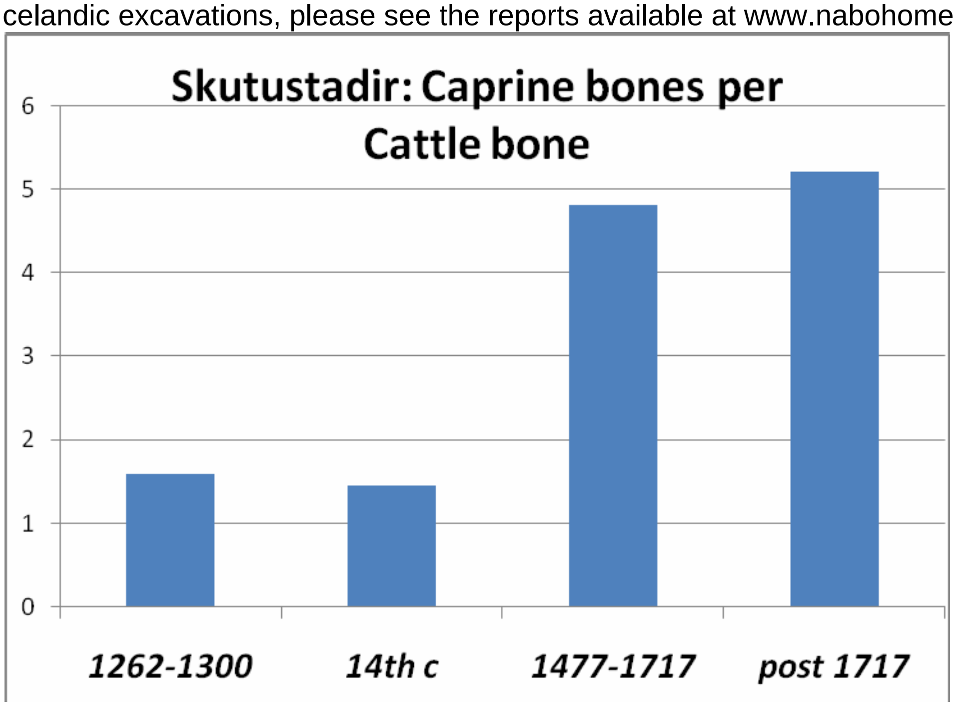
Intentional fragmentation of bone by humans is a significant source of taphonomic alteration. The full range of butchery signatures was observed in the assemblage from Skutustadir. This included evidence of chopped bone (bone divided with a heavy impact using a sharp instrument), split bone (long bone split to expose the marrow cavity), and knifed bone (bone marked by use of a cutting tool). Culturally specific butchery signatures were noted including biperforation of metapodials which involves the creation of two holes on either end of the metapodial, allowing marrow to be extracted without otherwise fragmenting the bone. This Practice seems to have been adopted in Norse settlements across the North Atlantic during the 1200's and continued through the early modern period (Bigelow 1985). Accordingly, biperforation of 30 metapodials is seen in the zooarchaeological record at Skutustadir from the 13th century until early modern times.

The past inhabitants of Skutustadir drew on animal bone as a useful raw material and may have worked bone and horn on site. Several diverse examples of worked bone were present in the assemblage including a drilled cattle astragalus, a sheep and cow metapodial shaped and oriented with the former inside the later, as well as an item made of smoothed cetacean bone (whale or porpoise bone). Evidence of horn working was recovered in the form of both horn core fragments (of caprines and cattle) and skull fragments showing evidence of intentional horn removal taking place after the animal's death.

Domestic Mammal Relative Abundance

Caprines (sheep and goats), followed by cattle, dominate the domesticate stock within faunal assemblage at Skutustadir. Where caprines were identified to the species level, most appeared to be sheep (*Ovis aries*). Only one specimen in the entire assemblage was identified as goat (*Capra hircus).* Additional specimens collected in the upcoming 2009 field season will be helpful in producing a larger sample of caprine bones and may shed further light on the presence or absence of goats at Skutustadir.

Previous studies have suggested that caprines and cattle traditionally comprised the majority of domestic livestock in Icelandic farms. The study of comparative ratios of domesticates and specifically the ratio of caprines to cattle has lent further complexity to the subject, allowing for a more detailed discussion of economic motives (McGovern et al 2007). Because we have relatively little data on pigs and goats, this discussion is best focused for now on cattle and caprines (sheep/goats). In Iceland's past, both caprines and cattle were consumed for meat while caprines were also kept for wool and dairy and cattle for extensive dairying activities (for a complete discussion on the use of zoooarchaeological evidence in determining herding strategies see Payne (1973) and Halstead (1998). For more information on the results from other Icelandic excavations, please see the reports available at www.nabohome.org).



Previous zoooarchaeological studies have suggested that in Northern Icelandic farms, after ca. 1200, there is a pronounced increase in numbers of caprines when compared to cattle in Icelandic stocks (McGovern 2007, Brewington et al 2004). Preliminary results suggest that there is an increase over time in the caprine to cattle ratio at Skutustadir, reaching 5 caprines per every head of cattle. This is comparatively low however when we look at some nearby examples. The 13th c. evidence from the site of Steinbogi (Brewington et al 2004) shows that the caprine to cattle ratio reaches approximately 22:1. Furthermore, the 18th century farm inventory (Jardabok) describes Myvatn area farms as having approximately 24 caprines per cattle at the time it was written. As a third example, the Viking age high status site of Hofstadir maintained approximately 1:4 cattle to caprine ratio from 930-1050 CE (McGovern et al forthcoming). The lower status site of Sveigakot transitioned from a 1:3 cattle to caprine ratio to a 1:10 ratio from the late 9th c to the 11th c. Skutustadir potentially holds valuable information regarding the intensity of the apparent trend of increasing caprines after the 1200's in Northern Iceland. The upcoming 2009 excavation season will be beneficial in adding to the preliminary information on this subject by allowing the analysis of larger data sets.

Halstead has argued that where cattle-based dairying is important, a large proportion of neonatal cattle bone is found in an archaeological assemblage (1998). By keeping cows in calf-bearing cycles while culling the calves, cows continuously produce milk and calves for human consumption. On the other hand, in a cattle economy based solely on meat production, cattle are slaughtered when they reach mature body size.

Neonatal bone is identified by a variety of traits including size, shape, porosity, state of fusion of long bone epiphyses, tooth eruption stage (where possible), and extensive use of comparative neonatal specimens. The archaeofauna collected in the 2008 field season suggest that past residents of Skutustadir were killing of many young calves and were likely practicing a dairy economy to some extent. In some contexts, nearly half of the cattle bones recovered are those of newborn calves (see chart below). The proportion of neonatal cattle being killed off appears to decrease in the late medieval to early modern period. It may be best to reserve final conclusions until more specimens are recovered in the following excavations of Skutustadir.

In contrast to the high number of neonatal cattle per adult cattle, only 18 neonatal specimens out of 1,204 total NISP of caprines were documented from the entire assemblage, across all contexts. This disparity may demonstrate separate herding strategies as well as separate economic uses for cattle and caprines.

Further description of the herding strategies employed by the Skutustadir residents will be reserved for the next zoooarchaeological laboratory report which will include size and age reconstructions based on bone metrics (following von den Driesch 1976) ideally making use of a larger sample than the one currently available.

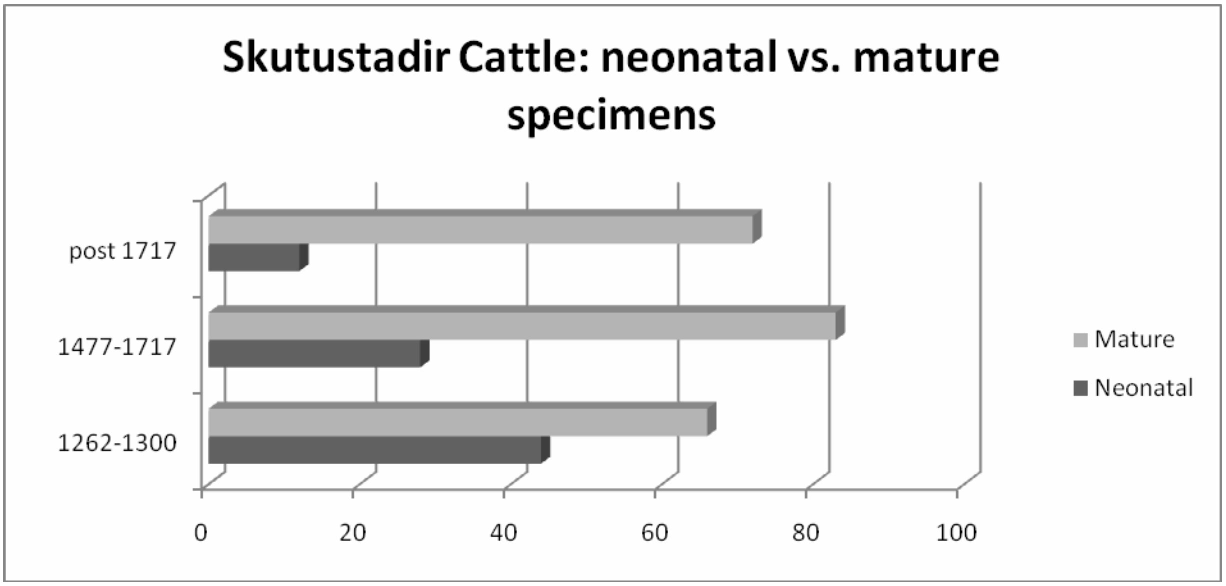


Figure 4. Cattle recovered in the 2008 Skutustadir excavation

Age of death of mammals can be estimated by tooth eruption and wear. Substantial literature on this subject exists (for review see Hillson 1994). The analysis carried out in this report follows widespread North Atlantic practice in using the alphabetical scoring system (A through O with advancing wear) of Grant (1982) for recording tooth eruption and wear (see Enghoff 2003 for discussion).

It is possible to age the majority of caprine mandibles from the Skutustadir archaeofauna to one year of life or older by the eruption or presence of the second molar (M2) (following Hillson 1986). Nine of the total specimens of caprine mandibles are from individuals clearly less than one year of age and have second molars still in crypt (un-erupted). Yet even these examples show advancing wear on the Dp4, indicating some months spent grazing. The vast majority of these young caprines in the Skutustadir archaeofauna (with dp4 present and M2 in crypt) have dp4 at wear stages past E (E, F, G and H). Could these examples represent a culling of the caprine herds not directly after birthing (ethnographically occurring in May) but before the first winter? Overall the evidence from caprine mandibular tooth eruption and tooth wear suggest that they were killed off at a range of ages, while the data on cattle tooth eruption and wear points to less variability and a very early age of death.

Table 4 Skutustadir caprine mandibular tooth eruption and wear

Context and Species			**Teeth and Wear Stages**				
AU	Species	Ref#	dp4	P4	M1	M2	M3
1262-1300	OVCA	22	M	/	/	/	/
1262-1300	OVI	14	G	/	F	CRYPT	/
1262-1300	OVI	15	/	B	H	G	CRYPT
1262-1300	OVI	21	/	/	/	G	/
1477-1717	OVCA	235	/	ABSCESS	N	M	J
1477-1717	OVCA	236	/	M	M	M	/
1477-1717	OVCA	239	PRESENT	/	PRES	ERUPTING	CRYPT
1477-1717	OVI	202	/	L	/	/	/
1477-1717	OVI	203	G	/	C	CRYPT	
1477-1717	OVI	204	H	/	G	F	CRYPT
1477-1717	OVI	222	/	G	G	G	D
1477-1717	OVI	223	H	/	G	C	CRYPT
1477-1717	OVI	224	G	/	F	CRYPT	
1477-1717	OVI	225	/	G	K	G	G
1477-1717	OVI	226	H	/	/	/	/
1477-1717	OVI	237	/	G	J	H	/
1477-1717	OVI	270	/	K	M	G	G
1477-1717	OVI	351	/	K	M	K	G
post 1717	CRA	300	/	G	G	G	F
post 1717	OVCA	301	E		A	/	/
post 1717	OVCA	302	F		B	CRYPT	
post 1717	OVCA	803A	/	H	H	G	G
post 1717	ovi	303	/	H	/	/	/
post 1717	ovi	307	/	J	L	/	/
post 1717	OVI	315	F	/	E	/	/
post 1717	OVI	316	F	/	E	/	/
post 1717	OVI	318	G	F	C		
post 1717	OVI	319	/	G	G	K	B
post 1717	OVI	320	/	G	H	G	G
post 1717	OVI	804	H	/	G	B	CRYPT
post 1717	OVI	805	/	G	G	G	D
post 1717	OVI	806	N/A	G	G	F	E
post 1717	OVI	807			/	/	B
post 1717	OVI	808	G	/	B	CRYPT	
post 1717	OVI	830		G	G	G	F
post 1717	OVI	840	G		D	CRYPT	
post 1717	OVI	841		/	M	L	J
post 1717	OVI	842	G	/	B	CRYPT	
post 1717	OVI	843	E		A		
post 1717	OVI	844	F		CRYPT		
unstratified	OVI	001	H		G	CRYPT	
UNSTRATIFIED	OVI	24	G				

Table 5 Skutustadir cattle mandibular tooth eruption and wear.

Context and species			**Teeth and wear stages**				
AU	Species	Ref#	dp4	P4	M1	M2	M3
1262-1300	BOS	10	B		CRYPT		
1262-1300	BOS	11	B		CRYPT		
1262-1300	BOS	12	B		CRYPT		
1477-1717	BOS	215	A		CRYPT		
1477-1717	BOS	238	A		CRYPT		
post 1717	BOS	306	B		CRYPT		
post 1717	BOS	803B	B		CRYPT		

Seven intact cattle mandibles were found in the assemblage and all seven mandibles had lightly worn (A-B) deciduous premolars (dp4), teeth which are present at birth. All seven mandibles had first molars which had not erupted. Accordingly, the cattle in the above chart can all be aged to <6 months (following Hillson 1986). The data from mandibular tooth eruption and wear supports the hypothesis that many cattle were killed off while very young possibly as part of an economy that focused on cattle dairy production. However, a larger sample of cattle mandibles is desired for a more reliable assessment of average age at death.

Figure 5. Extreme dental wear and pathology has adversely affected some caprines at Skutustadir

Three adult caprine mandibles showed evidence of advanced wear (stages L and M) and dental pathology of the p4 (an abscess evident on bone) as detailed in the image above. Tooth wear is an indirect indicator of age but is directly related to the level of gritty soil in grazing terrain or feed. A planned study will examine whether caprines have more advanced tooth wear (following Grant 1982) when compared to cattle tooth wear with the objective of exploring past characteristics of caprine and cattle grazing land and extending the Skutustadir research project to explore not just animal herding strategies but landscape use as well.

Other Domestic Mammals

Horse (*Equus caballus*) remains were represented by two specimens– one, a third phalanx (hoof), and the other, a small metacarpal. It is believed that horses were not eaten approximately after the Christianization of Iceland around 1000 CE as Icelanders increasingly adopted alternate customs alongside their new religion (Karlsson 2000, p 46).

Two specimens of pig (*Sus scrofa*) remains were found in the midden at Skutustadir: a canine tooth and an ulna. The ulna came from an unstratified context in area E, and the canine tooth, Area F, in an early modern context. The quantity of remains may not be sufficient to confirm that pigs were kept by past site residents but, recovery of more zooarchaeololgical material in the 2009 excavation season will add to our knowledge of the nature of pig keeping (or its absence) at Skutustadir.

Birds

Bird species found throughout the site include mallards (*Anas platyrhynchos),* red breasted merganser (*Mergus serrator*), scaup (*Aythya marilla*), swans (*Cygnus sp.)*, swan/goose sized specimens, slavonian grebe (*Auritus podiceps*), long-tailed ducks (*Clangula hyemalis*). Another present avian species was ptarmigan (*Lagopus mutus),* a local terrestrial bird. Marine avian species were not found in the assemblage except for one sea eagle claw (*Haliatus albicilla*) from an unstratified context. Bird egg shell was found but will require analysis at the micro-level in order to be identified to a species level. Bird egg shell previously found in other lake Myvatn archaeofauna has pointed to a long term tradition of sustainable harvest of bird eggs, beginning in the 9th centuries and still carried out today (McGovern et al 2007). The presence of a variety of local (non marine) birds in the midden suggests that the harvesting of local birds as food was not focused on a single local species.

Table 6 Avian Species

Latin name	**Common English name**	**9th c**	**1262-1300**	**14th c**	**1477-1717**	**Post 1717**	**Un-stratified**	**Total**
AVSP	Avian sp.	8	28	10	43	34		123
Gallus gallus	Chicken		2					2
Clangula hyemalis	Tufted/long tailed duck		2			1		3
A. Platyrhynchos	Mallard				1	1		2
Aythya marilla	Scaup	1	3					4
Anas sp.	Duck sp.				2	3	1	6
Bird (avsp)egg shell	Avian sp.			1	15	3		19
Cygnus sp.	Swan sp.				1			1
Lagopus mutus	Ptarmigan					4		4
Mergus serrator	Red-Breasted Merganser					2		2
Padiceps auritus	Slavonian grebe					1		1
Haliatus albicilla	Sea Eagle						1	1
Total		9	35	11	62	49	2	168

Evidence of chickens at Skutustadir consists of only two specimens in the entire assemblage, both from a medieval context. In Area E2 Context 059, a femur and a tibiotarsus were found (both are bones of the leg). These are the only data on chickens (*Gallus gallus*) available from the archaeofauna recovered from the Lake Myvatn Area (McGovern, personal communication).

Figure 6 Tibiotarsus of domestic chicken (*Gallus gallus*)

Marine Resources

A total of 53 seal (Phocid sp.) elements were found in the assemblage from Skutustadir. They were found throughout several contexts and time periods. All elements are represented throughout the assemblage including skull fragments, vertebral fragments, several different long bones, phalanges and teeth. Two specimens were identifiable to the species level as harp seals (*Pagophilus groenlandicus*) which are known to breed on ice off of the North coast of Iceland. Seal bones are notoriously difficult to identify to the species level due to high intraspecies variation but evidence for seals in the Icelandic diet has been suggested as an indicator of important trends such as the proximity of sea ice to N. Iceland (on which *P. groenladicus* breeds) and potentially indicates a strategic broadening of the diet when other resources were meager. Data collected on coastal resources may allow the discussion of the extent of exchange between the coast and the residents of Lake Myvatn.

The small numbers of various species of mollusca seen throughout the collection are possibly not part of the diets of the past Myvatn area residents but may have traveled inland with other coastal products (McGovern, personal communication). The low numbers of mollusks in this assemblage make it difficult to determine exactly what human activity may have brought them 60 kilometers inland. But they do contribute additional detail, if indirect, to the entire picture of coastal resources including seal and fish species that reached Lake Myvatn settlements.

Skutustadir's continuous stratigraphy including the Viking age, medieval and early modern periods along with the atypical inland zooarchaeological finds (numerous seals and fresh marine fish) make it an important site to the study of long term economics and human ecology in the region. The recovery of additional material in the 2009 field season will allow further detailed study of the uncommon species, such as pigs and goats, found within the assemblage and will enable the detailed study and quantification of trends in among common domesticates such as cattle and caprines.

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