Preliminary Report of Animal Bones from Hrísheimur, Mývatn District, Northern Iceland

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NORSEC LABORATORY REPORT NUMBER 6

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May 16, 2002
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A product of the North Atlantic Biocultural Organization (NABO) Research Cooperative.

Abstract:

In 2000 and 2001 the FSl / NABO project *Landscapes of Settlement in Northern Iceland* collected animal bones from the heavily eroded site of Hrísheimur south of lake Mývatn. The 2001 season produced a substantial archaeofauna from a 2 x 2 meter test excavation of a midden deposit that apparently fills a small sunken-feature structure. While further excavations are planned to collect more material and to better understand the deposit and site as a whole, it may be useful to provide an interim overview of the bone materials recovered from the largest context (003) of the midden deposit tested in 2001. The collection totals 4,634 fragments, of which 1,596 could be identified to a useful taxonomic level. The Hrísheimur collection is made up of domestic mammals (c 74%), birds (c 12%) and fish (c 15%). The domestic mammals include substantial numbers of cattle bones, a few horse bones (some showing butchery marks), pig bones, and bones of both sheep and goat. Nearly a quarter of the domestic mammals bones are from pigs (adult, juvenile and foetal), currently the highest percentage of pig remains known from any period in Iceland. Bird remains include both bone and egg shell. All identified birds are Ptarmigan (grouse). Fish include both fresh water species (arctic char and trout) and marine species (Atlantic cod, haddock and saithe) which were apparently imported as cured rather than whole fish. The Hrísheimur collection shows many similarities with bone collections from the nearby site of Sveigakot across the Kraká river, and definitely derives from a full scale farm rather than a sheep station or seasonal *sel.* Radiocarbon assay and preliminary analysis of stratigraphy and local tephra suggest the collection probably dates from the late 9th to late 10th centuries AD.

The Hrísheimur Excavations 2001: Hrísheimur (code HRH, at elevation 313 m, 40 24 53 E, 72 67 706 N, near the modern farm of Heidi) is a set of ruined structures, extensive stone walls, surface scatters of artifacts (including Viking Age beads, schist whetstones, spindle whorl, and small iron objects), smelting slag, and bones all exposed by extensive and ongoing soil erosion. FSl teams visited the site in 2000 and made small surface collections of artifacts and bones, and in 2001 a small crew returned to look for intact midden deposits. Using Oakfield tube-type soil corers, we located an area to the NE of the main house ruin that appeared to hold organic deposits up to 60 cm deep. We established a 2 x 2 meter unit (Unit H, SE corner grid reference 1000/1101) which was excavated stratigraphically in two phases, lowering one 1 x 2 meter trench to expose stratigraphy and then expanding the unit to its full size. Excellently preserved animal bone, wood charcoal, and ash were immediately encountered on the partially exposed midden surface (context 002) and substantial collections were rapidly made. Context 003 was a coherent layer running across the entire excavation unit, and produced 19 bags of bone in two day's work. As excavation continued, we encountered additional midden layers (004, 006) and bits of displaced structural turf (005, 007) which overlay what appeared to be several superposed layers of compact black floor deposit. We ended excavation

at this depth, and did not further penetrate the apparent sunken feature structure. The deposit was entirely dry sieved (4mm mesh) with whole soil samples taken for flotation.

Figure 1 *Unit H under excavation with major contexts labeled (Corner of 1001/1102)*

This interim working report provides a full analysis of the large context 003 archaeofauna. While further work at Hrísheimur and ongoing analysis of the bone collections generated by the *Landscapes of Settlement* project will certainly modify the conclusions of this interim report, we feel it may be useful to provide a timely preliminary view of animal bone collections from this newly discovered site. Updates will be provided as analysis continues.

Hrísheimar AMS C14 on collagen extracted from neonatal cattle bone

Lab Reference #	Context	comment	13C/12C ratio	radiocarbon age	1 Sigma	2 Sigma
AA49627(GU9729)	HRH1 01 003	Midden fill of pit house	-20.70%	1150+/- 35 BP	AD 860-980	AD 780-980
AA49628(GU9730)	HRH2 01 003	Midden fill of pit house	-21.00%	1135+/- 45 BP	AD 880-990	AD 770-1000
AA49629(GU9731	HRH3 01 003	Midden fill of pit house	-20.20%	1135+/- 45 BP	AD 880-990	AD 770-1000

Laboratory Methods: Analysis was carried out January-May 2002 at Hunter College Bioarchaeology Laboratory by Thomas McGovern (mammals and birds), while fish bones were studied at Brooklyn College's Zooarchaeology Laboratory by Sophia Perdikaris. Extensive use was made of the major comparative collections of N Atlantic fish and birds housed at the CUNY laboratories, with some assistance from the collections of the American Museum of Natural History (for which the authors are very grateful). All fragments were sorted by family (mammal, fish, mollusca, bird) and all fragments were identified as fully as possible with current methods (no sub-sampling or restricted-element-range approaches were employed). All measurements follow the metrical standard of Von Den Dreisch (1976) unless otherwise noted, measurements taken with digital calipers (Mityoyoto CD 6BS) the 0.10 mm. Quantification in this report follows NABO ZWG recommendations by making NISP (number of identified specimens) the basic quantitative measure, as this simple counting technique has proven robust in numerous sampling experiments and is easily replicable across investigators. Basic data was recorded through the NABO Zooarchaeology working group NABONE system (7th edition, see NABO website www.geo.ed.ac.uk/nabo for updates and sample data sets) which combines Access database with specialized Excel Spreadsheets. A full data archive with coding manual is in the CD R attached to this report, and will also be available via nabo@voicenet.com. As this is only a working paper based on ongoing analysis, we will hold extended discussions of taphonomy, element distribution, age assessment, and metrical analysis until a more complete report is possible.

Overview of Species Present

Table 1 provides an overview of the present Hrísheimur 003 archaeofauna including both identified (NISP) bone fragments and those that could only be identified by family and general size range. "Large terrestrial mammals" are cattle/horse sized fragments, "Medium terrestrial mammals" are sheep/goat/pig/large dog sized fragments, while "unidentified mammal fragments" are completely unidentifiable bits of bone scrap. While the collection is not as large as those currently excavated from Sveigakot and Hofstaðir, it is well above the informal NABO quantification threshold of 1,000 NISP and appears to present internally consistent patterning.

Table 1 Hrísheimur OO3

Domestic Mammals	1174
Birds	185
Fish	237
TOTAL NISP (Identified fragments) =	1,596
Medium Terrestrial Mammal	985
Large Terrestrial Mammal	263
Unidentified Mammal Fragments	1790
TOTAL TNF (all fragments) =	4,634

Domestic Mammals

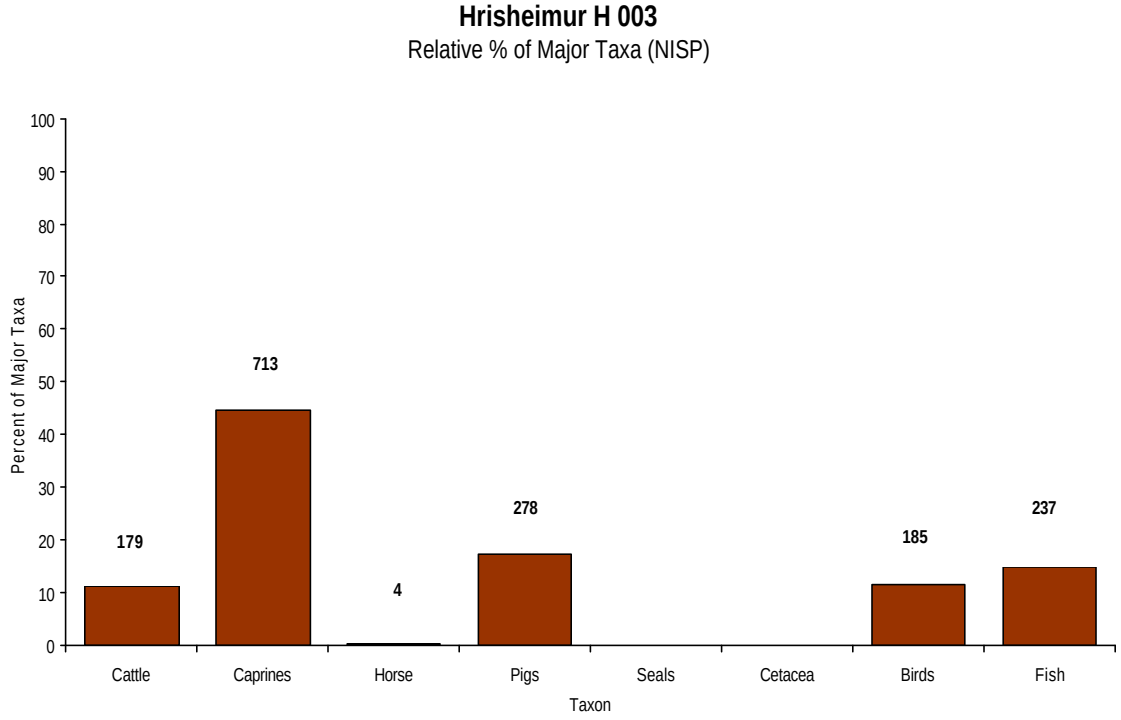
Table 2 presents a breakdown of the mammals identified in the HRH 003 collection:

Table 2 *Scientific Names*	**Hrísheimur H 003** *English Common Names*	*NISP Count*	*% Identified Mammals*	
Bos taurus dom.	Cattle	179	15.25	
Equus caballus	Horse	4	0.34	
Canis familiaris	Dog			present, canine tooth marks
Sus scrofa	Pig	278	23.68	
Capra hircus	Goat	18	1.53	
Ovis aries	Sheep	102	8.69	
Ovis or Capra sp.	Caprine	593	50.51	
All Caprines		713	60.73	
	Total	1174		

All the major Icelandic domestic mammals are represented, including cattle, horse, pig, goat, and sheep. The closely related sheep and goat are impossible to distinguish on many elements and thus analysts make use of the more inclusive Ovis/Capra or “Caprine” taxonomic category to refer to both. The ratio of caprine to cattle bones is one cattle to 3.98 caprine bones in the Hrísheimur

003 context, placing it near the center of the range of other known Mývatn area settlement period sites (Sveigakot range is 1:1.13 to 1: 3.2, Hofstaðir range is 1: 6.73 to 1: 2.55, see Tinsley 2000,2001). While sheep bones are far more common than goat (ratio is one goat bone to 5.67 sheep bones), the Hrísheimar collections are again similar to the Sveigakot and Hofstaðir archaeofauna, both of which contain significant numbers of goat remains. This is in marked contrast to most later Icelandic bone collections, whose Caprines are almost entirely sheep. The few horse elements merely serve to demonstrate the species presence at the site, but one of the bones (astragalus) shows a heavy chopping cut mark suggesting the animal was being dismembered for human consumption. While no dog bones were found, marks of dog gnawing is present on several elements of other species.

Figure 2 illustrates the relative abundance of major taxa in the sample.



Mammal Element Distribution: Cattle, pig, and caprine bones are present from the entire skeleton, and analysis thus far suggests that all three taxa were being butchered on site. All three taxa are represented by both high – and low-meat value elements, and do not seem to have been strongly subject to body part selection. As in other Icelandic midden deposits, the HRH 003 context seems to represent a mix of animal processing activities ranging from slaughter through human consumption and garbage disposal. When a final report is possible, a more complete discussion of mammalian element distribution will be presented.

Butchery Marks: Table 3 presents the distribution of butchery marks on the domestic mammal bones. As at Hofstaðir and Sveigakot, many heavy chopping marks left by axes or heavy cleavers were evident, probably mainly reflecting primary dismemberment of the animal carcasses. Splitting longitudinally was the dominant method of bone marrow extraction, and the later Icelandic practice of biperforation of the caprine metapodial was not seen in the collection.

Table 3	Butchery Marks		
Species	Chopping	Split	Sliced
Cattle	14	11	1
Horse	1		
Pig			
Caprine	5	39	

Age at Death: Standard measures of the age of death of domestic mammals (used to reconstruct herding strategy) include the fusion of long bones (epiphyseal fusion), eruption and wear of teeth, and the presence of newborn (late fetal or neonatal) animal bones. All of these approaches are strongly subject to sample size and a full analysis is thus best left until a more complete excavation has been carried out, but a few observations may be noted here. Table 4 presents the fetal (newborn) and neonatal (less than 3 months) bones recovered from the HRH 003 context, both as counts and as percentages of their respective species.

Table 4	Mammal Age	Hrísheimur H 003 (01)			
NISP		Fetal	Neonatal	Adult and older Juv.	total
	Cattle		71	108	179
	Pigs	8	20	250	278
	Caprine		7	586	593
%					
	Cattle	0.00	39.66	60.34	100
	Pigs	2.88	7.19	89.93	100
	Caprine	0.00	1.18	98.82	100

As in most Icelandic collections, cattle show the highest percentage of neonates, almost certainly reflecting a dairy economy (see Halstead 1999 for discussion).

Interestingly pigs show both newborn and neonatal elements, strongly indicating that pigs were in fact being raised on site and not imported as cuts of meat.

Tooth eruption and wear study will form a major area for zooarchaeological analysis in the *Landscapes of Settlement* project as a whole, as rates of tooth wear appear to provide insight into grit ingestion and thus state of vegetation cover. The 14 caprine (both sheep and goat) mandibles with tooth rows from HRH 003 are presented in table 5, scoring following the widespread method of Grant (1982).

Table 5 Hrísheimur H 003 Caprine Mandibular Tooth Eruption and Wear

(Halstead 2000)		Grant Wear Stages					
Species	Ref #	dp4	P4	M1	M2	M3	Age
prob. Sheep	HRH80		g	h	f	d	adult
prob. Sheep	HRH81		\	\	k	h	adult
prob. Sheep	HRH82			m	k	f	adult
indeterminate	HRH91			o	m	j	adult
indeterminate	HRH88			\	m	k	adult
indeterminate	HRH87			o	m	j	adult
prob Goat	HRH79		j	k	g	f	adult
prob. Sheep	HRH75	n		f	c	crypt	Jug
prob. Sheep	HRH76	m		f	f	crypt	Jug
prob. Sheep	HRH77	n		g	c	crypt	Jug
prob. Sheep	HRH78	n		g	d	crypt	Jug
prob. Sheep	HRH84	n		f	c	crypt	Jug
prob. Sheep	HRH86	n		g	e	crypt	Jug
indeterminate	HRH83	g		c	crypt		Jug

Following the set tables (see Hillson 1986:202-204) all but the last (HRH83) of the juvenile caprine mandibles should be between 8-12 months old, and HRH 83 should be approximately 6 months old. Two mandibles (different animals) show pathological changes following tooth loss in the premolar/first molar area.

Metrical Analysis: Measurements of animal bones have been used to reconstruct body size and to infer sex and (controversially) breed. The HRH 003 collections produced a number of measurable elements, but full scale analysis is best left to a later report. See CDR data archive attached for current data set. The cattle are typical small medieval animals, while the caprines are fairly robust and closely resemble the configuration of modern Icelandic sheep. Both sheep and goats provide metrics, with the goats appearing sturdy but somewhat shorter animals.

Birds

Table 6 presents the breakdown of bird remains from the HRH 003 context.

Table 6 **Bird species Hrísheimur H 003**

Scientific name	Common English Name	NISP	% NISP
Lagopus mutus	Ptarmigan (grouse)	145	79.67
Aves species indeterminate	Unidentified bird	37	20.33
total identified birds		145	
total all bird bone		182	

All identified fragments are the resident Ptarmigan (grouse) common to upland heaths throughout Iceland (and the unidentified bird fragments all could also be Ptarmigan by size). Most of the Ptarmigan skeleton was represented including wings, legs, sterna, and cranial fragments. Although egg shells probably deriving from ducks or other water birds were recovered from HRH 003 as from Sveigakot and Hofstaðir, thus far no bones of these species have been identified from the Hrísheimur site.

Fish

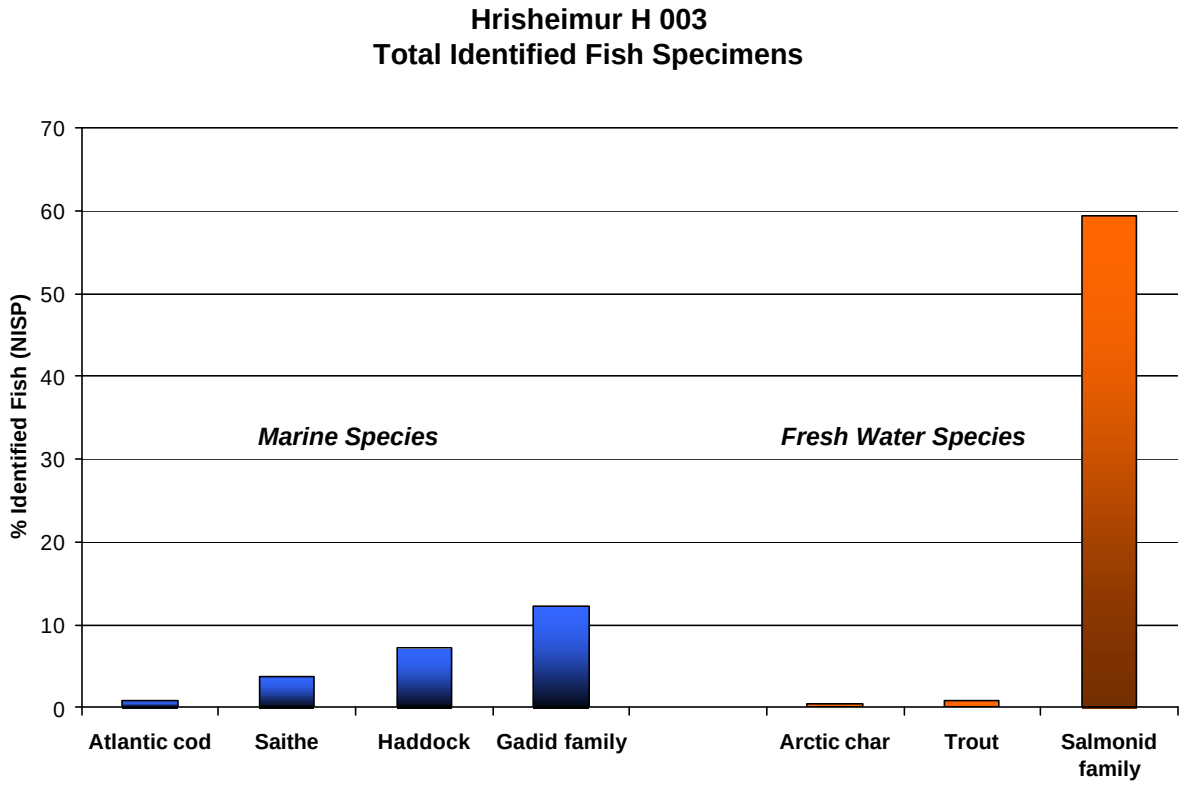
Table 7 presents the fish remains recovered from HRH 003, which include both marine species of the cod (*Gadidae*) family and freshwater fish of the salmonid family. Gadids include Atlantic cod, saith (or coalfish) and haddock, all common in later Icelandic collections. The archaeofauna also includes a few elements that can be identified as char (mainly dwelling in lakes) and trout (mainly in streams)

Table 7 **Hrísheimur H 003**

English Common Names	***Scientific Names***	NISP	% all ID Fish	% of Family
Atlantic cod	*Gadus morhua*	2	0.84	7.14
Saithe	*Pollachius virens*	9	3.80	32.14
Haddock	*Melanogramus aeglfinus*	17	7.17	60.71
Gadid family	*Gadidae sp.*	29	12.24	
Arctic char	*Salvelinus alpinus*	1	0.42	33.33
Trout	*Salmo trutta*	2	0.84	66.67
Salmonid family	*Salmonidae sp.*	141	59.49	
Fish species		36		
	total	**237**		

As with caprines, most bones of these related taxa cannot be reliably distinguished, so the majority of salmonid remains are left at the family level. No true andromous salmon (Atlantic salmon, *Salmo salar*) are present. As at Hofstaðir and Sveigakot, this inland farm definitely made use of both locally available fresh water fish and imported marine species.

Figure 4 illustrates the relative abundance of the fish species.



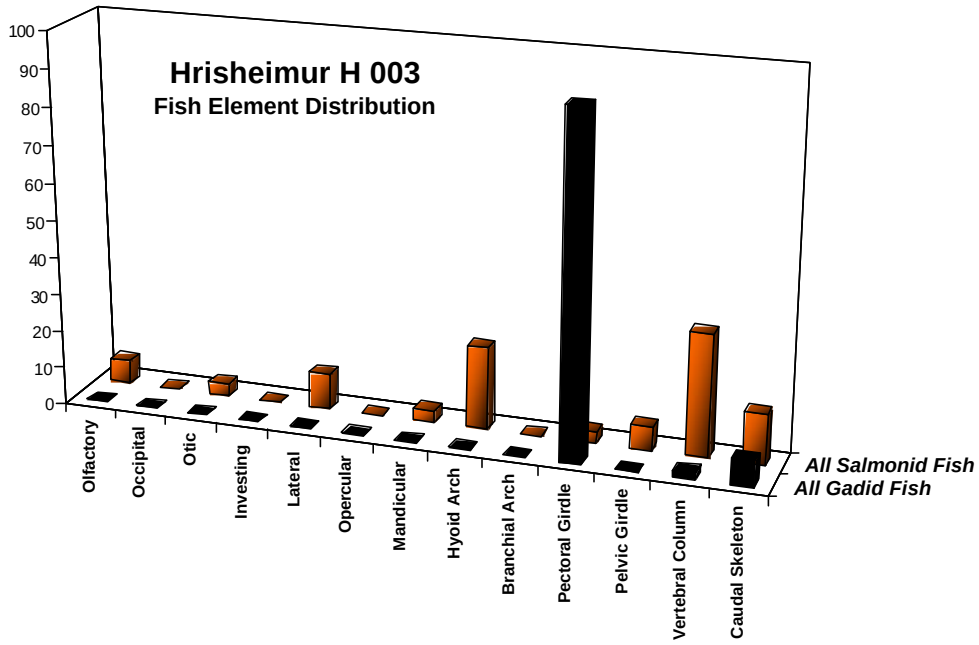
As at Sveigakot and Hofstaðir (Perdikaris 2002, forthcoming) the proportions of marine fish (multiple species with a predominance of Haddock) are more similar to patterns visible in Iron Age collections in N Norway (Perdikaris 1999) than to later medieval patterns in Norway or Iceland, where cod absolutely dominate the later commercial collections (Perdikaris, Amundsen & McGovern 2002) in terms of species abundance.

Fish element distribution: Unlike the domestic mammals at HRH 003, the recovered fish bones do not all follow a common pattern of distribution across the skeleton. Table 8 presents a summary of the distribution of Salmonid and Gadid skeletal elements represented in the HRH 003 collection (as % of whole skeleton, MAU). Note that while the Salmonids are represented by most parts of the fish skeleton, the Gadids are mainly represented by the elements of the pectoral girdle and the lower (caudal) vertebrae. Missing are all the rest of the head parts (including the very durable mouth parts) and the upper part of the vertebral column. This pattern is replicated at Hofstaðir and Sveigakot, and strongly indicates that preserved portions of these marine fish were being imported to these sites 60-70 km inland. The implications of this widespread pattern for some sort of early exchange in cured fish require further multi-disciplinary investigation.

Table 8

Hrísheimur H 003		MAU %
Element	All Salmonid Fish	All Gadid Fish
Olfactory	6.33	0.00
Occipital	0.00	0.00
Otic	3.16	0.00
Investing	0.00	0.00
Lateral	9.49	0.00
Opercular	0.00	0.00
Mandicular	3.16	0.00
Hyoid Arch	22.15	0.00
Branchial Arch	0.00	0.00
Pectoral Girdle	3.16	91.30
Pelvic Girdle	6.33	0.00
Vertebral Column	32.64	1.69
Caudal Skeleton	13.56	7.00

Figure 5 illustrates the contrasting pattern of Gadid and Salmonid bone distribution at HRH 003.



Directions for Further Research

While the presently reported sample for HRH 003 is fairly small and we still await radiocarbon dates to place the collection temporally in the growing Mývatn sequence, it is clear that the site represents a major resource for the reconstruction of settlement period economy. Larger samples from Hrísheimar will help to address some of the questions raised in this brief working paper and will allow more statistically secure conclusions to be drawn. Equally important will be systematic comparisons with archaeofauna already excavated from the Mývatn region to better understand regional scale interactions of early Icelandic settlers with natural environment and a rapidly changing cultural landscape.

Acknowledgements: The authors would like to gratefully acknowledge the sustained support of the NABO research cooperative and the generosity of its members in promoting international, interdisciplinary research projects and for providing stimulating discussion and interaction over the past decade. Results reported here are the product of sustained support from the US National Science Foundation (Office of Polar Programs Arctic Social Science Program, Research Experience for Undergraduates Program, and Anthropology Program), the Icelandic Science Council, National Geographic Society, PSC-CUNY Grants Program, and the Archaeological Institute Iceland. We would particularly like to thank Colin Amundsen, who aided in fish identification and Clayton Tinsley, who helped in the excavation of the 2001 unit.

Literature

Amundsen, Colin 2002, An Archaeofauna from Miðbaer on Flatey in Breiðafjorð in NW Iceland, *Environmental Archaeology 6*, in press.

Amorosi, T.; T. McGovern and S. Perdikaris. 1994. Bioarchaeology and Cod Fisheries, A New Source of Evidence*. Cod & Climate Change*. J. Jakobssen & S. Schopka (eds). ICES, Copenhagen 198:31-48.

Barrett, J.H., R. Nicholson & R. Ceron-Carrasco 1999. Archaeo-ichthyological evidence for long term socioeconomic trends in northern Scotland 3500 BC to AD 1500, *Jour. Arch. Sci*. 26:353-388

Bigelow G.F. 1985 Sandwick Unst and the Late Norse Shetlandic Economy, in B. Smith (ed) *Shetland Archaeology, New Work in Shetland in the 1970's*, Shetland Times Press, Lerwick, pp 95-127.

Ceron-Carrasco, Ruby 1994. The investigation of fish remains from an Orkney farm mound, in W. Van Neer (ed) *Fish Exploitation of the Past*: Proceedings of the 7th meeting of the ICAZ fish remains working group, Tervuren Belgium pp 207-210.

Crabtree, P. J. 1990. Zooarchaeology and Complex Societies: some uses of faunal analysis for the study of trade, social status and ethnicity*. In Archaeological Method and Theory, Vol 2*, University of Arizona Press, Tuscon

Crabtree, P. J. 1996. Production and consumption in an early complex society: animal use in Middle Saxon East Anglia. *World Archaeology* 28(1)

Daly, P. 1969. Approaches to Faunal Analysis in Archaeology. *American Antiquity* 34(2)

Davis, S.J.M. 1987. *The Archaeology of Animals*. Batsford Ltd, London

Driesch, A von den. 1976. *A Guide to the Measurement of Animal Bones from Archaeological Sites.* Peabody Museum Bulletin 1, Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge, Massachusetts

Enghoff, I. B. 1994 Fishing in Denmark during the Ertebolle Period, *Intl. Jour. Osteoarchaeology* 4: 65-96.

Gilbert, A & Singer, B. 1982. Reassessing zooarchaeological quantification. *World Archaeology* 14 (1)

Grayson, D. K. 1984. *Quantitative Zooarchaeology*. Academic press, Orlando

Halstead, Paul, 1998. Mortality Models and Milking: problems of uniformitarianism, optimality, and equifinality reconsidered, *Anthropozoologica* 27: 3-20.

Hillson, Simon , *Teeth,* 1986 Cambridge Manuals in Archaeology, Cambridge U Press.

Lyman , R.L. 1996, *Taphonomy*, Cambridge U.P.

Lyman, R.L 1992. Anatomical Considerations of Utility Curves in Zooarchaeology. *Journal of Archaeological Science* 19

Marshall, F. & Pilgram, A. 1991. Meat versus within-bone nutrients: another look at the meaning of body-part representation in archaeological sites. *Journal of Archaeological Science 18*

McGovern T.H., Amorosi T., Perdikaris S. & Woollett J.W. 1996. Zooarchaeology of Sandnes V51: Economic Change at a Chieftain's Farm in West Greenland, *Arctic Anthropology* 33(2)94-122*.*

McGovern T.H., Sophia Perdikaris, Clayton Tinsley, 2001 Economy of Landnam: the Evidence of Zooarchaeology, in Andrew Wawn & Thorunn Sigurðardottir (eds.) A*pproaches to Vinland* , Nordahl Inst. Studies 4, Reykjavik. Pp 154-166.

McGovern, T.H. 1999
Preliminary Report of Animal Bones from Hofstadir , *and* Area G excavations 1996- 97, *Archaeologica Islandica* 1.

Nicholson, R. 1998. Fishing in the Northern Isles: a case study on fish bone assemblages from two multi-period sites on Sanday, Orkney. *Environmental Archaeology 2 : 15-28.*

North Atlantic Biocultural Organization Zooarchaeology Working Group 2002. *NABONE Zooarchaeological Recording Package 7th edition*, CUNY, NY.

Payne, S. 1973. Kill-off patterns in sheep and goats: the mandibles from Asvan Kale. Journal of Anatolian Studies 23

Payne, S. 1972. On the interpretation of bone samples from archaeological sites. In E.S. Higgs (ed), Papers in Economic Prehistory. Cambridge University Press, Cambridge

Pilgrim, T. & Marshall, F. 1995. Bone Counts and Statisticians: a Reply to Ringrose. *Journal of Archaeological Science 22*

Perdikaris, S. , Colin Amundsen, T. H. McGovern 2002 *Report of Animal Bones from Tjarnargata 3C, Reykjavík, Iceland,* Report on file Archaeological Inst. Iceland, Reykjavik.

Perdikaris, S. 1999. From chiefly provisioning to commercial fishery: Long term economic change in Arctic Norway. Peter Rowley Conwy (ed). *World Archaeology* 30 (3):388-402

Perdikaris, S. 1996. Scaly Heads and Tales: Detecting Commercialization in Early Fisheries*. Archaeofauna*. Ichthyoarchaeology and the Archaeological record. Proceedings of the 8th meeting of the ICAZ Fish Remains Working Group, Madrid, Spain; A. Morales (ed.). 5 (1996): 21-33.

Perdikaris, S. 1998 The Transition to a Commercial Economy: Lofoten Fishing in the Middle Ages, A Preliminary Report. 7th ICAZ Conference Proceedings, September 1994, Konstanz, Germany. *Anthropozoologica* no 25-26/1997:505-510.

Perdikaris, S. 1993. Status and Economy: A Zooarchaeological Perspective from the Iron Age Site of Aker, Norway. Masters Thesis Hunter College

Tinsley, Clayton M. 2002a The Viking settlement of northern Iceland: a zooarchaeological perspective, Environmental *Archaeology 6,* Oxbow, (in press).

Tinsley, Clayton M, 2002b The zooarchaeology of settlement: some quantitative questions, Proceedings of the 21st Nordic Archaeology Conference Akureyri Iceland (in press).

Vesteinsson, Orri, 2001, *Archaeological investigations at Sveigakot 1998-2000*, Reykjavik, FSl.

Wheeler, A. & A.K.G.Jones 1989. *Fishes*, Cambridge U. Press.