A+

A good final field report of Stru
of the Nunaingok Site.
Excellent analysis of relative meat yi
of subsistence species based on wt
of skeletal elements.
Needs more data re gross wt.
of species individuals + the skelet
bone weight of those individuals,
rather than using White's percentage of
meat yield per individual of a species.
Howard Savage

AN ANALYSIS OF FAUNAL MATERIAL FROM STRUCTURE 1 OF THE NUNAINGOK SITE (JcDe-1), HISTORIC INUIT LEVELS

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for Dr. H. G. Savage
September 26, 1990

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0.1 INTRODUCTION

The Nunaingok site (JcDe-1) provides an opportunity to determine the subsistence strategy of an historic Inuit settlement in the Ungava Peninsula . This paper offers an analysis of faunal specimens excavated from the uppermost phase of house 1 - one of five sod *qarmat* occupied at Nunaingok in the 19th and early 20th centuries (Badgley n.d.). The house 1 data (and comparative information from previous reports on other Nunaingok contexts) will be applied to four chief problems:

1) identifying historic Inuit hunting and butchering patterns,
2) reconstructing the historic Inuit diet,
3) identifying patterns of animal exploitation based on non-food products,
4) determining the seasons in which the site was used and
5) detecting temporal changes in the use of animal resources.

Towards these ends, it is also essential to discuss sources of sample bias and methods of quantifying excavated faunal material.

PART 1: NUNAINGOK IN ITS CONTEXT

1.1 EXCAVATION HISTORY AND SITE DESCRIPTION

Nunaingok is located on the south side of McLellan Strait, on the northernmost coast of the Ungava Peninsula. To the south is Young Inlet and to the north, across the strait, is Killinek Island (see figures 1 & 2). The site has a long history of investigation. It was first recorded by Robert Bell, a geologist/naturalist who established a station at Port Burwell in 1884 (Stewart 1979:10). Although the site he visited was abandoned, this must have been a temporary absence (perhaps seasonal, see p.35 below). The next European to record the site, an ornithologist named Bernhard Hantzch, claimed that he visited it with families who had been residents there "a few years before." (Hantzsch 1931:170; Stewart 1979:11) This was in September of 1906. He described "... some well preserved earth houses..." a row of ruins, tent rings, fire places and heaps of bones in great numbers (Hantzsch 1931:170). History records that the qurmat were abandoned in the mid-1930's and the region was abandoned ~~all~~ altogether in 1978 (Badgley n.d.:1-2).

Excavations were first conducted in 1977 by the Torngat Archaeological Project (TAP) directed by William Fitzhugh. The project was a large scale survey of Northern Labrador, but a small team mapped the site, profiled the erosion bank, collected surface finds and excavated 6 small test units (Fitzhugh 1980;Jordan 1985:1). The site was threatened by serious erosion which led to further salvage operations in 1978, directed by Henry Stewart for the University of Quebec at Montreal (UQAM) (Jordan 1985:1). This team mapped the site in greater detail, excavated portions of a midden along the erosion face and

FIGURE 1: GEOGRAPHIC LOCATION OF THE NUNAINGOK SITE

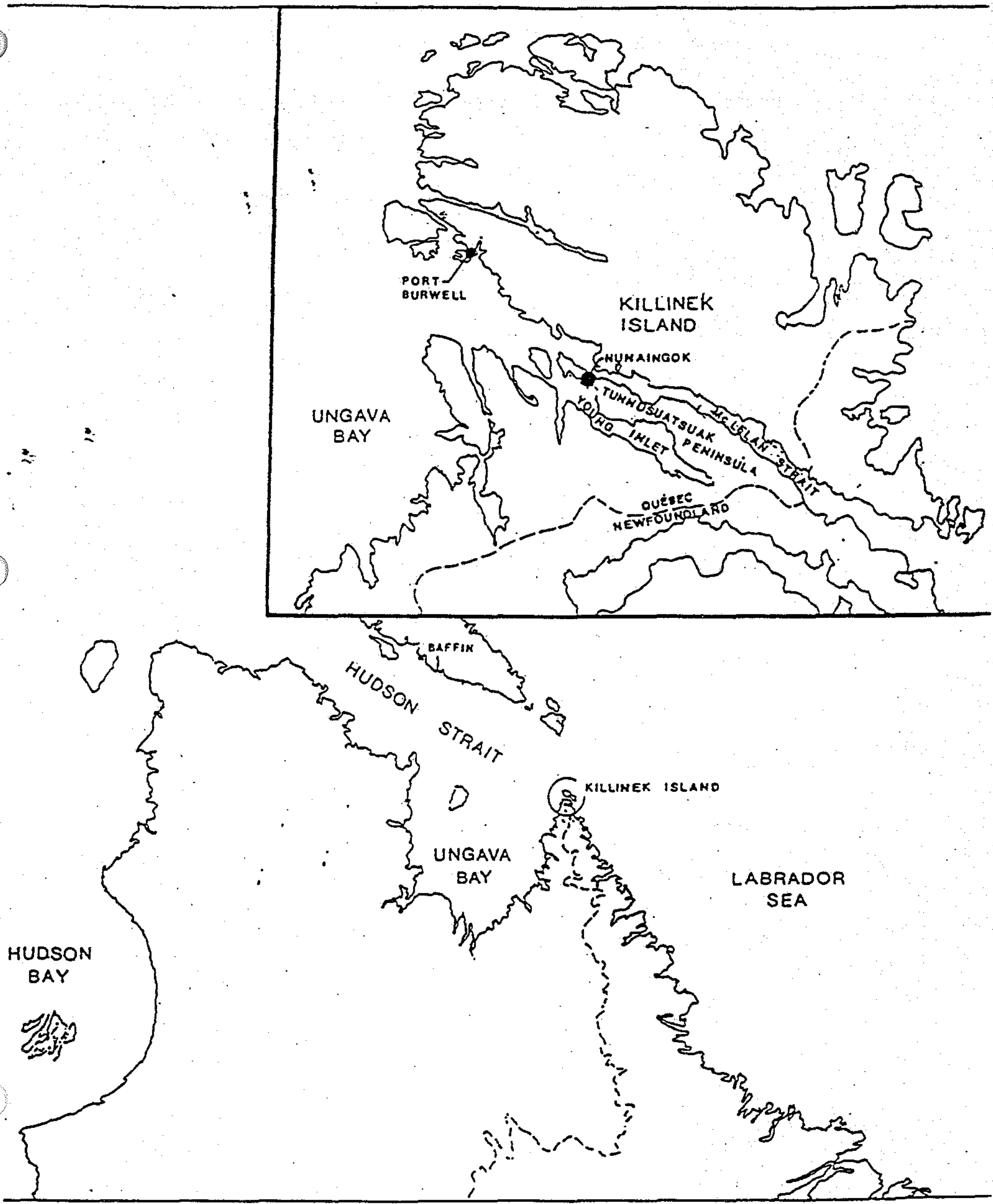
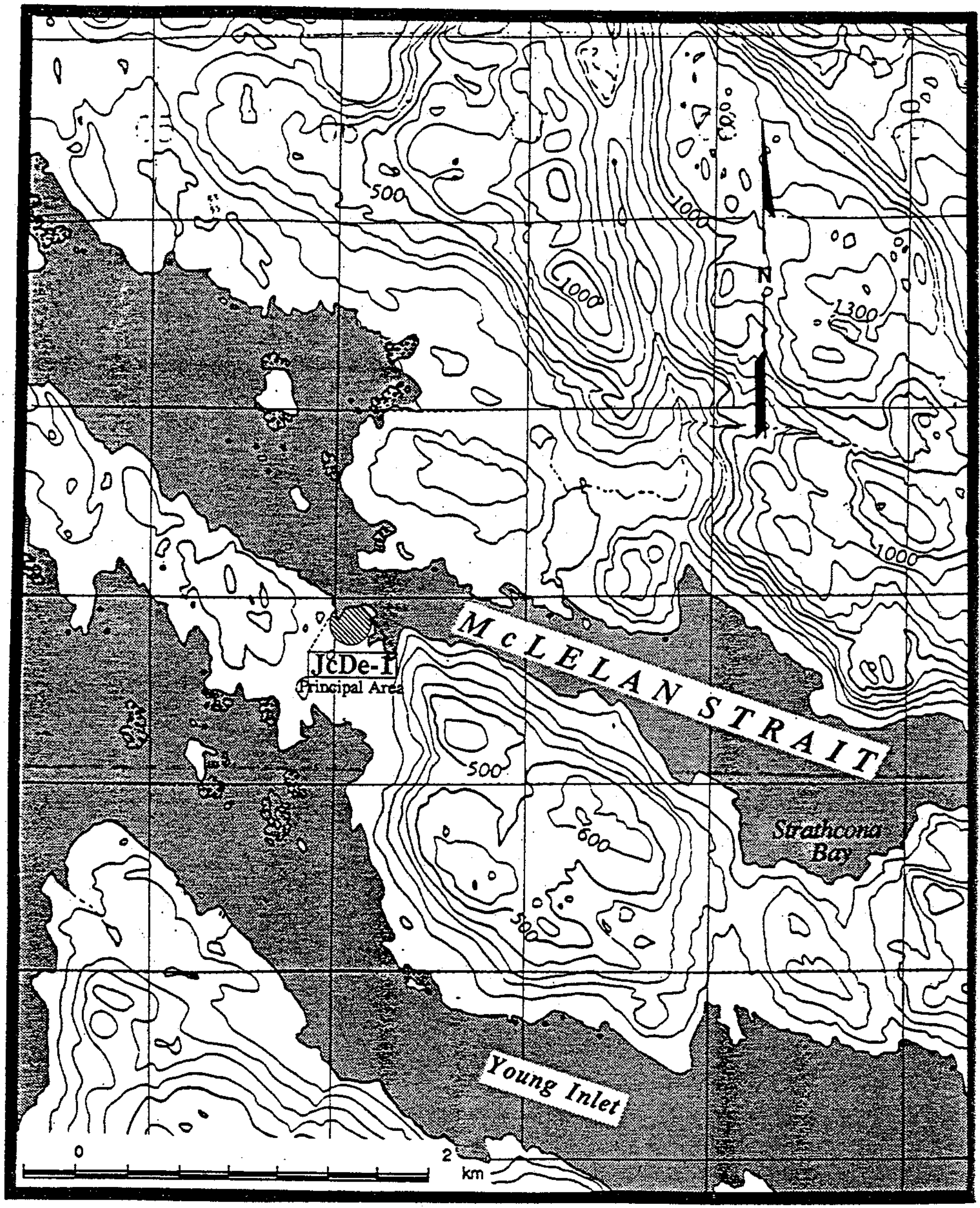


Figure2: Location of the JcDe-1 site, Nunaingok



stabilized the site with sand bags. A test trench was also excavated to the west of houses 1 and 2 in order to examine the stratigraphy of these occupations (Archambault 1978:78). In the same season TAP returned to the site and excavated 30 random test pits (Jordan 1985:1).

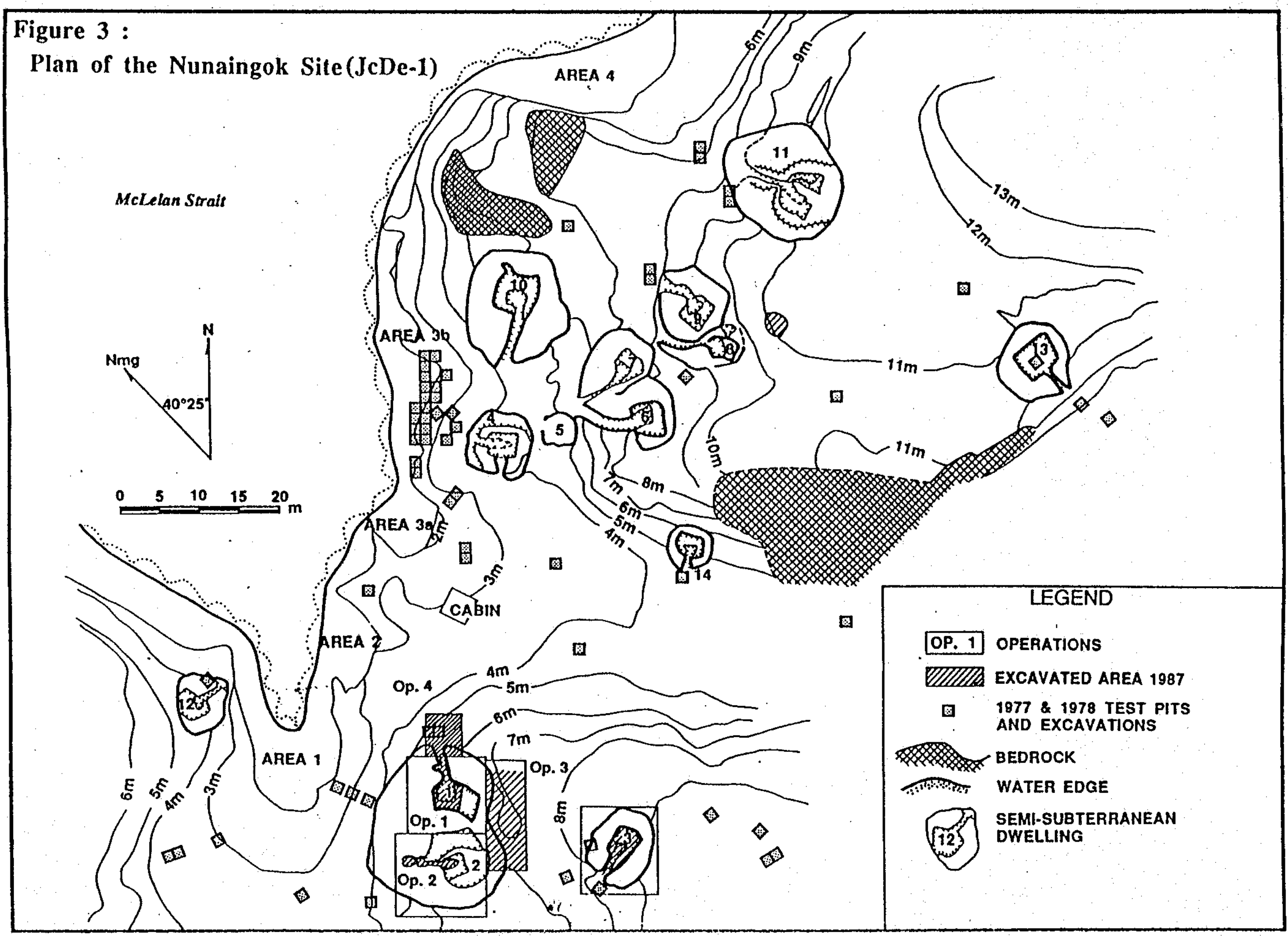
A Japanese crew excavated Structures 3 and 12 in 1987-1988. Test pits were also dug in middens adjacent to structures 4 and 10 (Badgley n.d.:3). No record of these operations is currently available

Excavations by UQAM continued in 1987 and 1988, directed by Ian Badgley (personal communication) (see figure 3). The project focused on the excavation of Structure 1 and its associated midden, Operation 4 (Badgley n.d.:2). These were divided into Sub-operations based on "identifiable architectural features and activity areas" (Badgley n.d.:2) Excavation was by trowel, but no sieving could be performed (Badgley, personal communication). The fibrous nature of the sod was not compatible with screening techniques.

Sixteen dwellings have been identified on the site, spread over approximately 10 000 square metres (see figure 3) (Badgley n.d.:1). Structures 1, 2, 4, 6 and 11 are the historic qarmat already mentioned (Badgley n.d.:1-2). Structure 1 artifacts include rifle cartridges, nails, glass, plastic and other obvious historic objects which date its final occupation to the 1920's (Badgley n.d.:7; personal communication). Structures 3, 5 and 12 to 16 are semi-subterranean dwellings, at least some of which are

Figure 3 :

Plan of the Nunaingok Site (JcDe-1)



prehistoric.

There is evidence for 4000 years of continuous occupation at the site. Pre-Dorset, Dorset, Thule and historic Labrador Inuit phases have all been identified (Badgley n.d.:1-2;Jordan 1985:1). However, faunal material is preserved only in the uppermost sod layers and below the c. 50 cm permafrost horizon. Bones survive only as stains in the intervening humic soils. Five zooarchaeological reports on Nunaingok contexts have all considered the top, historic period, levels (Chapin 1990; Etchells 1990; Leonard 1989; Watson 1988). A sixth report may include a mix of Thule and historic material (Spiess 1984:3). It discusses the combined sample from c. 30 random test pits excavated on the site in 1978 (Jordan 1985:1;Spiess 1984:3).

The present report analyses 747 faunal specimens from layers I and II of three Structure 1 sub-operations: the entrance passage, the structure interior and the walls (see table 1 for details regarding provenience codes and sub-operations). All of these contexts are related to the final occupation of the structure. The sample includes all material from the 1987 excavation of house 1 known to the author except for: 1) specimens from the sleeping platform which have been analyzed by Chapin (1990) and 2) 371 specimens from level I of the entrance passage which remain to be identified.

1.2 SITE ENVIRONMENT

TABLE I

HOUSE 1
PROVENIENCE AND CATALOG # CODES

Provenience (house/sub-op./feature)	Catalog # code	level	Description
1B	NL	historic Inuit	structure interior
1B	NM	I, historic Inuit	structure interior
1BI	NN	II, historic Inuit	western hearth
1BII	NO	surface, historic Inuit	eastern hearth
1BII	NP	historic Inuit	eastern hearth
1BII	NQ	II, historic Inuit	eastern hearth
1CI	NR	I, historic Inuit	fill in entrance passage alcove
1CII	NS	historic Inuit	entrance passage
1CII	NT	I, historic Inuit	entrance passage
1CIII	NU	I, historic Inuit	west wall of passage
1CIV	NV	I, historic Inuit	east wall of passage
1D	NW	I, historic Inuit	east wall
1E	NX	I, historic Inuit	south wall
1F	NY	I, historic Inuit	west wall
1F	NZ	historic Inuit	west wall

after Badgley (no date)

The environment of the site has probably changed very little since the beginning of the historic Inuit period. The climate has been relatively stable for more than 1000 years (Fitzhugh 1980:603). In the vicinity of Nunaingok floral resources are present but not very diverse. Alder, willow and birch shrubs reach their northernmost extent in this area and driftwood from the rivers of Ungava is not uncommon (Fitzhugh 1980:589). In good years berries ripen in the fall, but they are an unreliable food source (Hantsch 1931:172). The terrain of northern Ungava is dominated by barren hills, lichen and peat (Hantzsch 1931:172;Hare 1959:30;Jordan 1985:4). The site itself is located in a less formidable valley, which supports meadows in the summer and fall.(Hantzsch 1931:170).

Nunaingok abounds in faunal resources (see appendix b). Thirty foot tides keep the McLellan Strait ice free throughout the year, creating a winter haven for seals, walrus, birds and their human predators (Jorden 1985:31;Schledermann 1980:301). A dominant characteristic of northern Labrador's resources is a lack of predictability from year to year. Differences in weather and ice conditions can seriously effect the availability of floral and faunal resources (Fitzhugh 1980:590). The polynya at Nunaingok adds an important level of consistency to the regions subsistence base.

Ethnohistoric records emphasize the focused nature of fauna use by the historic Inuit of the Ungava region. A small number of Mammal species formed the foundation of the Inuit economy. These included:

arctic hare {*Lepus arcticus* Ross}
domestic dog {*Canis familiaris* Linnaeus}
arctic fox {*Vulpes lagopus*
polar bear {*Ursus maritimus* Phipps}
large whales such as the right whale {Balaenidae species}
white whale {*Delphinapterus leucas* (Pallas)}
walrus {*Odobenus rosmarus* (Linnaeus)}
seals: harbour {*Phoca vitulina* Linnaeus}
ringed {*Phoca hispida* Schreber}
harp {*Phoca groenlandica* Erxleben}
grey {*Halichoerus grypus* (Fabricius)}
bearded {*Erignathus barbatus* (Erxleben)}
hooded {*Cystophora crista* (Erxleben)}
caribou {*Rangifer tarandus* (Gmelin)}

(collated from Hantzsch 1932:7-12,34-36;Jordan 1978:176;Kaplan 1980;Spiess 1976:54;Spiess 1978:48-49;Spiess 1984:9;Taylor 1969;Whitaker 1980; for a complete list of northern Ungava fauna see appendix b)

Although less important than mammals, avifauna was also utilized (Hantzsch 1931:196;Schledermann 1980:298). Ethnographic evidence from early in the 20th century records an emphasis on:

ptarmigan {*Lagopus* species}
ducks, especially the eider {*Somateria* species}

gulls {Laridae species such as Larus argentatus Pontoppidan}
guillemots {Cepphus grylle (Linnaeus)}

and other large birds which migrated in flocks (Hantzsch 1931:196-198;Watson 1988:appendix b).

Fish were also used, at least from the 19th century on. European traders encouraged fishing by supplying the Labrador Eskimo with nets and a market for their catch (Kaplan 1980:653). Fish bones appear in 19th century sites such as North Aulatsivik (Kaplan 1980:656). The ethnographic record of the early 20th century includes specific reference to:

cod {Gadus morhua Linnaeus}
Salmonidae species
capelin {Mallotus villosus (Muller)}

(Hantzsch 1931:195). In early Neo-Eskimo times, small scale fishing may have been performed with lances (Kaplan 1980:653).

The fauna of northern Ungava provided both food and non-food resources. Fish, fox furs, hare furs, blubber (from whales, seals and walrus), baleen, seal skins and some walrus tusks and hides were traded to the Europeans (Hantzsch 1932:7-12;Kaplan 1980:654-655). The trade in whale products began perhaps as early as the 17th century, whereas the fox and fish trade began in earnest only in the 19th century (Kaplan 1980:645,650,653). Skins were used for clothing and tents, sinew for thread, bones and teeth for weapons and tools, and blubber for lighting and heating by oil lamps (Hantzsch 1932:7).

1.3 CULTURAL CONTEXT

Past and present zooarchaeological analyses of the Nunaingok site have considered two cultural phases. This report- and earlier papers by Chapin (1990), Etchells (1990), Leonard (1989) and Watson (1988) - discuss faunal material deposited by historic Inuit. Spiess' paper (1984) considers an amalgamated sample which may include Thule deposits in addition to historic material. Traditionally the difference between these cultures has been couched in terms of the presence or absence of large sea mammal - especially whale and walrus - hunting (eg.Fitzhugh 1980:601;Kaplan 1980:648;Wright 1979:107). Evidence for Thule whale hunting is prevalent in the faunal remains of sites at Staffe Island, Seven Islands Bay, Nachvak and Hebron (Fitzhugh 1980:601). At the turn of the 19th century Hantzsch (1932:7) reported that "the ribs of the animals (<u>Eubalaena glacialis</u>) are still to be seen as rafters of old Eskimo houses" at Nunaingok.

Whale hunting, inspired at least in part by a European demand for blubber and baleen, continued until the 1800's (Jordan 1978:176). Susan Kaplan (1980:652) has shown that mention of large whale kills became less and less common in Moravian mission records during the early 19th century. Perhaps the European demand for whale products had resulted in over hunting. She associates this transition with changes in Neo-Eskimo house form and social organization (Thule to historic Inuit). Between the late 18th and early 19th centuries houses became smaller, with fewer built at each site, and inter group trading was reduced (Jordan 1978:175;Kaplan 1980:652,657). Seal hunting and fox or hare trapping (for a newly introduced fur trade) required much smaller co-operative groups than large whale and walrus hunting and processing (Hantzsch 1932:9;Kaplan 1980:657).

Nunaingok Structure 1 reveals this sequence of change. The latest phase was a small rectangular sod house only 5m long (Stewart 1979:23). This qarmat replaced a Thule structure 2.4m wider than its successor (Archambault 1978:78;Stewart 1979:23-24). Further, ethnographic evidence records the use of qarmat by single or extended nuclear families (Badgley n.d.:1-2).

It has not yet been established which houses at the site were contemporary (Badgley, personal communication). The five qarmat were probably occupied within the same hundred years, but little can be said about the semi-subterranean dwellings until more are excavated (Badgley n.d.:1). We have some assistance from Hantzsch's (1931:170) ambiguous statement, "Besides some well-preserved earth houses, one saw whole rows of fallen ruins, in which the driftwood spars and whale bones had sunk together." Although "some" is not very revealing, the rows of ruins made with whale bones may be. Perhaps the village did shrink considerably following a reduction in whale hunting. If economic and cultural change between Thule and Labrador Eskimo is real, the Fauna of Nunaingok may shed light on this process. The final pages of this report will compare the historic bone assemblage from Structure 1 to Spiess' amalgamated Thule and historic period sample. We should expect to see:

1) less walrus (over hunted),
2) less whale (over hunted),
3) more seal, (to take the place of whale and walrus)
4) more arctic hare (for fur trade),
5) more fish (for trade) and
6) more fox (for fur trade)

in the historic qarmat if there was a significant culture change at the site.

PART II

THE HOUSE 1 EVIDENCE

2.1 THE SAMPLE

The 747 bone fragments considered by this report will be analyzed as a single assemblage. They were collected from a single temporal phase (historic) of a single spacial unit (Structure 1). Of these 747 specimens, 245 (33%) were unidentifiable beyond class. Three specimens (0.4%) could not be identified beyond order and 143 (19%) could not be identified beyond family. The remaining 356 specimens (48%) were identified to genus, or more frequently, species.

2.2 QUANTIFYING THE FAUNAL REMAINS

The first, and often the only step used to quantify excavated faunal remains is to count the number of individual specimens (NISP) identified for each taxa, bone element, age group or other category. These numbers can then be compared to reveal the hunting patterns, butchering patterns, diet and other aspects of the culture which deposited the bones (Grayson 1984;Lyman 1979; Smith 1975).The technique has its defendants (eg. Grayson 1984;McGovern 1983). Presumably, the number of bone fragments should have some relationship to the number of animals which were utilized by the site's inhabitants. Also, the technique avoids the problem of cumulative error inherent in more complicated methods. As the number of analytical steps increase, the degree of error is likely to increase (Dunnell 1971:76;for a thorough review of this question see Grayson 1984).

There are, however, problems with this technique. First, bone specimens are interdependent (Grayson 1984:49). Each specimen does not represent an animal, it represents some variable portion of that animal, which may or may not be completely present in the sample under analysis. Counting techniques, such as percentages, require that each datum be independent if they are to accurately represent proportions (Grayson 1984:49). Second, the number of identified specimens is exactly that, the number of IDENTIFIED specimens. This is

split infinitive

affected not only by the number of animals that contributed to the sample , but by a host of biasing factors including the number of bones in a given species and a variety of taphonomic processes (Grayson 1984:20-24). I define taphonomic processes as pre-depositional, depositional, post-depositional and excavation factors which effect the preservation, recovery and "identifiability" of the specimens. For example, the extent of bone fragmentation due to butchering, carnivore gnawing and preservation differences between species would all influence the relationship between the animals used by a culture and the NISP counts which aim to represent this use.

The first problem is a mathematical source of error which cannot be avoided without employing an entirely different quantification technique. The second can be dealt with to some degree by a detailed taphonomic study of the specimens (c.f. Lyman 1987). The effects of butchering, carnivore gnawing and other sources of sample bias should be visible on the specimens (see section 2.3 below).

A third problem is central to the reconstruction of palaeo-diets. Different species may provide radically different amounts of food (White 1953:396-397). One polar bear can be expected to provide as much meat as 95 arctic hare (see table 11).

Theodore White (1953) introduced the Minimum Number of Individuals (MNI) and Estimated Meat Weight techniques to avoid some of these problems. They have their own difficulties (which will be discussed below), but are perhaps an improvement over

NISP as measures of taxa abundance (MNI) and dietary contribution (Estimated Meat Weight). The MNI of a taxa (caribou, for example) can be determined by counting the most abundant skeletal element identified as _Rangifer tarandus_. Bone portions and age classes should also be considered in this calculation (see White 1953:397; Flannery 1967). An estimate of the amount of meat yielded by caribou eaten at the site could then be calculated by multiplying its MNI by the average weight of an individual caribou (White 1953).

Although MNI and estimated meat yield are still standard techniques of faunal analysis, it has been recognized that they are affected by at least 4 variable factors. The first of these, taphonomy, must be considered regardless of the quantification technique (Lymann 1987:257). The second is aggregation. Donald Grayson (1984:27-49) has shown that MNI counts, and even the rank order of species importance produced by a comparison of MNI, is dependant on the way in which a site's fauna is divided for analysis. If a faunal sample does not constitute a total excavation of a tight archaeological strata this problem will be evident. The MNI technique relies heavily on the most abundant element, but if a site's bones are divided into groups (from different houses for example) the most abundant element can vary from group to group. Thus, the cumulative MNI from several separated groups will not be the same as the MNI calculated for the sample as a single unit (Grayson 1984:27-49). This problem applies to most, including this, faunal analyses. There is no solution aside from adopting a completely different technique for quantifying excavated bone.

Third, the selective hunting of animals of a certain age or sex can effect meat weight estimates (Smith 1975:105). The problem is especially important when considering species which reach adult weight very slowly or which demonstrate marked sexual dimorphism (Smith 1975:100-101). Where possible, patterns in the age and sex of excavated specimens must be identified. Meat weight estimates can then be adjusted to reflect these patterns (eg. Smith 1975;Spiess 1978:58).

Last, the selective use of only certain portions of different species (butchering units or BU's) would obviously skew White's meat weight method (Lyman 1979:539;White 1953). It assumes that all available meat from all species would be used. If only certain portions of an animal were eaten, MNI and meat yield estimates must be calculated for these portions, not for whole animals.

Given these considerations the reconstruction of a palaeo-diet requires at least seven steps:

1) identifying the specimens by taxa,
2) determining how taphonomic processes have biased the sample,
3) calculating the NISP of each taxa,
4) identifying the selective hunting of certain ages or sexes,
5) identifying selective butchering unit (BU) use,

6) calculating the MNI of each taxa and

7) calculating the estimated meat yield of each taxa.

Each of these steps involves its own assumptions and error. By step number seven the cumulative error is likely to be very high. Meat yield estimates are so far removed from the data that it would be remarkable if they resemble the subsistence strategy they allegedly represent. This is not to say that the steps are without value. The calculation of NISP is necessary for intra- and inter-site comparison as it is the most consistently applied quantification technique (eg. Spiess 1984;Grayson 1984). It also serves as the basis for identifying selective hunting and butchering, which are interesting goals in themselves. The problem focuses on the reconstruction of diets. A better method must be found.

A possible improvement would be to use the bone weight of each taxa's specimens as an estimate of its contribution to the palaeo-diet. The bone weights could be expressed as proportions for intra-site or inter-site comparison. Although this technique has been used before (eg. MacLean 1986:26;Stewart 1974), it has received insufficient attention by zooarchaeologists. If there is a roughly linear relationship between the food weight of an animal and its skeleton weight this method should be an improvement on the MNI based technique. It would involve only three steps:

1) specimen identifications,

2) a study of taphonomic factors and

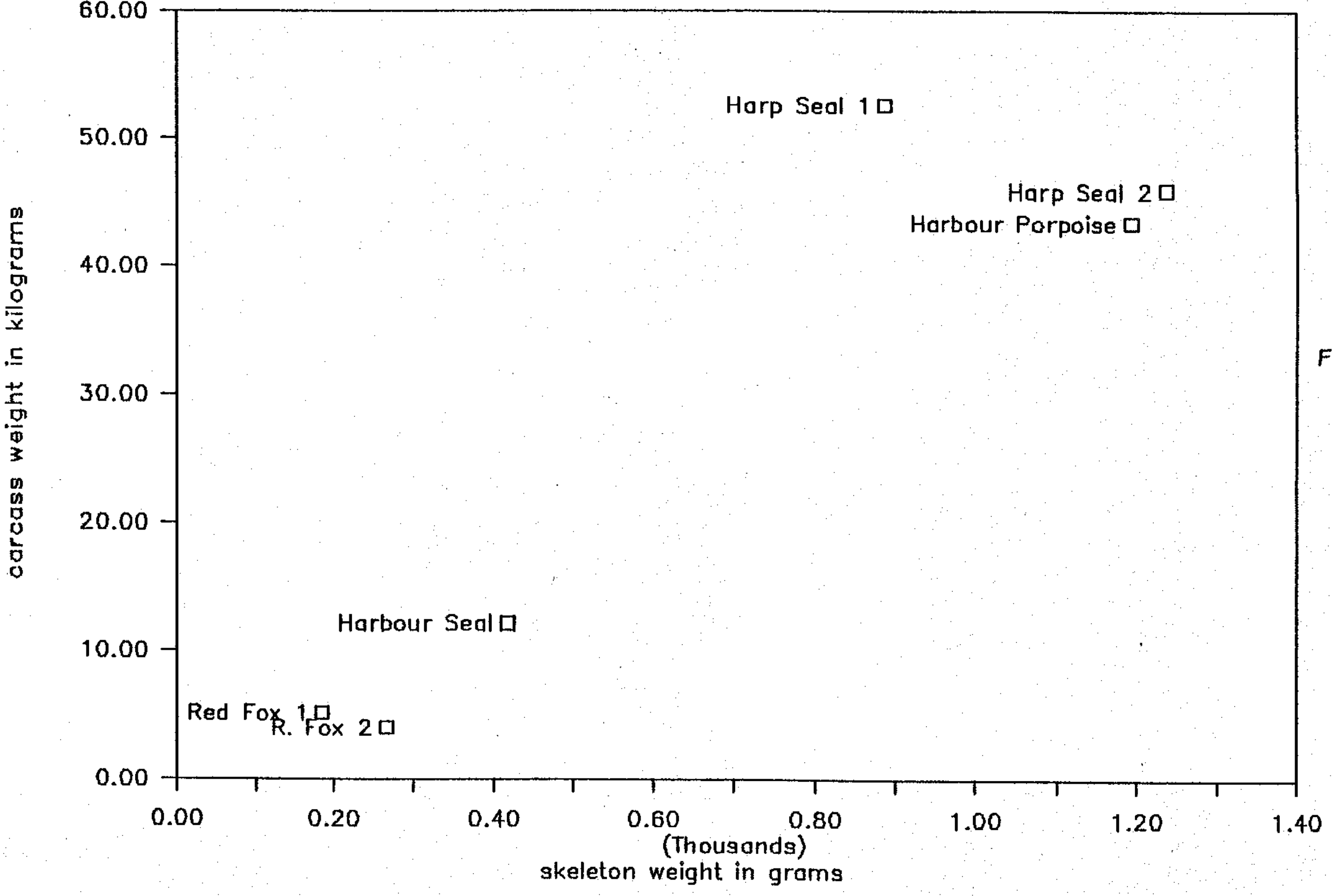
3) weighing the bones.

The problem of cumulative error would be greatly reduced.

As a preliminary test of the method's validity I have plotted the skeleton weight to carcass weight relationship of 6 animals on an xy graph (see figure 4). Taxa relevant to the current report, for which the carcass weight and nearly complete skeletons were available, provide the sample. They are all specimens from the collection of the H. G. Savage Faunal Osteo-archaeology collection at the University of Toronto anthropology department. To standardize the effects of missing elements all hyoids, bacula, phalanges, metapodials, carpals and tarsals except for the tali and calcanea were excluded from the skeleton weights. Other minor missing elements were not universally excluded in the interest of keeping the skeletons as complete as possible. These include:

Harp Seal 1-	rib epiphyses, distal epiphysis of right humerus, xiphisternum, and left jugal bone.
Harp Seal 2-	right forelimb and innominate. The left ones were weighed twice to account for this.
Harbour Seal-	both patellae
Red Fox 1-	both mandibles, vertebral epiphyses, posterior portion of the skull

The red fox 2 and harbour porpoise [<u>Phocoena phocoena</u> (Linnaeus)] skeletons were missing only the universally excluded elements.



BONE WEIGHT/MEAT YIELD RELATIONSHIP

a preliminary inquiry

Figure 4

TABLE 2 DATA ON FIGURE 4 SPECIMENS

	Skeleton Weight in grams	Carcass Weight in kilograms	age	sex
Harp Seal 1	885.7	52.6	Immature	Male
Harp Seal 2	1235.7	46	10 Months	Female
Harbour Seal	416.1	12.2	Immature	Female
Harbour Porpoise	1192.7	43.5	Sub-adult	Male
Red Fox 1	185.4	5.11	Immature	Male
R. Fox 2	266.1	3.97	Sub-adult	Male

Weight, sex and age data for the specimens is presented in table 2.

The tiny sample size allows only the most tentative interpretations. However, the relationship is a roughly linear one. Future investigations with a larger sample must clarify these results, but for now the experiment does not disprove the validity of a bone weight method. For this report the historic Inuit diet at Nunaingok will be reconstructed with both this method and a modified version of White's MNI based technique. If the results are similar this will at least suggest that the methods are equally valid. The simplicity and efficiency of the bone weight method will make it an appealing alternative if its validity is equivalent to, or greater than, MNI based processes.

2.3 TAPHONOMIC SOURCES OF SAMPLE BIAS

The goals of this report, to reconstruct various aspects of subsistence strategy, require the assumption that the excavated material has a 1 to 1 correlation with the fauna which was caught and used by the site's inhabitants. Before making such an assumption, it is necessary to consider how pre-depositional, depositional, post-depositional and recovery factors may have biased this correlation.

2.3.1 PRE-DEPOSITIONAL FACTORS

The first stage of bone modification is produced by humans while butchering and processing their prey. Lewis Binford

(1981:26) suggested that certain bone breaks and cut marks could be used as "signature criterion" to determine butchering patterns. In practice, however, it is difficult to distinguish natural and cultural modifications (Lyman 1987:276, 259-260). In this report linear stria, deep linear chop marks, spiral fractures and bone flakes have been interpreted as possible butchering evidence (see table 3). In the absence of definitive signature criterion, they must be treated as working hypotheses.

The sample (32 marked bones [4.3% of the assemblage]) reveals a variety of cut and chop marks, but no dominant patterns (see table 3). Marks are present in seal, walrus, whale, polar bear, caribou and bird bones. They occur on long bones metapodials, ribs, scapulae, lumbar vertebrae, cervical vertebrae, thoracic vertebrae, and on one mandible. No more than four marked specimens (12.5% of the modified bones) were identified for any one element. The weak patterns which do emerge are thus based on tiny samples. They must be treated as tentative (Lyman 1987:289-290).

Two left caribou humeri chopped off at the distal diaphysis are intriguing. The remaining two caribou humeri (NP-14, NS-500) have no obvious chop marks, but are also broken across the distal diaphysis. These suggest that caribou extremity bones were being processed, perhaps for marrow. It is thus surprising that the sample included few extremity bone fragments. Even when unidentified specimens are considered (long bone fragments often lack identifiable features) the sample included only 8 diaphysis

TABLE 3

CULTURAL MODIFICATION OF SPECIMENS

#	Element	Taxon	Comments
NR-25	femur	*Erignathus barbatus*	deep chopmark across distal diaphysis
NX-33	fibula	*Erignathus barbatus*	distal end chopped off diagnally
NU	fibula	Mammal	spiral fracture of diaphysis
NZ-48	humerus	*Phoca groenlandica*	spiral fracture of the shaft
NZ-40	humerus	*Rangifer tarandus*	diaphysis chopped off across bone axis
NZ-51	humerus	*Rangifer tarandus*	diaphysis chopped off across bone axis
NU	long bone	Mammal	spiral fracture of diaphysis
NX	long bone	Mammal	possible chop marks on one end
NN-501	mandible	*Erignathus barbatus*	longitudinal split lines
NX-20	metatars.	Phocidae sp.	ventral side of each end chopped off
NX-42	metatars.	Phocidae sp.	shallow transverse cut marks on mid-bon
NY-32	rib	Mammal	transverse cut marks on rib shaft
NW-16	rib	*Phoca hispida*	possible cut marks across line of rib
NQ-6	rib	*Ursus maritimus*	7 parallel cuts (c.1cm) at mid-shaft
NZ-57	rib	*Erignathus barbatus*	cut marks across rib. canine punctures
NX-24	scapula	Mammal	severed perpendicular to spine.
NX-36	scapula	*Phoca groenlandica*	possible chop mark on glenoid fossa
NX-11	scapula	*Phoca hispida*	coracoid process broken off cleanly
NM-3	scapula	Phocidae sp.	possible longitudinal chop ant. to spin
NM-26	tibia	*Phoca hispida*	spiral fracture
NZ-17	tibia	Phocidae sp.	possible cut marks
NR-47	tibiotar.	Anatidae sp.	bowed & compressed (post depositional?)
NL-544	ulna	Aves	transverse cuts at ends. surface polish
NP	vertebra	Mammal	transverse process cut from vertebra
NR	vertebra	Mammal	vertebral body severed longitudinally
NL-517	lumbar	Phocidae sp.	longitudinal shearing of vertebral body
NS-547	atlas	Phocidae sp.	cortex charred black
NW-8	cervical	*Odobenus rosmarus*	spinous process sheared off (cultural?)
NM-505	cervical	*Delphinapterus leucas*	chop mark on posterior articular surfac
NM-13	cervical	Mammal	chopped longitudinaly through the body
NQ-21	thoracic	*Phoca hispida*	partially charred
NQ-7	thoracic	*Rangifer tarandus*	1 transverse possible cut mark (c.8mm)

fragments from marrow yielding bones. If the diaphyses of caribou long bones were routinely fragmented, the pieces were not recovered. Consequently, this "pattern" should not exaggerate the NISP for caribou. Even if fragments were present, most would not be identifiable and the NISP would remain the same. The bone weight, however, would be underestimated. If caribou extremity bones were fragmented, some may not have survived at all, which would reduce the NISP, the bone weight and the MNI. In conclusion, caribou may be under represented in the sample.

The butchering of sea mammal specimens has probably done little to bias the sample. The modified bones are virtually all cleanly chopped. However, most of the 217 (29% of the total assemblage) unidentifiable mammal fragments were sea mammal. The clean chop marks of the modified specimens suggest that another taphonomic agent must be responsible for this fragmentation. There were only two burnt specimens, both seal vertebrae. None were present in Watson's (1988:9) sample from Structure 2 or Etchells' (1990:45-46) sample from the Operation 4 midden (associated with Structure 1). The sample should not be biased by the effects of cooking or disposal by fire. The remaining taxa yielded one or no modified specimens.

2.3.2 DEPOSITIONAL FACTORS

Humans were probably not the final agent of bone deposition at the Nunaingok site. At the turn of the 20th century Hantzsch (1932:10) recorded that Neo-Eskimo dogs fed themselves on food scraps and bones when at camp. Direct evidence of carnivore gnawing (tooth marks) is present on 21 (2.8%) of the 747 specimens analyzed (see table 4). Although 19 of these are seal, it would be incorrect to recognize a pattern. Seal specimens are by far the most numerous, and it follows that secondary evidence (be it tooth marks, cut marks or whatever) should be more frequent in this category. It is probably safe to assume that all species would be effected similarly by the gnawing. This activity provides one explanation for the 245 highly fragmented unidentified specimens. It may also reveal why the seal long bone specimens are frequently mid-diaphyses. Binford (1981) has demonstrated that carnivores first attack the epiphysial ends of bones.

My results have been considerably influenced by dog gnawing. The degree of bone fragmentation was probably greater among the taxa which have marrow cavities. Caribou, birds, fox, arctic hare and other land mammals will thus be underestimated by this report. The more fragmented bones would: 1) disintegrate more quickly under acid soil conditions, 2) be more difficult to recover and 3) be less frequently identified beyond class.

2.3.3 POST-DEPOSITIONAL FACTORS

When carnivore damage is excluded,the preservation of bone in the Neo-Eskimo levels of Nunaingok is excellent. Many bones are whole, including small phalanges and epiphyses. There is some surface disintegration, possibly due to acid soil conditions. Evidence of root etching is minimal, but many bones were stained by the peat soil. The poor preservation of interior cortex noted

TABLE 4

EVIDENCE OF CARNIVORE GNAWING

#	Taxon	Element	Comments
NL-512	Mammal	diaphysis	carnivore gnawing & spiral fracture
NL-513	Sea Mammal	diaphysis	carnivore gnawing & longitudinal fract.
NN-502	*Phoca* sp.	mandible	bone edges worn & 1 canine puncture
NN-505	*Phoca* sp.	vertebra	edges worn, tooth punctures on post edge
NN-507	*Phoca* sp.	rib, post	possible tooth marks on proximal edge
NR-22	*Phoca vitulina*	scapula	possible canine marks on posterior edge
NR-41	Phocidae sp.	vertebra	epiph lines distinct. gnaw marks on body
NR-508	*Phoca* sp.	humerus	tooth marks around protruding edges
NR-509	Phocidae sp.	humerus	tooth marks concentrate at broken ends
NR-516	*Phoca* sp.	ulna	1 tooth puncture at each broken end
NR-520	Phocidae sp.	tibia	surface pitted with tooth marks
NR-521	*Phoca* sp.	vertebra	a possible canine puncture
NR-522	*Phoca hispida*	vertebra	a possible canine puncture
NT-2	*Phoca* sp.	maxilla	2 tooth impressions
NT-9	*Phoca groenlandica*	humerus	tooth impressions on both epiphyses
NU-16	*Phoca hispida*	radius	possible tooth crushing on prox. end
NW-15	*Phoca groenlandica*	rib	2 probable canine punctures
NX-34	*Erignathus barbatus*	rib	canine punctures
NX-53	*Phoca groenlandica*	rib	possible gnaw marks on distal end
NY-1	*Erignathus barbatus*	humerus	carnivore gnawing on epiphyses
NZ-55	*Erignathus barbatus*	vertebra	thoracic # 1 or 2, canine tooth marks

Table 5

UNIDENTIFIED BONE

Class	Element	Frequency
mammal	rib fragments	71 (30.0%)
	long bone fragments	28 (11.4%)
	skull fragments	27 (11.0%)
	vertebrae fragments	19 (7.8%)
	?	72 (29.4%)
bird	long bone fragments	25 (10.2%)
	trunk fragments	2 (0.8%)
	?	1 (0.4%)
total		245 (101.0%)

by Watson (1988:5) was only present in bird bones. Aves specimens were occasionally reduced to a thin shell.

The disintegration of bird bone is contrary to Spiess' (1984:16) evidence from Nunaingok. In light of a low NISP for birds he noted that "The reason for this ... cannot be found in the state of preservation."(Spiess 1984:16). There may be preservation differences across the site for Spiess' sample did not come from the mound location of Houses 1 and 2 (Spiess 1984:3;Jordan 1985:1,24). The dietary contribution of bird may be underestimated in the House 1 sample. However, differential preservation should have little effect on the NISP, MNI or bone weight of the mammalian specimens.

2.3.4 RECOVERY FACTORS

The peaty sod excavated from Structure 1 was not screened (Badgley, personal communication). Rootlet peat, with its intertwined fibers, is not conducive to this technique. Careful troweling was employed, but nevertheless small fragile bones and fragments may have been undiscovered. This is especially likely in rootlet peat, where small stained bones would have blended with the roots and twigs of the soil matrix. Some roots and twigs were even mistakenly included in the bone sample.

Bird and fish bones would be especially susceptible to this problem. Thoms (in Grayson 1984:169-170) has shown that c. 78% of bones from animals weighing 5 Kg and under are lost through 1/4 inch screens. The figure must be much higher when no screen is used. However, large fish such as cod (<u>Gadus</u> <u>morhua</u>) were caught by the Labrador Eskimo (Hantzsch 1931:195) and only three Osteichthyes specimens have been identified in six faunal reports on Nunaingok (Chapin 1990; Etchells 1990; Leonard 1989; Spiess 1984; Watson 1988). In addition, the director of the 1987-88 excavations has assured me that fish bones were specially sought by his crew (Badgley, personal communication). Bird bones were present and are probably under represented to a large degree.

Intrusive bones are unlikely, impossible to identify and of little significance. Structure 1 has not been occupied since the 1920's (Badgley n.d.:7) and local fauna has not changed since.

The MNI counts will be ~~e~~affected by the choice of area excavated. This analysis is based on a partial excavation of House 1. Therefore, the problem of aggregation (see p.14 above) applies. Spiess (1984:8) suggests that MNI analysis only be used when a relatively closed system, such as a house and its associated midden, has produced the sample. It is impossible to know how this will effect my results. The NISP and bone weights will not be ~~e~~affected by this problem.

2.4 DISTRIBUTION OF TAXA BY NISP

The 747 specimen sample was almost exclusively Mammalia (710 specimens, 95%), with 37 Aves specimens (5%) and no Osteichthyes (see figure 5). 493 of the mammal specimens and 9 bird specimens could be identified beyond class. Seal is by far the most important contributor (83.8%), with the ringed seal

PROPORTION OF SPECIMENS BY CLASS

INCLUDING UNIDENTIFIED FRAGMENTS

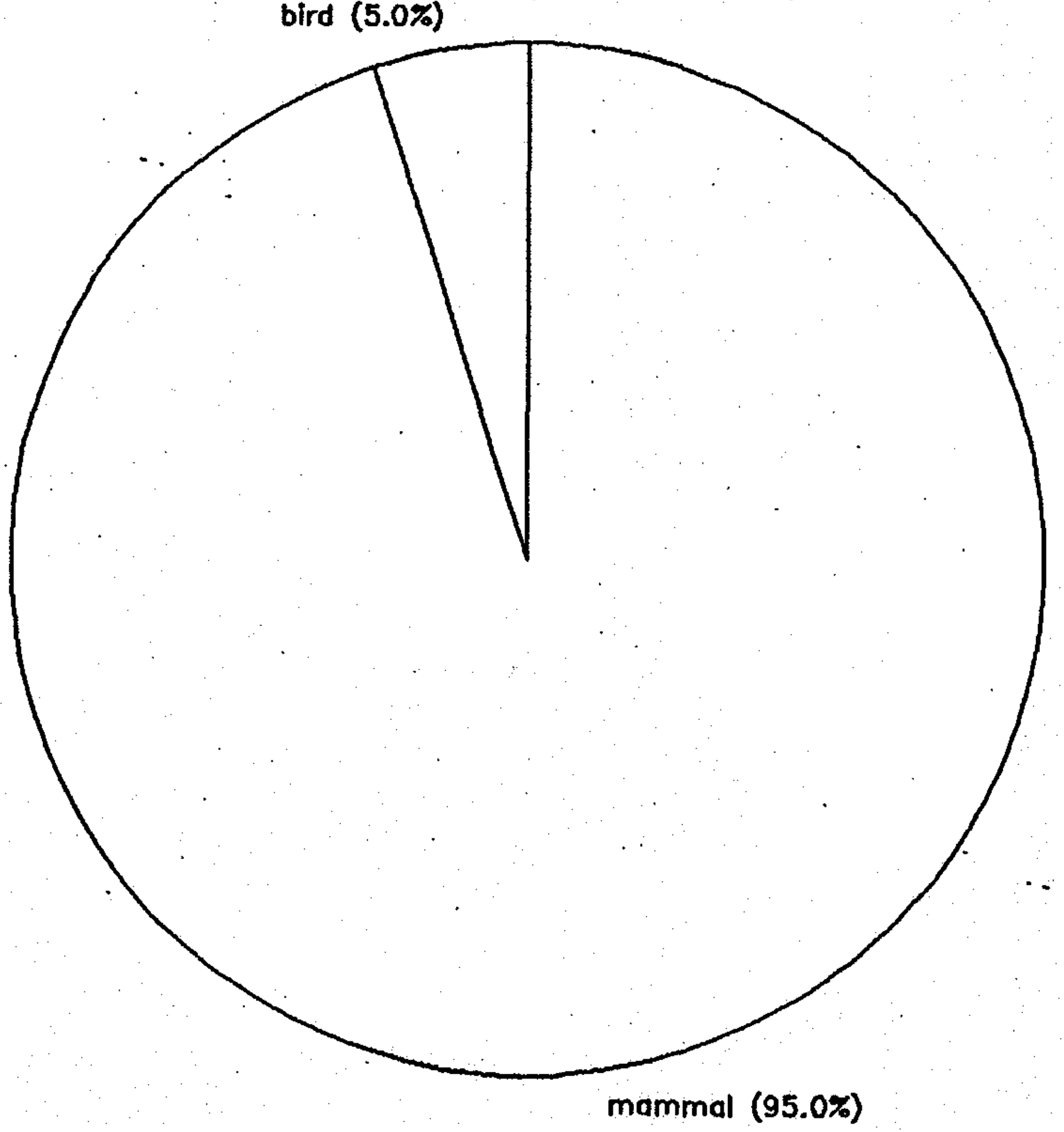


Figure 5

Table 6

ABUNDANCE OF SPECIES BY NISP

Species	NISP (%)
MAMMALS	
arctic hare	10 (1.2%)
whale	5 (1.0%)
dog/wolf	3 (0.6%)
fox	21 (4.2%)
{arctic/red fox	17}
{arctic fox	4}
polar bear	3 (0.6%)
walrus	5 (1.0%)
Phocidae sp.*	131 (26.1%)
Phoca sp.*	134 (26.7%)
harbour seal	12 (2.4%)
ringed seal	65 (13.0%)
harp seal	47 (9.4%)
grey seal	2 (0.4%)
bearded seal	26 (5.2%)
hooded seal	3 (0.6%)
caribou	26 (5.2%)
BIRDS	
duck	5 (1.0%)
gull	4 (0.8%)
total	502 (99.4%)

notes: Phocidae sp. includes specimens which could only be identified to this seal family.

Phoca sp. includes specimens which could only be identified to this seal genus.

dominant (13.0%), followed closely by harp seal (9.4%). Caribou (5.2%) and fox (4.2%) are next in importance, but the margin between them and seal is large. Arctic hare (1.2%), whale (1.0%), walrus (1.0%), duck (1.0), gull (0.8%), dog or wolf (0.6%) and polar bear (0.6%) follow in this order (see table 6). This data provides the foundation for further investigation.

2.5 IDENTIFYING SELECTIVE HUNTING PATTERNS

Based on the distribution of skeletal age groups

The distribution of each species by skeletal age categories is displayed in table 7, figure 6 and figure 7. Age catagories were identified according to Cooper's (1980) scheme. Some error may have been introduced by variation in epiphysial fusion patterns among Phocidae (Savage, personal communication). Among the seals there is a virtual absence of juvenile specimens and a focus on immature specimens. Only the harp seals appear to have a random distribution. Adult and sub-adult age classes are represented among the seals, but only by a few specimens. The high frequency of Immature + specimens is to be expected, as this category represents three age classes.

This data provides guidelines for the calculation of food weight estimates for each seal species (to be used in conjunction with White's MNI based technique for reconstructing a palaeo-diet). An estimate of a harp seal's food yield should average the weight of juvenile, immature, sub-adult and adult specimens

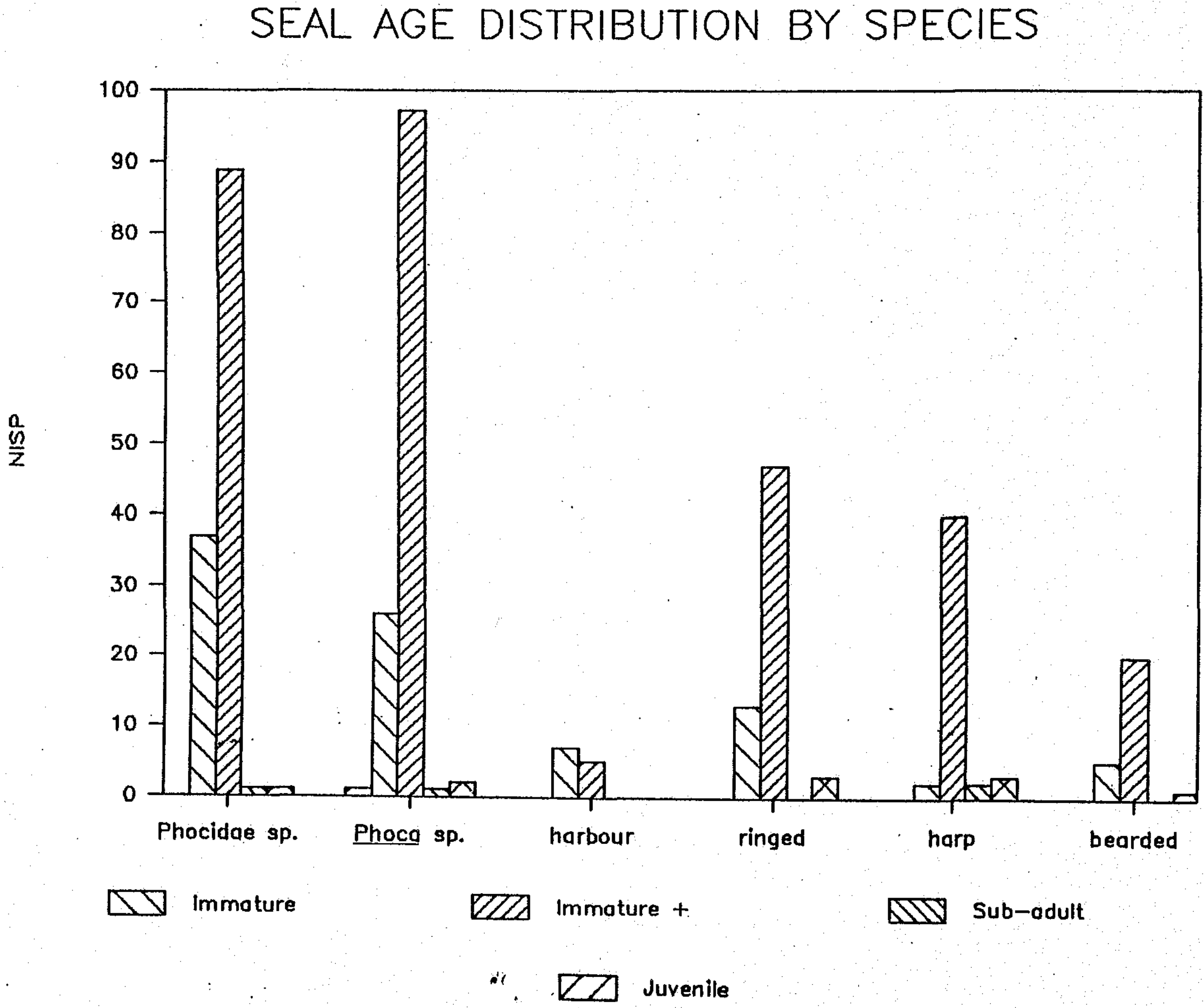
TABLE 7

AGE DISTRIBUTION OF MAMMAL SPECIES (by NISP)

Species	Juv.	Imm.	Imm.+	Sub-adult	adult
arctic hare	0	1	5	0	4
whale	0	1	3	0	1
dog/wolf	0	1	1	0	0
fox	0	1	19	0	0
polar bear	0	0	3	0	0
walrus	0	0	5	0	0
Phocidae sp.*	0	37	89	1	1
Phoca sp.*	1	26	97	1	2
harbour seal	0	7	5	0	0
ringed seal	0	13	47	0	3
harp seal	0	2	40	2	3
grey seal	0	0	2	0	0
bearded seal	0	5	20	0	1
hooded seal	0	1	1	1	0
caribou	0	4	21	0	1

*notes: Phocidae sp. includes specimens which could only be identified to this seal family.

Phoca sp. includes specimens which could only be identified to this seal genus.


SEAL AGE DISTRIBUTION BY SPECIES
NISP
100
90
80
70
60
50
40
30
20
10
0
Phocidae sp.
Phoca sp.
harbour
ringed
harp
bearded
Immature
Immature +
Sub-adult
Juvenile

Figure

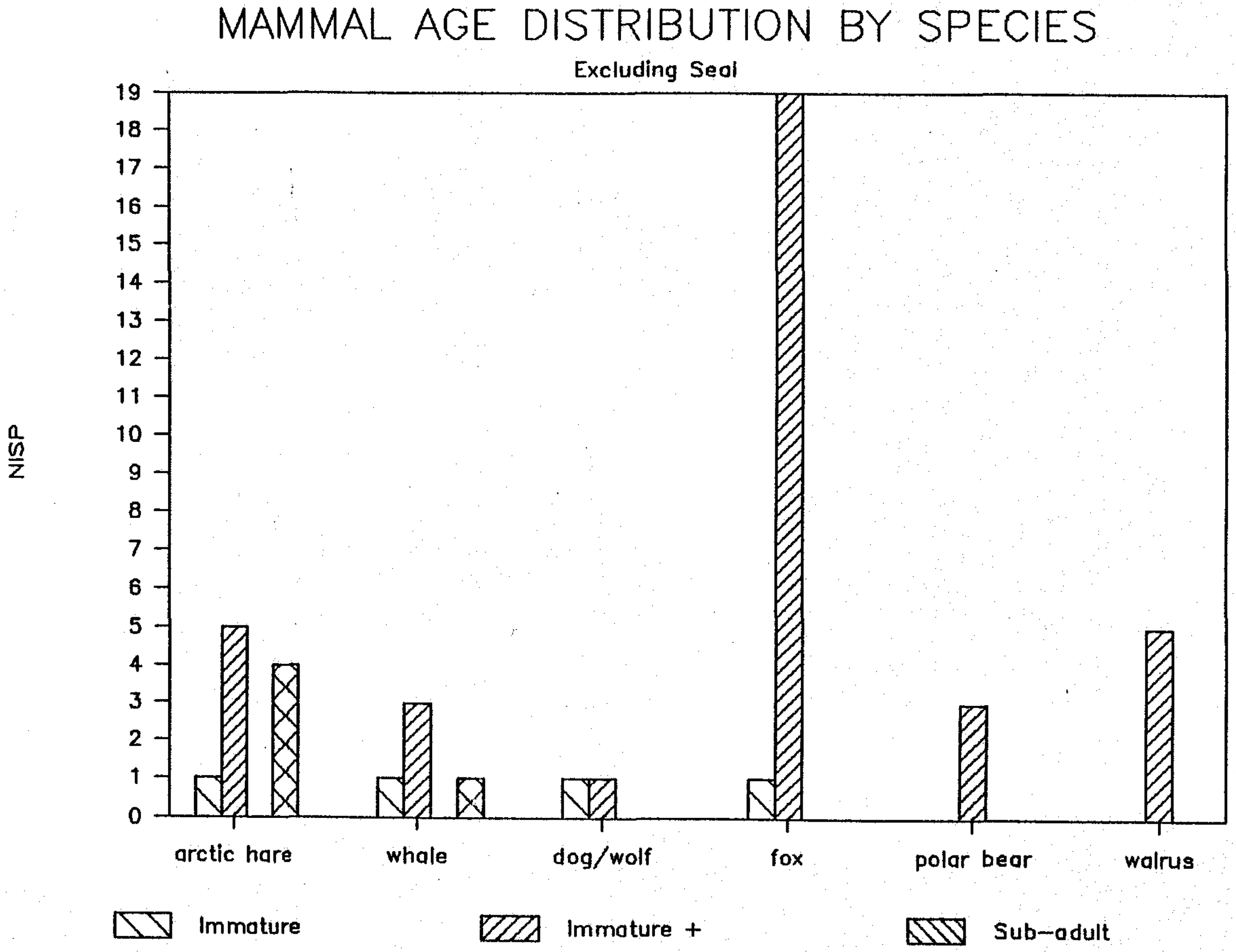

MAMMAL AGE DISTRIBUTION BY SPECIES
Excluding Seal
NISP
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
arctic hare
whale
dog/wolf
fox
polar bear
walrus
Immature
Immature +
Sub-adult

Figure 7

(there are specimens from each of these age groups in the sample). Data on Juvenile specimens could not be found so weight values for immature, sub-adult, and adult harp seals were averaged to provide the best approximate:

1 harp seal = 25 kg meat + 91 kg fat (Spiess 1978:58).

An average food weight value for each of the other seal taxa should include all age classes except juvenile. This is possible for the ringed and bearded seals:

1 ringed seal = 12 kg meat + 14 kg fat (Spiess 1978:58)

1 bearded seal = 58 kg meat + 70 kg fat (Spiess 1978:58).

Only live adult weights are available for grey (Whitaker 1980:626) and hooded seals (Whitaker 1980:628). These can be converted into meat and fat weights by applying Spiess' (1978:58) multipliers, 33% meat and 40% blubber:

1 grey seal = 89 kg meat + 108 kg fat

1 hooded seal= 88 kg meat + 106 kg fat.

Food yield estimates for the umbrella taxa, Phocidae sp. and <u>Phoca</u> sp., were determined by averaging the weight estimates for immature, sub-adult and adult individuals from all species which they include (Spiess 1978:58;Whitaker 1980:626-628):

1 Phocidae sp. = 28 kg meat + 34 kg fat

1 <u>Phoca</u> sp. = 18 kg meat + 21 kg fat.

The sample sizes of the other taxa are too small to merit serious consideration. Whale, dog or wolf, fox, polar bear, and walrus are all represented almost exclusively by immature + specimens. This hints at a normal distribution but the numbers are too low to be certain. The whale category (Cetacea sp.) is too broad to facilitate the estimation of a meat yield and will be excluded from analysis by the White method. Whale will be quantified only by NISP, MNI and bone weight. Food yield values for fox, polar bear, and dog or wolf are adopted from Spiess (1978:58) who did not subdivide them by age:

1 fox = 4 kg meat + trace fat

1 polar bear = 190 kg meat + 30 kg fat

1 wolf = 11 kg meat + trace kg fat.

An estimate for walrus is determined by averaging the two available age class weights, sub-adult and adult:

1 walrus = 248 kg meat + 300 kg fat (Spiess 1978:58).

Forty percent of the arctic hare specimens are adult, but the NISP of 10 is too small to give this great significance. White's (1953:397-398) generalized meat weight figure is used:

1 arctic hare = 2 kg.

Birds are excluded from this process due to the lack of adequate aging criteria for Aves species. General food weight estimates for a duck (0.8 kg) and a Gull (1.1 kg) are based on Spiess (1978:58) and White (1953:398).

Specimens were not identified to sex for this report due to time constraints and the fragmentary nature of the bones. Hunting patterns based on animal sex can not be determined, which may effect the validity of the White method analysis. It should not, however, effect the NISP or bone weight analysis.

Table 8

DEFINITION OF BUTCHERING UNITS*

Butchering Unit	Definition
forequarters (fore)	radius, ulna, humerus, scapula, carpals, matacarpals, front phalanges
hindquarters (hind)	tibia, femur, patella, fibula, tarsals, metatarsals, hind phalanges
trunk	pelvis, sacrum, vertebrae, sternal segments, ribs
head	skull bones, mandible, teeth

*note: after Lyman (1979) with modifications

TABLE 9

DISTRIBUTION OF BUTCHERING UNITS BY SPECIES

Species	Forequarters (NISP)	Hindquarters (NISP)	Trunk (NISP)	Head (NISP)
arctic hare	6	2	0	3
whale	1	0	4	0
dog/wolf	0	1	1	1
fox	6	1	1	5
polar bear	1	1	1	0
walrus	2	0	2	1
Phocidae sp.*	24	51	36	13
Phoca sp.*	20	25	73	15
harbour seal	4	4	3	1
ringed seal	9	7	27	22
harp seal	8	5	20	14
grey seal	2	0	0	0
bearded seal	4	3	10	9
hooded seal	1	0	2	0
caribou	7	4	13	0

*notes: Phocidae sp. includes specimens which could only be identified to this seal family. It includes all seal species which range into northern Ungava.

Phoca sp. includes specimens which could only be identified to this seal genus. It includes only the harbour seal, the ringed seal and the harp seal.

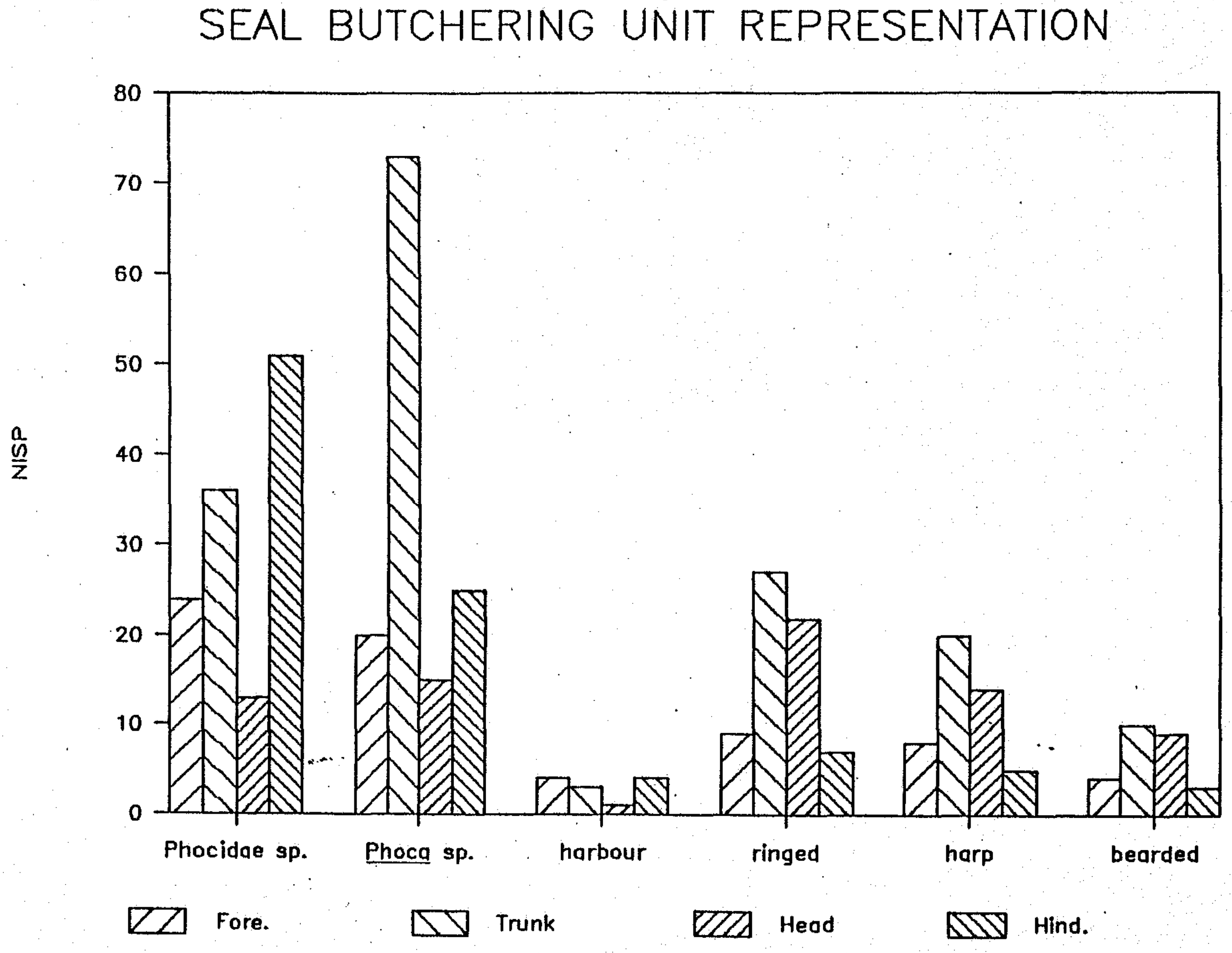

SEAL BUTCHERING UNIT REPRESENTATION
NISP
80
70
60
50
40
30
20
10
0
Phocidae sp.
Phoca sp.
harbour
ringed
harp
bearded
Fore.
Trunk
Head
Hind.

Figure 8

2.6 IDENTIFYING SELECTIVE BUTCHERING UNIT (BU) USE

The (mammalian) identified specimens were divided into four Butchering Unit classes to determine if only certain meat cuts were utilized (see tables 8 & 9) (after Lyman 1979). Birds have been excluded. The small sample size and poor preservation of this class ensure that the results would bear no relation to historic Inuit butchering patterns.

Two minor patterns emerge in the seal data (see figure 8). First, the high proportion of trunk specimens reflects the greater number of elements in this category (see table 9). Second, the apparent high proportion of hindquarters in the Phocidae Sp. category is actually a product of identification factors. Ribs are easier to identify to <u>Phoca</u> sp. than hindquarter bones. Thus there is an abnormally large number of trunk elements in the <u>Phoca</u> sp. category and a correspondingly low number of trunk specimens in the Phocidae sp. category. As a result, hindquarters, the next highest column, appears abnormal.

The overall pattern suggests that whole seals were used at Nunaingok. When the seal species are combined forequarters represent 17.5% of Phocidae, hindquarters, 23.1%, trunk, 41.5%, and head, 18.0%. This is in harmony with the results of Watson's structure 3 (1988:6) report and Etchells' Operation 4 (1990:42-43) report where seals were represented by all body portions.

Some information can be gleaned from the small samples of the non-seal species (see figure 9). Several patterns emerge. Fox

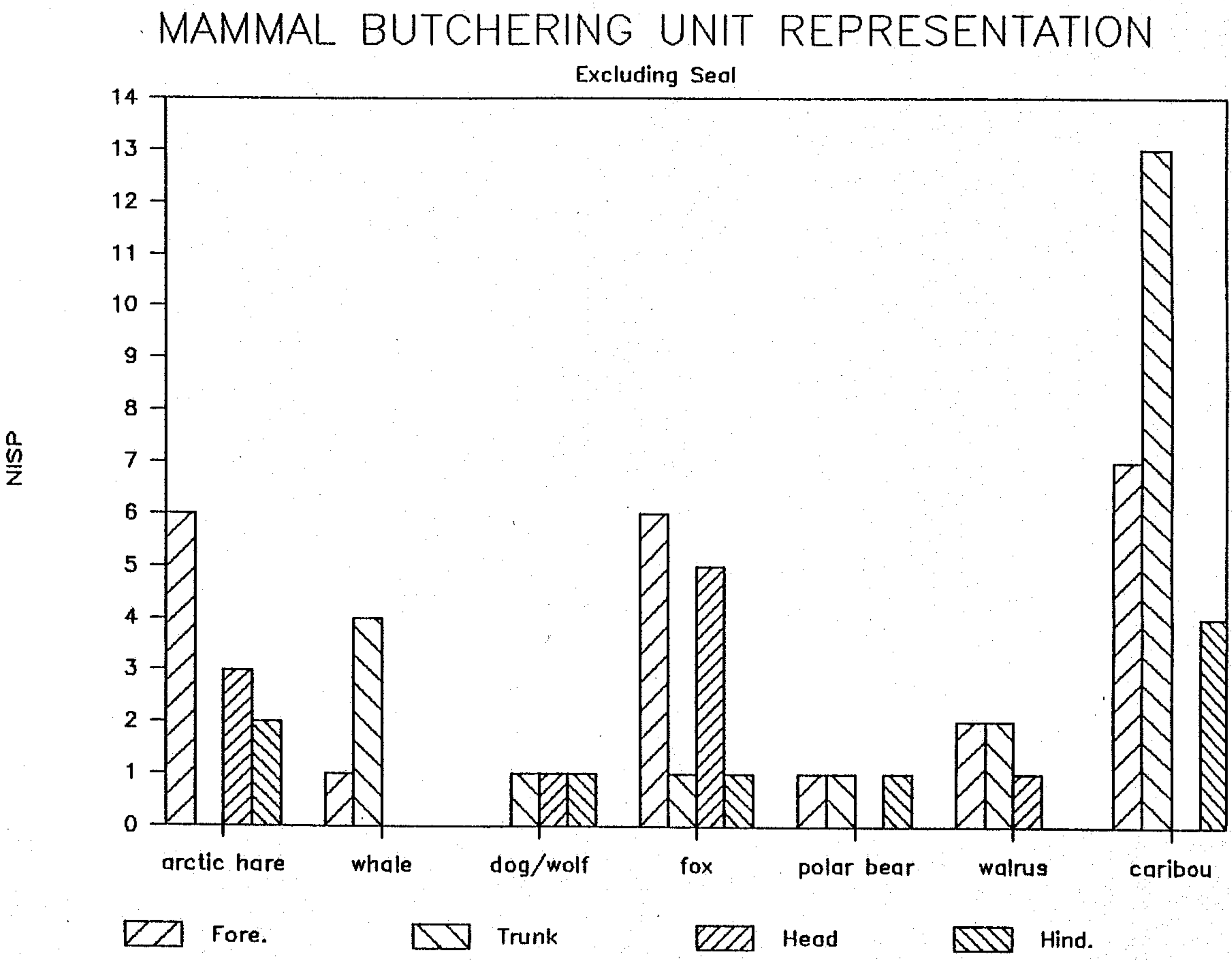

MAMMAL BUTCHERING UNIT REPRESENTATION
Excluding Seal
NISP
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
arctic hare
whale
dog/wolf
fox
polar bear
walrus
caribou
Fore.
Trunk
Head
Hind.

Figure 9

and arctic hare are both characterized by an absence of trunk elements (8% of fox specimens, 0% of arctic hare specimens). This may suggest that only their limbs and skulls were returned to camp for food. My experience with hare suggests otherwise. There is very little meat on the appendicular skeleton. A more likely explanation is that the animals were caught for their pelts, which were sometimes returned to Nunaingok with limb and skull bones still attached. It may thus be appropriate to eliminate these species from a reconstruction of the historic Inuit diet. I will return to this issue later.

The least frequent species, dog or wolf, polar bear and walrus all span at least three butchering units. Tentatively, it would appear that whole animals were used. Whale, which is also represented by a tiny sample (5 specimens), fails to reveal a useful pattern.

Caribou deserves further mention. It provides an important lesson on the danger of interpreting small samples. Figure shows an abnormal absence of cranial elements for this species. A close look at previous site reports reveals that there were no cranial specimens in Watson's (1988:7) sample and only one among 50 caribou fragments in Spiess' (1984:19) sample (excluding antler, which can be collected separately). The low frequency of these bones would suggest that caribou were harvested at a distance from the site. Only meat bearing bones were being transported to Nunaingok. Today caribou rarely stray north of Cape Kakkiviak (Fitzhugh 1980:589). Spiess (1984:20) has argued that an annual hunt must have traveled south to this territory. However, Chapin's recent report on material from the Structure 1 sleeping platform records 5 caribou cranial specimens (1990:appendix b). An interpretation supported by data from three reports on the site has been altered by the identification of another 500 bones. It now appears that whole caribou were being used at Nunaingok.

2.7 RECONSTRUCTING THE HISTORIC INUIT DIET

2.7.1 MINIMUM NUMBER OF INDIVIDUALS

MNI values for a faunal sample can not be viewed as a representation of the diet which produced the assemblage. Like NISP, MNI does not consider the variation in food yield between species. It serves as a measure of the abundance which can be multiplied by estimated food weights for each species to reconstruct their dietary contribution. The picture presented by minimum number of individual calculations is similar to that of the NISP (see tables 6 and 10). The top five taxa share the same rank order: Phoca sp. (13.0% of the MNI), Phocidae sp. (10.9%) ringed seal (13.0%), harp seal (8.7%), caribou (6.5%) and bearded seal (6.5%). The major differences between NISP and MNI values occur among the rare taxa. For example, arctic hare has 1.2% of the NISP and 6.5% of the MNI. Except perhaps for circumstance where perfectly preserved samples are completely excavated (eg. Spiess 1978), MNI exaggerates the abundance of rare taxa and

Table 10

ABUNDANCE OF SPECIES BY MNI

Species	MNI (%)	Selection Criterion
MAMMALS		
arctic hare	3 (6.5%)	age
whale	2 (4.4%)	taxonomy: 1 Monodontidae 1 Balaenidae
dog/wolf	2 (4.4%)	age
fox	2 (4.4%)	left mandible
polar bear	1 (2.2%)	-
walrus	1 (2.2%)	-
Phocidae sp.*	5 (10.9%)	left radius
Phoca sp.*	6 (13.0%)	left fibula, age
harbour seal	2 (4.4%)	left tibia
ringed seal	6 (13.0%)	left mandible
harp seal	4 (8.7%)	age
grey seal	1 (2.2%)	-
bearded seal	3 (6.5%)	age
hooded seal	2 (4.4%)	age
caribou	3 (6.5%)	left humerus
BIRDS		
duck	2 (4.4%)	left humerus
gull	1 (2.2%)	-
total	46 (100.3%)	

notes: Phocidae sp. includes specimens which could only be identified to this seal family.

Phoca sp. includes specimens which could only be identified to this seal genus.

grossly underestimates the number of animals which were frequently used at a site. It is important to note that MNI calculations can provide at best an ordinal measure of the relative frequency of each species (Grayson 1984:110-111).

2.7.2 ESTIMATING FOOD YIELD BY THE MODIFIED WHITE METHOD

The final step of dietary reconstruction is calculated by multiplying the MNI for each taxa (section 2.6.1) by a meat yield and fat yield estimate for an individual of the appropriate age category (section 2.2) and taxa (see table 11). This method elaborates on White's original scheme which did not consider age categories (Smith 1975) or fat weight (Spiess 1978). Hare and fox will be included for the sake of comparison with the bone weight method of estimating food yield. The resulting food weights presented in table 11 must be treated with caution. They are dependant on an ordinal measure, MNI, and should therefore not be treated as true ratio scale measures of food weight. Like MNI counts, they must be interpreted as a gauge of the relative contribution of each species to the diet. To emphasise this, the data is graphed only on percentage pie charts (figures 10 & 12).

The conversion of MNI values to food yield estimates radically changes the interpretation of Nunaingok's palaeo-diet. The problems of a small sample apply, but the food yield data can suggest hypotheses to be investigated further in the Ungava Peninsula. Seal remains dominate (68.7%), with harp contributing the most food (14.2%). The heavier hooded (11.9%) and bearded seals (11.8%) replace ringed seal (4.8%) as the next most

Table 11

ESTIMATED FOOD YIELD CALCULATIONS

Species	Live Weight Estimate in kg	Meat Weight Estimate in kg	Fat Weight Estimate in kg	MNI	Food Yield kg(%)
MAMMALS					
arctic hare	4	2	?	3	6 (0.2%)
dog/wolf	20	11	trace	2	22 (0.7%)
fox	8	4	trace	2	8 (0.3%)
polar bear	350	190	30	1	220 (6.7%)
walrus	750	248	300	1	548 (16.8%)
Phocidae sp.*	86	28	34	5	310 (9.5%)
Phoca sp.*	53	18	21	6	234 (7.2%)
harbour seal	75	25	30	2	110 (3.4%)
ringed seal	36	12	14	6	156 (4.8%)
harp seal	76	25	91	4	464 (14.2%)
grey seal	270	89	108	1	197 (6.0%)
bearded seal	175	58	70	3	384 (11.8%)
hooded seal	265	88	106	2	388 (11.9%)
caribou	100	55	20	3	215 (6.6%)
BIRDS					
duck	1.1	0.8	trace	2	1.6 (0.1%)
gull	1.5	1.1	trace	1	1.1 (0.03%)

Totals = 3264.7 kg (100.23%)

*notes: Phocidae sp. includes specimens which could only be identified to this seal family.
Phoca sp. includes specimens which could only be identified to this seal genus.

(see text pages 25-26 for sources)

important seals. Walrus ranks second (16.8%), due to a live weight almost three times as large as the second heaviest species in the sample, polar bear (see table 11). Land mammals are reduced to a minor role in the diet, with polar bear (6.7%) and caribou (6.6%) contributing the most. These proportions can not be accepted at face value. The rare species, especially hooded seal (NISP=3), grey seal (NISP=2), polar bear (NISP=3) and walrus (NISP=5), are likely to be overestimated by the MNI based method.

Arctic hare (0.2%) and fox (0.2%) are reduced to insignificance. Even these small proportions may overestimate their contribution to the diet when the butchering unit evidence (section 2.2) is considered (see below).

Birds contribute almost nothing (0.1%) to the food yield. This is partially due to the effects of preservation discussed above. The true contribution of aves to the Nunaingok diet must be larger than represented in figure 10.

2.7.3 ESTIMATING FOOD YIELD BY THE WEIGHT OF SPECIMENS METHOD

For this method, the weight of all identified specimens of each taxa was determined, except Aves, for which unidentified elements were also included (see table 12). These weights were then graphed as proportions (figures 11 & 13) to represent the relative food yield of each taxa. The method has some immediate advantages. Taxa for which known food yields can not be calculated (eg. whale, Cetacea sp.) can be quantified. Whale was omitted from figure 11 to facilitate comparison with the White method results, but it contributed 9.8% of the total specimen

Table 12

ABUNDANCE OF SPECIES BY WEIGHT OF SPECIMENS

Species	Weight of Specimens in grams
MAMMALS	
arctic hare	21.5g (0.3%)
whale	672.1g (9.8%)
{Cetacea sp. 230.1g}	
{white whale 175.3g}	
{baleen whale 266.7g}	
dog/wolf	22.6g (0.3%)
fox	32.1g (0.5%)
{arctic/red fox 9.6g}	
{arctic fox 22.5g}	
polar bear	198.6g (2.9%)
walrus	546.6g (8.0%)
Phocidae sp.*	1149.9g (16.8%)
Phoca sp.*	846.0g (12.4%)
harbour seal	164.7g (2.4%)
ringed seal	844.4g (12.3%)
harp seal	871.0g (12.7%)
grey seal	9.9g (0.1%)
bearded seal	704.2g (10.3%)
hooded seal	127.5g (1.9%)
caribou	609.0g (8.9%)
BIRDS	
total Aves (includes unidentified specimens)	32.0g (0.5%)
total	6852.1g (100.1%)

*notes: Phocidae sp. includes specimens which could only be identified to this seal family.

Phoca sp. includes specimens which could only be identified to this seal genus.

FOOD YIELDS BY MODIFIED WHITE METHOD

Excluding Whale

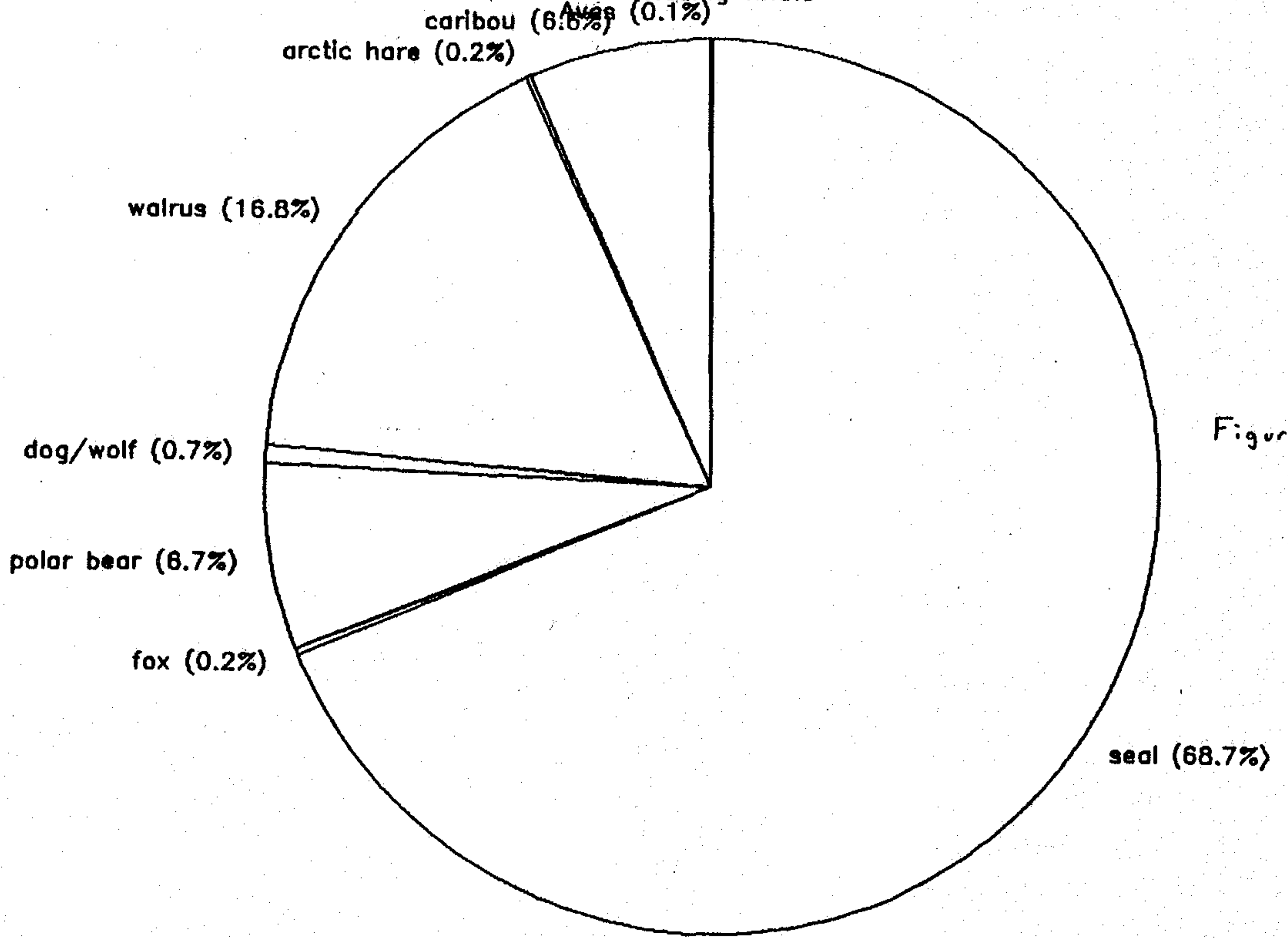


Figure 10

AVES

Gavia stellata (Pontoppidan)	Red-throated Loon
Gavia immer (Brunnich)	Common Loon
Puffinus gravis (O'Reilly)	Greater Shearwater
Branta canadensis (Linnaeus)	Canada Goose
Aythya marila (Linnaeus)	Greater Scaup
Somateria mollissima (Linnaeus)	Common Eider
Somateria spectabilis (Linnaeus)	King Eider
Camptorhynchus labradorius (Gmelin)	Labrador Duck
Histrionicus histrionicus (Linnaeus)	Harlequin Duck
Clangula hyemalis (Linnaeus)	Oldsquaw
Bucephala islandica (Gmelin)	Barrows Goldeneye
Mergus serrator Linnaeus	Red-breasted Merganser
Buteo lagopus (Pontoppidan)	Rough-legged Hawk
Aquila chrysaetos (Linnaeus)	Golden Eagle
Falco peregrinus Tunstall	Peregrine Falcon
Falco rusticolus Linnaeus	Gyr Falcon
Dendragapus canadensis (Linnaeus)	Spruce Grouse
Lagopus lagopus (Linnaeus)	Willow Ptarmigan
Lagopus mutus (Montin)	Rock Ptarmigan
Charadrius semipalmatus Bonaparte	Semipalmated Plover
Actitis macularia (Linnaeus)	Spotted Sandpiper
Numenius borealis (Forster)	Eskimo Curlew
Calidris pusilla (Linnaeus)	Semipalmated Sandpiper
Gallinago gallinago (Linnaeus)	Common Snipe
Phalaropus lobatus (Linnaeus)	Red-necked Phalarope
Stercorarius parasiticus (Linnaeus)	Parasitic Jaeger
Larus argentatus Pontoppidan	Herring Gull
Larus hyperboreus Gunnerus	Glaucus Gull
Larus marinus Linnaeus	Great Black-backed Gull
Rissa tridactyla (Linnaeus)	Black-legged Kittiwake
Sterna paradisaea Pontoppidan	Arctic Tern
Uria lomvia (Linnaeus)	Thick-billed Murre
Cepphus grylle (Linnaeus)	Black Guillemot
Nyctea scandiaca (Linnaeus)	Snowy Owl
Eremophila alpestris (Linnaeus)	Horned Lark
Corvus corax Linnaeus	Common Raven
Oenanthe oenanthe (Linnaeus)	Northern Wheatear
Anthus spinoletta (Linnaeus)	Water Pipit
Spizella arborea (Wilson)	American Tree Sparrow
Passerculus sandwichensis (Gmelin)	Savannah Spaarrow
Zonotrichia leucophrys (Forster)	White-crowned Sparrow
Calcarius lapponicus (Linnaeus)	Lapland Longspur
Plectrophenax vivalis (Linnaeus)	Snow Bunting
Carduelis flammea (Linnaeus)	Common Redpoll

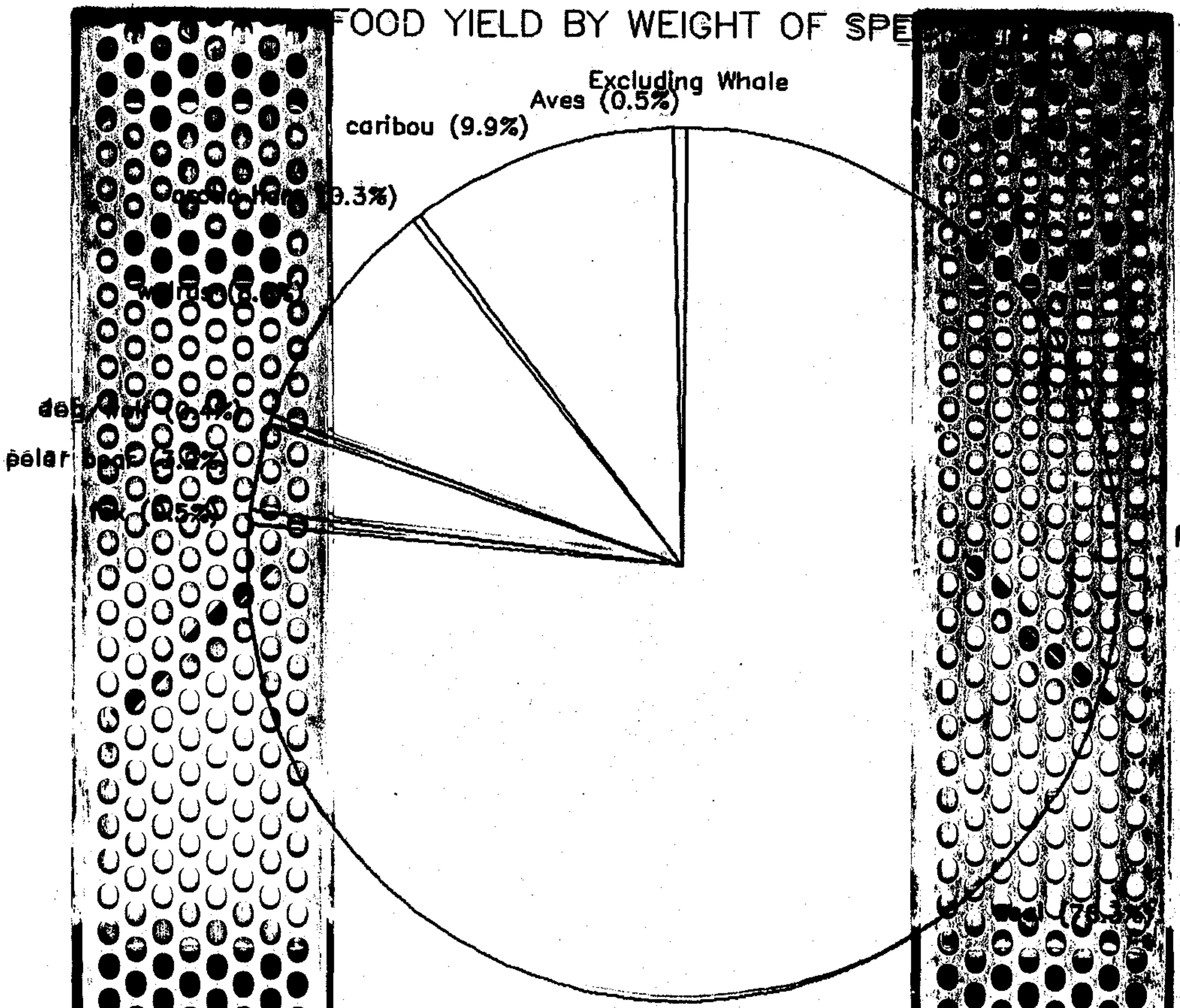

FOOD YIELD BY WEIGHT OF SPE
Excluding Whale
Aves (0.5%)
caribou (9.9%)
arctic hare (0.3%)
walrus ([illegible])
dog/wolf (0.4%)
polar bear ([illegible])
fox (0.5%)
seal (78.3%)

Figure 11

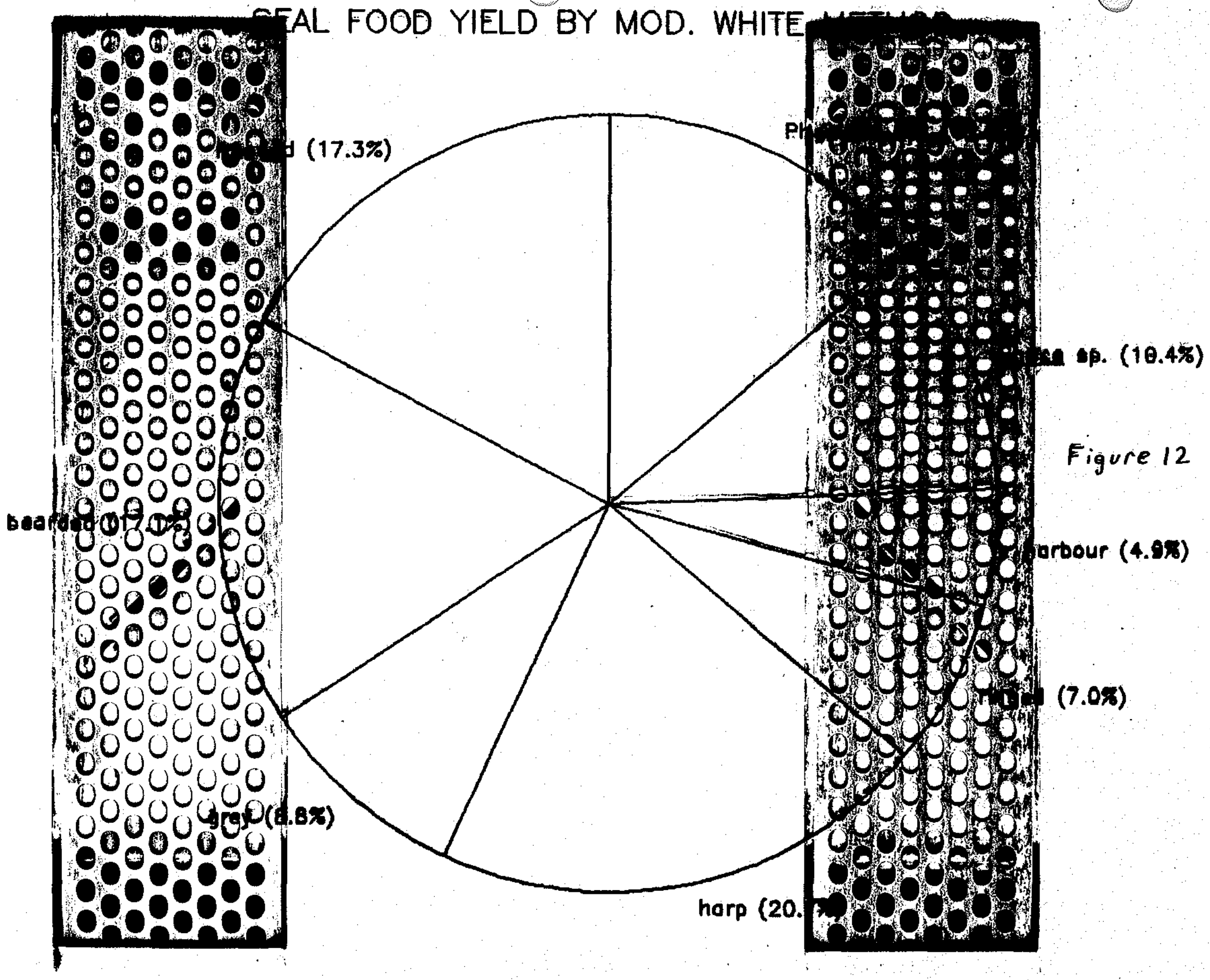

SEAL FOOD YIELD BY MOD. WHITE
d (17.3%)
bearded (17.1%)
grey (6.8%)
harp (20.
(7.0%)
arbour (4.9%)
sp. (10.4%)
Ph

Figure 12

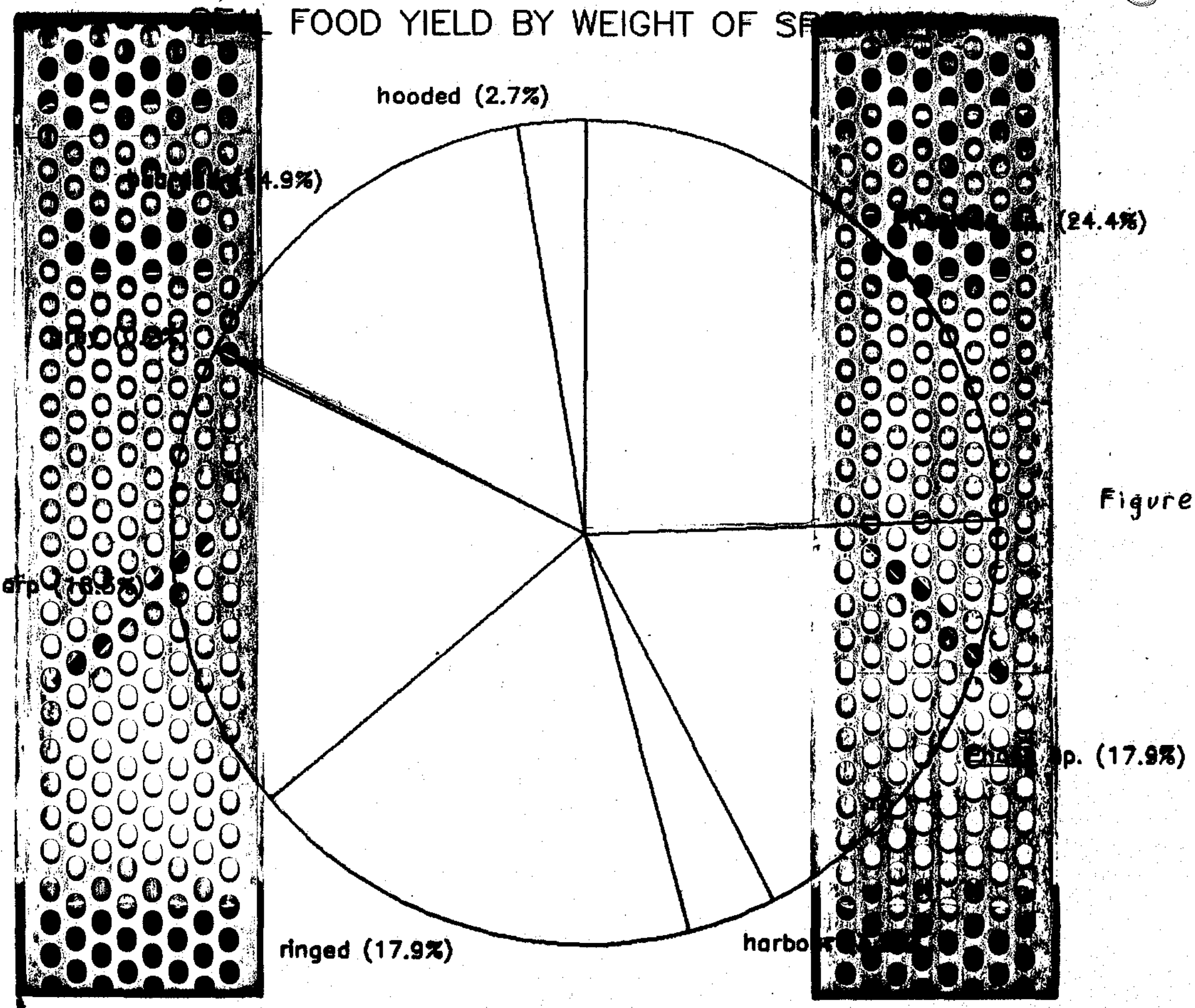

[illegible] FOOD YIELD BY WEIGHT OF S[illegible]
hooded (2.7%)
[illegible] (4.9%)
[illegible]
harp [illegible]
ringed (17.9%)
harbo[illegible]
[illegible] (24.4%)
[illegible] sp. (17.9%)

Figure 13

weight. It thus contributed the second largest proportion of food to the diet (after seal).

Further, selective hunting and butchering patterns can be ignored. If certain age groups yield less food this should be reflected in the bone weight. Similarly, if only certain butchering units were carried to the site, the specimen weight method will register only these units (not the whole animal as the White method does).

Some of the results compare closely to the White method (compare figures 10, 11, 12 & 13). The largest differences are among the seals. Harp and ringed seals are more evenly matched at 18.5% and 17.9% of the seal specimens. Grey seal (0.2%) and hooded seal (2.7%) contribute dramatically less food than in the White method results. This results from the tendency for MNI to exaggerate rare species. It is difficult to imagine that hooded seal, represented by 3 specimens, contributed more food to the Nunaingok diet than the ringed seal, with 65 specimens, despite the difference in body weight (see table 11).

The results of the 2 methods are more evenly matched for the non-seal species. The specimen weight technique reduces the dietary contribution of polar bear (3.2%) and walrus (8.8%). Both of these were rare species probably exaggerated by the White method. The proportion of caribou increased to 9.9%. The remaining taxa represented less than 1% of the diet each according to both techniques.

2.7.4 NON-FOOD ANIMAL RESOURCES

Table 13

FOOD & NON-FOOD ANIMAL RESOURCES*

hide
hair
meat
blood
brains
marrow
grease
juice
sinew (tendon, ligament)
bone, teeth, horn, antler, hooves
visera

*note: after Lyman (1987:252)

The abundance of a species at a site does not indicate that it was used exclusively for food. Non-food products could play an important role in the selection of prey. Lyman (1987:252) has compiled a list of the total resources provided by a game animal (see table 13). Nearly half of these are not food products. The abundance measures (NISP & MNI) of the Nunaingok sample reflect not only the importance of a species to the diet, but also its importance as a source of other products. It is necessary to separate these factors before summarising the meaning of estimated meat yield estimates for the sample (White 1953:397).

At the turn of the 20th century, the Labrador Eskimo of northern Ungava peninsula used a wide range of non-food animal products (see p.8 above). The butchering unit evidence already suggests that fox and arctic hare were not eaten at the site. Ethnohistory records that they were caught exclusively, or at least primarily, for their pelts. Fox and arctic hare trapping was introduced by European traders, in order to obtain a supply of fur (Hantzsch 1932:9; Kaplan 1980:653). Although the meat may have been eaten, it was of secondary importance to the valuable pelt (Hantzsch 1932:12). These land mammals must be interpreted in the context of non-food resources.

The dog or wolf (<u>Canis</u> species) specimen was probably not treated as food. Dog flesh was not relished by the historic Labrador Eskimo and wolves did not inhabit the territory surrounding Nunaingok (Hantzsch 1932:9,11). The polar bear was a large meat source, but its hide also served as a valued trade good (Hantzsch 1932:34).

Seals and walrus provided skins, ivory and blubber for clothing, tools and trade, (Hantzsch 1932:7). Blubber was also used in lamps for light and heat. This has a major effect on food yield estimates for these species. If fat weight was removed from the equation, the contribution of seal and walrus would be reduced by more than 50% (see table 11). Land mammals, specifically caribou and polar bear, must be viewed as major contributors to the palaeo-diet of Nunaingok.

Caribou and polar bear provided pelts, teeth, bones, sinew, antler and other products for trade and use by the Labrador Eskimo (Hantzsch 1932:7-8,34). None of these, however, reduced the amount of food they could contribute. Even if the fat from these species was traded and burned like sea mammal blubber, the ratio of fat to meat is much lower in land mammals (see table 11).

2.7.5 PALAEO-DIET: SUMMARY AND CONCLUSIONS

The weight of specimens method is superior to the White technique for dietary reconstruction. Specimen weight does not exaggerate rare species and otherwise closely matches the MNI based results. Sea mammals provided a large portion of the available food, perhaps just under half if blubber was being traded and burned (86.7% including blubber, approximately <u>half</u> that figure excluding blubber). Seals were the most important sea mammals, with whale and walrus together providing about one quarter as much food.

Caribou and polar bear contributed the bulk of the remaining 60%. The proportion of caribou in this sample is underestimated due to the destruction of extremity bones, by dogs and probably during marrow processing. Arctic hare and fox were harvested principally for furs, but may have provided a dietary supplement. Birds were poorly represented in this sample, but in light of preservation evidence and the excavation technique, they were probably a small but numerous element in the site's food base.

2.8 SEASONS OF SITE USE

The evidence from Structure 1 suggests a fall, winter and spring occupation of Nunaingok. Harp seal are only available at McLellan Strait in the spring, during migration from the Gulf of St. Lawrence to Greenland, and in the fall during their return trip (Mansfield 1967:12). Spiess (1984:16,20-21) identified newborn ringed seal specimens from Nunaingok which must have been killed in April or May.

Polar bear were usually killed in the winter, when they would approach villages (Hantzsch 1932:34). Fox and hare were hunted in the winter when their furs were prime (Hantzsch 1932:9,12). Dogs were present at Neo-Eskimo sites throughout the year (Hantzsch 1932:9-12) and no medullary bone was found in the bird specimens to suggest a season of occupation. The year round ice free conditions would make Nunaingok an ideal location to spend winter (see Schledermann 1980 for a discussion of this in another context).

The Labrador Eskimo abandoned their sod houses for tents during the summer in the early 20th century (Hantzsch 1932:63). Hantzsch (1932:63) believed that this was an ancient practice. Spiess (1984:24) has convincingly argued that garbage and dampness would make them an unpleasant summer residence.

This interpretation agrees with Watson's (1988:12) conclusions. Spiess (1984:22-23) argues that it was a spring and fall camp. However, he does not consider the significance of the fur trade, or of an opportunity to exploit mid-winter open water.

Etchells (1990:46-48) suggests that the site was also occupied in the summer, based on the presence of juvenile harp seal specimens. These are only available in the region in late June (Taylor 1974:26). The other ethnographic and faunal evidence implies that these would be hunted during the late spring before the site was abandoned for mid-summer.

There is one large difficulty with this interpretation. The sample may include a mixture of bones deposited by families or groups with different seasonal rounds. If so, my conclusions will represent the sum of these seasonal occupations, not the pattern of a single group of inhabitants.

2.9 EVIDENCE OF ECONOMIC CHANGE

There is no evidence of a subsistence economy change associated with the Thule to historic Inuit transition at the

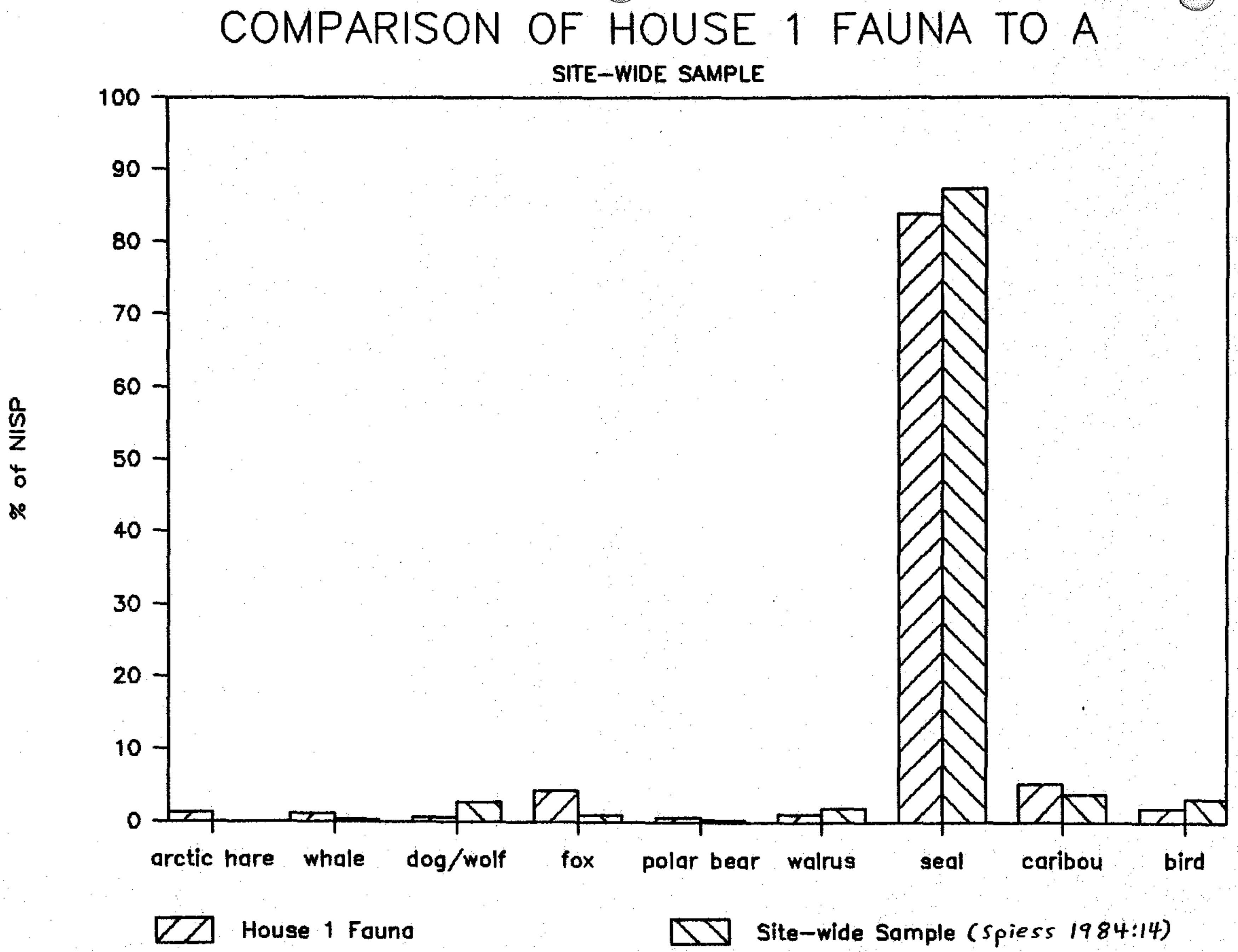

COMPARISON OF HOUSE 1 FAUNA TO A
SITE–WIDE SAMPLE
% of NISP
0
10
20
30
40
50
60
70
80
90
100
arctic hare
whale
dog/wolf
fox
polar bear
walrus
seal
caribou
bird
House 1 Fauna
Site–wide Sample (Spiess 1984:14)

Figure 1

site (see figure 14). The results of this study are comparable to Spiess' (1984:14) data on an amalgamated Thule and historic Inuit sample. The percent of the total NISP represented by each taxa was used in this comparison to eliminate the effect of sample size differences. NISP was chosen as a measure of abundance because it was the technique used by Spiess. It also requires the least amount of abstraction from the data, thus eliminating the problem of cumulative error.

The pattern of change from Thule to historic Inuit economy which I predicted in section 1.3 is not visible. There _is_ more walrus in Spiess' sample and more arctic hare and fox in the Structure 1 assemblage. However, the differences are in no instance greater than 3%, the proportion of seal remains the same, and the proportions of whale are too tiny to even speculate on their significance. Either there was no economic Transition from Thule to historic Inuit, or Spiess' sample is exclusively historic in origin.

3.0 CONCLUSIONS:

To conclude, it is useful to return to the projects goals. First, the Inuit at Nunaingok hunted all ages of harp seals, but brought home mostly immature individuals of the other seal species. Whole animals were used at the site, with the exception of fox and arctic hare which were probably skinned for their pelts where they were caught. Caribou long bones were smashed, presumably for marrow, and seal bones were sometimes cleanly chopped through during the butchering process.

The historic Inuit diet was dominated by sea mammal (principally seal) and caribou, with polar bear occasionally providing large amounts of meat. Birds were a plentiful, but small, supplement to this menu.

There was also a plentiful supply of resources for trade or local use. Sea mammal blubber and hide, caribou hide, fox and arctic hare pelts and the bones themselves are a small selection of animal products which the Structure 1 inhabitants had at their disposal (see table 13). In addition, dogs would have proven useful for traction.

The site was probably occupied from fall to spring. Seal were hunted in the spring and fall, and fur trapping must have been an important winter activity. The polynya at Nunaingok would make it a focus of faunal resources in mid-winter.

The subsistence economy change from Thule to historic Inuit suggested by Susan Kaplan (1980:652,657) is not apparent at Nunaingok. There is virtually no difference between the faunal assemblage from Structure 1 and Spiess' (1984) mixed Thule and historic sample. Spiess' sample is from a series of random test pits, not a tightly bounded Thule context, so a resolution of this problem cannot be offered. The analysis of such a context is an ideal direction for future research.

ACKNOWLEDGEMENTS

I would like to thank Dr. Howard Savage for his excellent instruction, and for his patience. Ian Badgley provided the faunal material from Nunaingok and has helpfully answered my questions regarding the site. Nancy Saxburg helped me translate the French sources with which I have struggled. Thanks are owed to Snorri and Athena, without whom this may never have been finished.

REFERENCES CITED

Archambault, Marie-France
1978 "Nunaingoq: Un Site de Polynie Dans L'Arctique Oriental Quebecois. Dossier 49:73-81, Ministere des Affaires Culturelles, Direction Generale du Patrimoine.

Badgley, Ian
n.d. "The Nunaingok Project." Manuscript on file at Laboratoire D'Archaeologie de L'UQAM Mission Nunaingoq. 7 pages.

n.d. personal communication. Telephone conversation on 12/18/89.

Binford, Lewis R.
1981 Bones: Ancient Men and Modern Myth. New York: Academic Press

Chapin, Laura
1990 "Final Faunal Report: Nunaingok-1 Site (JcDe-1), Ungava, House 1." Manuscript on file at the Howard Savage Faunal Archaeo-Osteology laboratory, University of Toronto. 16 pages.

Cooper, J.
1980 "Skeletal Age Categories and Their Criteria." ANT 1037L course handout.

Dunnell, R.
1971 Systematics in Prehistory. New York: Free Press

Etchells, Mark
1990 "Final Faunal Report: Operation -4, Nunaingok-1 Site (JcDe-1), Extreme Northern Labrador." Manuscript on file at the Howard Savage Faunal Archaeo-Osteology laboratory, University of Toronto. 83 pages.

Fitzhugh, William
1980 "Preliminary Report on the Torngat Archaeological Project." Arctic. 33(3):585-606.

Flannery, K. V.
1967 "The Vertebrate Fauna and Hunting Patterns." In The Prehistory of the Tehuacan Valley, volume 1, edited by D. S. Byers. Austin: University of Texas Press. pp. 132-178.

Grayson, Donald K.
1984 _Quantitative Zooarchaeology_. New York: Academic Press.

Hantzsch, Bernhard
1931 "Contributions to the Knowledge of Extreme North-Eastern Labrador." Canadian Field Naturalist, 45: 169-174, 194-198, 222-228.

1932 "Contributions to the Knowledge of Extreme North-Eastern Labrador." _Canadian Field Naturalist_, 46:7-12, 34-36.

Hare, F. K.
1959 _A Photo-Reconnaissance Survey of Labrador - Ungava_. Ottawa: Department of Mines and Technical Surveys.

Jordan, Richard H.
1978 "Archaeological Investigations of the Hamilton Inlet Labrador Eskimo: Social and Economic Responses to European Contact." _Arctic Anthropology_ 15(2):175-185.

1985 "Paleo-Eskimo Occupations of Nunaingok 1-7 Killinek Region, Arctic Quebec". Manuscript on file at Bryn Mawr College Department of Anthropology.

Kaplan, Susan A.
1980 "Neo-Eskimo Occupations of the Northern Labrador Coast." Arctic 33(3):646-658.

Leonard, Kevin
1990 "Faunal Findings From House 3, Level C, at the Nunaingoq Site (JcDe-1)". Manuscript on file at the Howard Savage Faunal Archaeo-Osteology laboratory, University of Toronto. 16 pages.

Lyman, R. Lee
1979 "Available Meat From Faunal Remains: A Consideration of Techniques." _American Antiquity_ 44(3):536-546.

1987 "Archaeofaunas and Butchery Studies: A Taphonomic Perspective." In _Advances in Archaeological Method and Theory, Volume 10_, edited by M. Schiffer. New York: Academic Press.

MacLean, James D.
1990 "A Preliminary Faunal Analysis of the Gupuk Site (NiTs-1) District of Mackenzie, North West Territories." Manuscript on file at the Howard Savage Faunal Archaeo-Osteology laboratory, University of Toronto. 68 pages.

Mansfield, A. W.
1967 Seals of Arctic and Eastern Canada. Ottawa: Fisheries Research Board of Canada.

McGovern, Thomas H.
1983 "Contributions to the Paeleoeconomy of Norse Greenland." Acta Archaeologica 54:73-122.

Savage, Howard G.
n.d. Personal communication on 12/13/89.

Schledermann, Peter
1980 "Polynyas and Prehistoric Settlement Patterns." Arctic 33(2):292-302.

Smith, B. D.
1975 "Toward a More Accurate Estimation of the Meat Yield of Animal Species at Archaeological Sites." In Archaeozoological Studies, edited by A. T. Clason. Oxford: North-Holland Publishing Co..

Stewart, Frances L.
1974 Faunal Remains From the Nodwell Site (BcHi-3) and From Four Other Sites in Bruce County, Ontario, Mercury Series No.16. Ottawa: National Museum of Man.

Spiess, Arthur
1976 "Determining Season of Death by Analysis of Teeth." Arctic 29(1):53-55.

1978 "Zooarchaeological Evidence Bearing on the Nain Area Middle Dorset Subsistence-Settlement Cycle." Arctic Anthropology 15(2):48-60.

1984 "Faunal Analysis of the Nunaingok Labrador Eskimo Site (JcDe-1)." Augusta: Maine Historic Preservation Commission.

Stewart, Henry
1979 "Rapport de la Mission Nunaingok 78 (Kil.3 - JcDe-1)." Manuscript on file at Laboratoire D'Archaeologie de L'UQAM Mission Nunaingoq. 37 pages.

Taylor, J. G.
1969 "William Turner's Journeys to the Caribou Country with the Labrador Eskimos in 1780." Ethnohistory 16:141-164.

Watson, Natalie
1988 "Final Report on the Faunal Analysis of House 2 of the Nunaingok-1 Site (JcDe-1). Manuscript on file at the Howard Savage Faunal Archaeo-Osteology laboratory,

University of Toronto. 20 pages.

Whitaker, John O.
1980 The Audubon Society Field Guide to North American Mammals. New York: Alfred A. Knopf.

White, Theodore E.
1953 "A Method of Calculating the Dietary Percentage of Various Food Animals Utilized by Aboriginal Peoples." American Antiquity 18(4):396-398.

Wright, J. V.
1979 Quebec Prehistory. Ottawa: National Museum of Man.

APPENDIX A

SPECIMEN IDENTIFICATIONS BY PROVENIENCE

1

#	Taxon	Element	Portion	Side	Age	Taph.	Comments
NL-501	Phocidae sp.	radius	whole minus dist epiphysis	l	I		
NL-502	*Erignathus barbatus*	radius	whole minus dist epiphysis	r	I		
NL-503	*Phoca hispida*	radius	whole minus dist epiphysis	r	I		
NL-504	Phocidae sp.	tibia	middle 50%	l	I+		
NL-505	Phocidae sp.	tibia	distal diaphysis 30%	l	I		
NL-506	*Phoca hispida*	fibula	distal 60%	r	I		
NL-507	*Phoca* sp.	tibia	middle 33%	l	I+		
NL-508	*Phoca* sp.	rib, posterior	whole	l	I+		
NL-509	*Phoca* sp.	rib	middle 90%	l	I+		
NL-510	*Phoca* sp.	rib, posterior	middle 75	r	I+		
NL-511	Phocidae sp.	rib	middle 55%	r	I+		
NL-512	Mammal	diaphysis frag.	?	?	I+	gnaw	carnivore gnawing & spiral fracture
NL-513	Sea Mammal	diaphysis frag.	?	?	I+	gnaw	carnivore gnawing & longitudinal fract.
NL-514	Phocidae sp.	Radius	distal diaphysis 40%	r	I+		
NL-515	Phocidae sp.	fibula	proximal diaphysis 20%	r	I+		
NL-516	Phocidae sp.	vertebra, th.	whole minus epiphyses	m	I		
NL-517	Phocidae sp.	vertebra, L.	body fragment 25%	m	I+	chop	longitudinal shearing of vertebral body
NL-518	Phocidae sp.	vertebra, th.	left arch fragment 20%	m	I+		
NL-519	Phocidae sp.	vertebra, .	left side 30%	m	I		
NL-520	*Vulpes* sp.	metacarpal V	whole	l	I+		
NL-521	*Vulpes* sp.	metacarpal IV	whole	l	I+		
NL-522	*Vulpes* sp.	metacarpal II	whole	l	I+		
NL-533	*Vulpes* sp.	metacarpal III	whole	l	I+		
NL-534	*Vulpes* sp.	phalanx, middle	whole	?	I+		
NL-535	*Vulpes* sp.	phalanx, middle	whole	?	I+		
NL-536	*Vulpes* sp.	phalanx, middle	whole	?	I+		
NL-537	*Vulpes* sp.	phalanx, prox.	whole	?	I+		
NL-538	*Vulpes* sp.	phalanx, prox.	whole	?	I+		
NL-539	*Vulpes* sp.	phalanx, prox.	whole	?	I+		
NL-540	*Vulpes* sp.	phalanx, prox.	whole	?	I+		
NL-541	*Vulpes* sp.	phalanx, prox.	whole	?	I+		
NL-542	*Vulpes* sp.	carpal 4	whole	l	I+		
NL-543	*Vulpes* sp.	carpal 3	whole	l	I+		
NL-544	Aves	ulna	middle 40%	r	I+	cut	transverse cuts at ends & surface polish
NM-1	*Phoca hispida*	mandible +teeth	proximal 80%	r	I+		3 post canines in place
NM-2	*Phoca* sp.	scapula	middle of posterior edge	l	I+		
NM-3	Phocidae sp.	scapula	middle of posterior edge	l	I+	chop	possible longitudinal chop ant. to spine
NM-4	Phocidae sp.	scapula	neck, no epiphysis	l	I		
NM-5	*Phoca* sp.	femur	whole minus epiphyses	r	I		
NM-6	Phocidae Sp.	radius	proximal epiphysis	r	I		
NM-7	*Phoca vitulina*	tibia	whole minus epiphyses	r	I		
NM-8	Phocidae sp.	sternebra	whole*	m	I+		*very erroded
NM-9	Phocidae sp.	metatarsal V	whole	r	I+		
NM-10	Phocidae sp.	phalanx	distal 90%	?	I+		
NM-11	Phocidae sp.	phalanx, mid.IV	whole	r	I+		
NM-12	*Rangifer tarandus*	innominate	illium minus acetabulum	l	I+		

APPENDIX A

SPECIMEN IDENTIFICATIONS BY PROVENIENCE

#	Taxon	Element	Portion	Side	Age	Taph.	Comments
NM-13	Mammal	vertebra, c.6/7	r half of body, no epiph.	m	I	chop	chopped longitudinaly through the body
NM-14	*Phoca hispida*	skull	tympanic bulla	l	I+		matches NM-15
NM-15	*Phoca hispida*	skull	tympanic bulla	r	I+		matches NM-14
NM-16	*Erignathus barbatus*	rib, 3	whole minus head	l	I+		
NM-17	*Phoca groenlandica*	rib, posterior	vertebral end 80%	r	I+		
NM-18	*Phoca groenlandica*	rib, middle	middle 40%	l	I+		
NM-20	*Phoca hispida*	skull	Occipital bone	m	I+		
NM-21	*Phoca hispida*	skull	tympanic bulla	l	I+		
NM-22	*Erignathus barbatus*	skull	tympanic bulla	r	I+		
NM-23	*Phoca* sp.	xiphisternum	anterior 90%	m	I+		
NM-24	*Phoca hispida*	fibula	proximal 60%, no epiphysis	l	I		
NM-25	Phocidae sp.	fibula	middle 70%	l	I+		probably Phoca sp.
NM-26	*Phoca hispida*	tibia	middle 40%	r	I+	break	spiral fracture
NM-27	Phocidae sp.	tibia	middle 50%	l	I+		heavily eroded
NM-28	*Phoca hispida*	fibula	whole minus epiphyses	l	I		
NM-29	Phocidae sp.	humerus	head	l	I+		very eroded
NM-501	*Phoca hispida*	vertebra, atlas	whole	m	I+		
NM-502	*Phoca hispida*	vertebra, c.	whole minus epiphyses	m	I		
NM-503	*Rangifer tarandus*	vertebra, th.	body	m	I		
NM-504	*Phoca vitulina*	vertebra, th.	body & arch	m	I		
NM-505	*Delphinapterus leucas*	vertebra, c.2	whole	m	I+	chop	chop mark on posterior articular surface
NM-506	*Phoca* sp.	fibula	middle 50%	r	I+		
NM-507	*Canis* sp.	tibia	distal 40%	l	I+		
NM-508	*Phoca* sp.	fibula	middle 65%	l	I+		
NM-509	Phocidae sp.	scapula	posterior 20%	l	I+		
NM-510	*Phoca* sp.	rib	middle 60%	l	I+		
NM-511	*Phoca* sp.	fibula	proximal diaphysis 25%	l	I+		
NM-512	Phocidae sp.	tibia	proximal diaphysis 30%	l	I+		
NM-513	Cetacea sp.	rib, posterior	middle 80%	l	I+		
NM-515	*Phoca* sp.	rib, 15	middle 60%	r	I+		
NN-501	*Erignathus barbatus*	mandible	whole, no teeth	r	I+	split	longitudinal split lines
NN-502	*Phoca* sp.	mandible	whole, no teeth	r	I+	gnaw	bone edges worn & 1 canine puncture
NN-503	*Phoca* sp.	vertebra, L.	whole minus 1 epiphysis	m	I		
NN-504	*Phoca* sp.	vertebra, th.	whole minus epiphyses	m	I		edges eroded
NN-505	*Phoca* sp.	vertebra, L.	whole minus epiphyses	m	I	gnaw	edges worn, tooth punctures on post edge
NN-506	Phocidae sp	vertebra, c.	whole	m	I+		processes damaged
NN-507	*Phoca* sp.	rib, posterior	middle 95%	r	I+	gnaw	possible tooth marks on proximal edge
NO-1	Cetacea sp.	humerus	whole	r	A		
NP-1	Phocidae sp.	tooth	whole	?	?		post canine, very small
NP-2	Phocidae sp.	tooth	whole	?	?		post canine, very small
NP-3	*Phoca hispida*	mandible +tooth	whole	r	I+		canine tooth in place
NP-4	*Phoca* sp.	rib	whole minus epihpysis	l	I		
NP-5	*Phoca* sp.	rib	middle 90%	l	I+		
NP-6	*Phoca* sp.	rib	whole minus epiphysis	l	I		
NP-7	*Phoca* sp.	rib	whole minus epiphysis	l	I		
NP-8	*Phoca* sp.	rib	middle 85%	r	I+		
NP-9	*Phoca* sp.	rib	middle 90%	r	I+		

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SPECIMEN IDENTIFICATIONS BY PROVENIENCE

#	Taxon	Element	Portion	Side	Age	Taph.	Comments
NP-10	*Phoca* sp.	rib	middle 90%	l	I+		
NP-11	*Phoca* sp.	rib	middle 85%	r	I+		
NP-12	*Phoca* sp.	rib, posterior	whole minus epiphysis	l	I		
NP-13	*Phoca* sp.	rib, posterior	whole minus epiphysis	l	I		
NP-14	*Rangifer tarandus*	humerus	distal 35%	l	A		
NP-15	*Rangifer tarandus*	rib	distal 25%	r	I+		
NP-16	*Phoca hispida*	mandible	whole, no teeth	r	I+		
NP-17	*Lepus arcticus*	scapula	lateral 30%	r	I+		
NP-18	*Erignathus barbatus*	humerus	proximal epiphysis 20%	l	I		
NP-19	*Phoca hispida*	radius	whole	l	I		
NP-20	*Phoca* sp.	radius	distal diaphysis 35%	l	I		
NP-21	*Phoca* sp.	radius	distal 85%	l	A		
NP-22	*Phoca hispida*	mandible	whole, no teeth	l	I+		
NP-23	Phocidae sp.	humerus	whole minus epiphyses	r	I		
NP-24	*Phoca* sp.	ulna	middle 80%	l	I+		
NP-25	*Phoca* sp.	fibula	middle 60%	l	I+		
NP-26	Phocidae sp.	fibula	middle 30%	r	I+		
NP-27	Phocidae sp.	femur	middle 45%	l	I+		
NP-28	Phocidae sp.	sternebra	whole	m	I+		
NP-29	Phocidae sp.	metatarsal I	whole	l	I+		
NP-30	Phocidae sp.	metatarsal	whole minus epiphysis	r	I		
NP-31	Phocidae sp.	metatarsal V	whole minus epiphysis	l	I		
NP-32	Phocidae sp.	phalanx, middle	distal 85%	?	I+		
NP-33	Phocidae sp.	phalanx, prox.	whole minus epiphysis	?	I		
NP-34	Phocidae sp.	phalanx, prox.	whole minus epiphysis	?	I		
NP-35	Phocidae sp.	phalanx, prox.	whole minus epiphysis	?	I		
NP-36	*Phoca* sp.	skull	left temporal bone	m	I+		
NP-37	*Phoca* sp.	vertebra, th.	whole minus epiphyses	m	I		
NP-38	*Rangifer tarandus*	vertebra, th.	body minus epiphyses 60%	m	I		
NP-39	*Rangifer tarandus*	rib	middle 30%	?	I+		
NP-500	*Phoca* sp.	rib	whole	l	I+		
NP-501	*Phoca* sp.	rib	middle 90%	l	I+		
NP-502	Phocidae sp.	metatarsal I	whole	r	I+		
NP-503	*Phoca vitulina*	innominate	middle 90%	l	I+		
NP-504	*Phoca* sp.	scapula	middle 35%	l	I+		
NP-505	Phocidae sp.	Talus	50%	R	I+		
NP-506	*Phoca vitulina*	radius	diaphysis, no epiphyses	r	I		
NP-507	*Phoca groenlandica*	humerus	90%	l	SA		
NP-508	Phocidae sp.	femur	diaphysis, no epiphyses	r	I		
NP-509	*Phoca* sp.	femur	proximal 50%	r	I+		
NP-510	*Erignathus barbatus*	skull	left frontal	m	I+		
NP-511	*Phoca hispida*	vertebra, axis	whole	m	I+		
NP-512	*Phoca hispida*	vertebra, c.	whole	m	I+		
NP-513	*Phoca* sp.	vertebra, th.	whole minus epiphyses	m	I		
NP-514	*Phoca* sp.	vertebra, L.	whole minus epiphyses	m	I		
NP-515	Phocidae sp.	vertebra, s.1	right half	m	I+		
NQ-1	*Phoca Groenlandica*	mandible +teeth	whole	r	I+		4 post canine teeth in place

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#	Taxon	Element	Portion	Side	Age	Taph.	Comments
NQ-2	Phocidae sp.	skull	maxilla fragment + tooth	m	I+		canine tooth in place
NQ-3	*Phoca* sp.	rib	middle 50%	l	I+		
NQ-4	*Rangifer tarandus*	phalanx, distal	whole	?	I+		
NQ-5	*Phoca* sp.	rib	middle 80%	r	I+		
NQ-6	*Ursus maritimus*	rib	middle 75%	r	I+	cut	7 parallel cut marks (c.1cm) at midshaft
NQ-7	*Rangifer tarandus*	vertebra, th.	spine	m	I+	stria	1 transverse possible cut mark (c.8mm)
NQ-8	*Odobenus rosmarus*	skull	right maxilla & premaxilla	m	I+		*incl. jugal, frontal & nasal fragments
NQ-9	Phocidae sp.	humerus	whole minus epiphyses	r	I		
NQ-10	Phocidae sp.	humerus	middle 40%	l	I+		
NQ-11	Phocidae sp.	fibula	distal diaphysis 80%	r	I		
NQ-12	*Phoca groenlandica*	scapula	lateral 20%	r	I+		
NQ-13	*Phoca hispida*	innominate	middle 75%	l	I+		
NQ-14	*Phoca hispida*	innominate	middle 55%	r	I+		
NQ-15	*Erignathus barbatus*	mandible	proximal 50%, no teeth	l	I+		
NQ-16	*Phoca hispida*	skull	right temporal bone	m	I+		
NQ-17	Phocidae sp.	skull	right occipital condyle	m	I+		
NQ-18	*Phoca groenlandica*	skull	left tympanic bulla frag.	m	I+		
NQ-19	*Erignathus barbatus*	vertebra, th.	whole	m	I+		
NQ-20	Phocidae sp.	vertebra, th.	whole minus epiphyses	m	I		edges damaged
NQ-21	*Phoca hispida*	vertebra, th.	body fragment	m	I+	burnt	partially charred
NQ-22	Phocidae sp.	vertebra, L.	body minus epiphyses	m	I		
NQ-23	*Phoca* sp.	rib, anterior	middle 85%	r	I+		
NQ-24	*Phoca* sp.	metatarsal II	distal 65%	l	I+		
NQ-25	*Phoca* sp.	metatarsal	60%	?	I+		poorly preserved
NQ-26	*Phoca groenlandica*	skull	left tympanic bulla	m	I+		
NR-1	Phocidae sp.	tooth, canine	whole	l	I+		
NR-2	Phocidae sp.	tooth, canine	whole	l	I+		probably Phoca sp.
NR-3	*Phoca hispida*	mandible +teeth	whole	l	I+		3 post canines
NR-4	*Phoca* sp.	skull	right maxilla + tooth	r	I+		canine tooth in place
NR-5	*Phoca hispida*	mandible +teeth	whole	r	I+		1 canine & 3 post canines in place
NR-6	Phocidae sp.	tooth, canine	whole	r	I+		probably Phoca sp.
NR-7	Phocidae sp.	tooth, canine	whole	l	J?		very small. Probably Phoca sp.
NR-8	*Phoca* sp.	tooth	whole	r	J?		small post canine. Probably P. hispida
NR-9	*Phoca* sp.	tooth	whole	r	J?		small post canine. Probably P. hispida
NR-10	*Phoca* sp.	tooth	whole	r	J?		small post canine. Probably P. hispida
NR-11	*Phoca* sp.	tooth	whole	r	J?		small post canine. Probably P. hispida
NR-12	*Phoca* sp.	tooth	whole	r	J?		small 1st post canine. Phoca hispida?
NR-13	*Phoca* sp.	tooth	whole	r	J?		small post canine. Probably P. hispida
NR-14	Phocidae sp.	tooth	whole	r	J?		small, poorly developed, post canine
NR-15	*Lepus arcticus*	mandible +teeth	whole	l	I+		all teeth in place
NR-16	*Phoca groenlandica*	skull	left maxilla & canine	m	I+		cojoins with NR-17
NR-17	*Phoca groenlandica*	skull	right maxilla & teeth	m	I+		3 incisors, canine, 2 post canine
NR-18	*Phoca* sp.	rib	proximal 65%	l	I+		
NR-19	*Rangifer tarandus*	rib	middle 25%	l	I+		
NR-20	*Phoca groenlandica*	rib, 4	middle	l	I+		
NR-21	*Phoca* sp.	rib, 4	middle 60%	l	I+		
NR-22	*Phoca vitulina*	scapula	lateral 50%	l	I+	gnaw	possible canine marks on posterior edge

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SPECIMEN IDENTIFICATIONS BY PROVENIENCE 5

#	Taxon	Element	Portion	Side	Age	Taph.	Comments
NR-23	Phocidae sp.	scapula	whole minus epiphysis	r	I		probably Phoca hispida
NR-24	*Phoca hispida*	scapula	middle 40%	l	I+		
NR-25	*Erignathus barbatus*	femur	middle 85%	r	I+	chop	deep chopmark across distal diaphysis
NR-26	*Phoca* sp.	femur	distal epiphysis	R	I		
NR-27	*Phoca vitulina*	tibia	whole minus epiphyses	l	I		
NR-28	*Phoca* sp.	tibia	middle 50%	l	I+		
NR-29	*Phoca groenlandica*	tibia	proximal 50%	r	A		
NR-30	Phocidae sp.	humerus	middle 30%	l	I+		
NR-31	*Erignathus barbatus*	mandible	whole, no teeth	l	I+		
NR-32	*Phoca hispida*	mandible	whole, no teeth	r	I+		
NR-33	*Erignathus barbatus*	skull	occipital bone	m	I+		
NR-34	*Phoca hispida*	skull	left tympanic bulla	m	I+		
NR-35	*Phoca* sp.	skull	left maxilla & canine	m	I+		probably Phoca groenlandica
NR-36	Phocidae sp.	metatarsal II	proximal 50%	l	I+		
NR-37	Phocidae sp.	vertebra, L.	whole minus epiphyses	m	I		
NR-38	*Phoca hispida*	sacrum	proximal 50%	m	I+		
NR-39	*Phoca hispida*	vertebra, th.	whole minus anterior epiph	m	I		
NR-40	*Phoca* sp.	vertebra, th.	whole	m	I+		
NR-41	Phocidae sp.	vertebra, L.	90%	m	I*	gnaw	epiph lines distinct. gnaw marks on body
NR-42	*Phoca* sp.	rib	whole	l	I+		
NR-43	*Phoca* sp.	rib	proximal 90%	l	I+		
NR-44	Phocidae sp.	vertebra, th.	body minus epiphyses	m	I		
NR-45	Phocidae sp.	vertebra*	anterior articular process	m	I+		*lumbar or posterior thoracic
NR-46	*Phoca* sp.	rib	distal 40%	l	I+		
NR-47	Anatidae sp.	tibiotarsus	middle 85%	l	I+	bent	bowed & compressed (post depositional?)
NR-48	Anatidae sp.	tibiotarsus	middle 60%	r	I+		
NR-49	Laridae sp.	humerus	middle 50%	r	I+		
NR-50	Phocidae sp.	rib	proximal 90%	l	I+		
NR-51	*Phoca* sp.	humerus	whole minus epiphyses	r	I		
NR-52	Phocidae sp.	fibula	middle 50%	l	I+		
NR-53	*Phoca groenlandica*	tibia	proximal 55%	r	A		
NR-54	*Phoca hispida*	scapula	lateral 40%	r	I+		
NR-55	*Phoca hispida*	scapula	centre 30% (spine area)	l	I+		
NR-56	*Erignathus barbatus*	rib, posterior	head 20%	l	I+		
NR-57	Phocidae sp.	vertebrae, L.	85%, no epiphyses	m	I	*	* cortex bleached white (sun exposure)
NR-58	Phocidae sp.	vertebrae, th.	anterior epiphysis	m	I		
NR-59	Phocidae sp.	tibia	middle 25%	l	I+		
NR-500	Phocidae sp.	rib	middle 90%	r	I+		
NR-501	Phocidae sp.	rib	middle	l	I+		
NR-502	*Erignathus barbatus*	rib	whole minus epiphysis	r	I		
NR-503	Phocidae sp.	metatarsal I	whole	r	I+		
NR-504	Phocidae sp.	metatarsal IV	whole	l	I+		
NR-505	Phocidae sp.	metatarsal IV	whole minus dist. epiph.	l	I		
NR-506	Phocidae sp.	carpal II	whole	r	I+		
NR-507	Phocidae sp.	tarsal I	whole	l	I+		
NR-508	*Phoca* sp.	humerus	distal 80%	l	A	gnaw	tooth marks around protruding edges
NR-509	Phocidae sp.	humerus	middle 50%	r	I+	gnaw	tooth marks concentrate at broken ends

APPENDIX A

SPECIMEN IDENTIFICATIONS BY PROVENIENCE

#	Taxon	Element	Portion	Side	Age	Taph.	Comments
NR-510	Phocidae sp.	radius	distal diaphysis 25%	r	I		
NR-511	Phocidae sp.	radius	distal diaphysis 25%	r	I		
NR-512	Phocidae sp.	radius	diaphysis fragment 10%	r	I+		
NR-513	Phocidae sp.	radius	middle 40%	l	I+		
NR-514	Phocidae sp.	radius	distal diaphysis fragment	l	I		
NR-515	Phocidae sp.	femur	diaphysis 60%	r	I		
NR-516	*Phoca* sp.	ulna	diaphysis 75%	r	I+	gnaw	1 tooth puncture at each broken end
NR-517	*Phoca* sp.	fibula	diaphysis 80%	l	I		
NR-518	*Phoca* sp.	fibula	middle 30%	l	I+		
NR-519	*Phoca* sp.	fibula	distal epiphysis 10%	l	I		
NR-520	Phocidae sp.	tibia	middle 15%	r	I+	gnaw	surface pitted with tooth marks
NR-521	*Phoca* sp.	vertebra, th.	whole	m	I	punct	a possible canine puncture
NR-522	*Phoca hispida*	vertebra, th.	spine	m	I+	punct	a possible canine puncture
NR-523	*Phoca hispida*	vertebra, L.	left side of arch 20%	m	I		
NR-524	Phocidae sp.	vertebra	right side of arch, frag.	m	I+		
NR-525	*Phoca* sp.	skull	right maxilla & premaxilla	m	I+		
NR-526	*Phoca hispida*	skull	left occipital condyle	m	I+		cojoins with NR-527
NR-527	*Phoca hispida*	skull	right occipital condyle	m	I+		cojoins with NR-526
NR-528	*Phoca* sp.	skull	right tympanic bulla frag.	m	I+		
NR-529	*Erignathus barbatus*	skull	left jugal	m	I+		
NR-530	*Phoca groenlandica*	mandible	whole, no teeth	l	I+		
NR-531	*Vulpes* sp.	tibia	distal 40%	l	I+		
NR-532	*Larus* sp.	humerus	proximal 70%	l	I+		
NS-500	*Rangifer tarandus*	humerus	distal diaphysis 20%	r	I+		
NS-501	*Rangifer tarandus*	calcaneum	whole minus epiphysis	l	I		
NS-502	*Halichoerus grypus*	scapula	medial 90%	r	I+		
NS-503	*Phoca* sp.	scapula	neck 20%	r	I+		
NS-504	*Phoca* sp.	scapula	glenoid fossa & neck 15%	l	I+		
NS-505	*Phoca* sp.	scapula	neck 25%	r	I+		
NS-506	*Odobenus rosmarus*	scapula	glenoid fossa & neck 25%	l	I+		
NS-507	*Phoca hispida*	rib	middle 85%	r	I+		
NS-508	*Phoca* sp.	rib	middle 90%	l	I+		
NS-509	Phocidae sp.	rib	proximal 90%	l	I+		
NS-510	*Phoca* sp.	humerus	distal diaphysis 40%	r	I		
NS-511	*Phoca* sp.	femur	middle 40%	l	I		
NS-512	Phocidae sp.	rib, anterior	whole	l	I+		
NS-513	*Phoca* sp.	rib, posterior	proximal 30%, no epiphysis	r	I		
NS-514	*Phoca* sp.	rib	middle 40%	l	I+		
NS-515	*Phoca* sp.	rib	middle 70%	l	I+		
NS-516	*Phoca* sp.	rib	middle 25%	r	I+		
NS-517	*Phoca* sp.	vertebra, axis	whole minus epiphysis	m	I		
NS-518	*Phoca* sp.	vertebra, th.	whole minus epiphyses	m	I		
NS-519	*Erignathus barbatus*	vertebra, th.	whole minus epiphyses	m	I		
NS-520	Phocidae sp.	vertebra, L.	whole minus anterior epiph	m	I		
NS-521	Phocidae sp.	vertebra, c.7	whole minus epiphyses	m	I		
NS-522	Phocidae sp.	vertebra caudal	whole minus epiphyses	m	I		
NS-523	Phocidae sp.	vertebra	articular process 10%	m	I+		

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SPECIMEN IDENTIFICATIONS BY PROVENIENCE

#	Taxon	Element	Portion	Side	Age	Taph.	Comments.
NS-524	Phocidae sp.	phalanx, prox.	whole	?	I+		
NS-525	*Phoca* sp.	phalanx, prox.*	whole	?	I+		*front
NS-526	Phocidae sp.	phalanx, prox.*	distal 50%	?	I+		*hind
NS-527	*Phoca* sp.	patella	whole	l	I+		
NS-528	*Phoca* sp.	talus	60%	r	I+		
NS-529	*Phoca* sp.	talus	15%	r	I+		
NS-530	*Phoca* sp.	tarsal centrale	whole	l	I+		
NS-531	Phocidae sp.	sternebra	90%	m	I+		
NS-532	*Phoca* sp.	fibula	middle 40%	l	I+		
NS-533	*Rangifer tarandus*	scapula	anterior 25%	r	I+		
NS-534	*Phoca* sp.	ulna	middle 20%	r	I+		
NS-535	Phocidae sp.	scapula	spine	r	I+		
NS-536	Phocidae sp.	femur	head 15%	r	I+		
NS-537	canidae sp.	ulna	mid diaphysis	r	I+		
NS-538	*Phoca vitulina*	innominate	pubis	l	I+		
NS-539	Phocidae sp.	metatarsal II	whole	l	I+		
NS-540	*Phoca* sp.	skull	left jugal	m	I+		
NS-541	*Phoca hispida*	skull	left tympanic bulla	m	I+		
NS-542	Phocidae sp.	skull	maxilla fragment	m	I+		
NS-543	*Phoca hispida*	skull	occipital bone fragment	m	I+		
NS-544	Phocidae sp.	vertebra caudal	dorsal 30% minus epiphyses	m	I		
NS-545	Phocidae sp.	skull	basisphenoid	m	I+		
NS-546	Phocidae sp.	vertebra, axis	left ant. articular proc.	m	I+		
NS-547	Phocidae sp.	vertebra, atlas	left side of arch 20%	m	I+	burnt	cortex charred black
NS-548	Phocidae sp.	vertebra, th.	left articular process	m	I+		
NS-549	Pinnipedia sp.	rib	middle 90%	r	I+		
NS-550	*Larus* sp.	coracoid	whole	r	I+		
NS-551	Anatidae sp.	humerus	middle 40%	l	I+		similar in size to Mergus serrator
NS-552	Cetacea sp.	rib	?	?	I+		
NT-1	Phocidae sp	tooth*	whole	r	J?		*post canine. unusual morphology
NT-2	*Phoca* sp.	skull	right maxilla & teeth*	m	I+	punct	*canine, 2 post canines. 2 tooth marks
NT-3	Phocidae sp	rib, anterior	distal 80%	l	I+		
NT-4	*Phoca* sp.	rib	proximal 95%	r	I+		
NT-5	Phocidae sp.	rib, posterior	middle 95%	r	I+		
NT-6	*Phoca hispida*	rib	middle 60%	l	I+		
NT-7	Phocidae sp.	tibia	proximal diaphysis 55%	r	I		
NT-8	Phocidae sp.	fibula	middle 75%	r	I+		
NT-9	*Phoca groenlandica*	humerus	whole	l	SA	gnaw	tooth impressions on both epiphyses
NT-10	*Phoca groenlandica*	skull	right temporal bone	m	I+		
NT-11	Phocidae sp.	vertebra, axis	anterior 70%	m	I+		
NT-12	*Phoca groenlandica*	vertebra, th.	arch portion 40%	m	I+		
NT-13	*Phoca hispida*	vertebra, th.	whole minus post. epiph.	m	I		posterior thoracic
NU-1	*Phoca hispida*	mandible	whole	l	I*		*very small, probably I or even J
NU-2	*Phoca hispida*	mandible	whole	l	I*		*very small. cojoins with NU-1
NU-3	*Phoca* sp.	rib, posterior	whole	l	I+		
NU-4	Phocidae sp.	rib, posterior	proximal 90%	r	I+		
NU-5	*Phoca* sp.	rib, middle	proximal 90%	r	I+		

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SPECIMEN IDENTIFICATIONS BY PROVENIENCE

#	Taxon	Element	Portion	Side	Age	Taph.	Comments
NU-6	*Phoca groenlandica*	rib, middle	proximal 40%	l	I+	*	*distal end is sun bleached
NU-7	*Phoca* sp.	rib, 1	whole	l	I+		
NU-8	*Phoca* sp.	rib, 1	whole	r	I+		
NU-9	*Phoca* sp.	rib, posterior	whole	l	I+		
NU-10	*Phoca* sp.	rib, posterior	whole	l	I+		
NU-11	*Phoca* sp.	rib, middle	middle 50%	l	I+		
NU-12	*Phoca hispida*	skull	tympanic bulla	m	I+		
NU-13	Phocidae sp.	skull	basisphenoid	m	I+		
NU-14	*Phoca hispida*	innominate	95%	r	I+	*	*illium is sun bleached
NU-15	*Rangifer tarandus*	innominate	acetabulum 25%	r	I+		
NU-16	*Phoca hispida*	radius	distal 75%	r	A	gnaw	possible tooth crushing on prox. end
NW-1	*Cystophora cristata*	humerus	whole	r	SA		
NW-2	*Phoca groenlandica*	tibia	diaphysis	r	I		
NW-3	Phocidae sp.	metatarsal, I	whole	l	I+		
NW-4	Phocidae sp.	phalanx, middle	whole	?	I+		Phoca sp.?
NW-5	*Phoca groenlandica*	sternebra, 9	whole	m	I+		
NW-6	*Phoca groenlandica*	sternebra	whole	m	I+		
NW-7	*Phoca vitulina*	radius	diaphysis	l	I		
NW-8	*Odobenus rosmarus*	vertebra, c.1	ventral 90%	m	I+	chop	spinous process sheared off (cultural?)
NW-9	*Phoca groenlandica*	scapula	glenoid fossa & distal 80%	l	I+		
NW-10	*Phoca groenlandica*	femur	greater trochanter	r	I+		
NW-11	*Erignathus barbatus*	skull occipital	15% incl occipital condyle	l	I+		
NW-12	*Phoca* sp.	vertebra, th.	body minus epiphysis	m	J		
NW-13	*Phoca* sp.	rib	middle 50%	r	I+		
NW-14	*Phoca* sp.	rib	middle 90%	l	I+		
NW-15	*Phoca groenlandica*	rib, middle	40% of vertebral end	l	I+	punct	2 probable canine punctures
NW-16	*Phoca hispida*	rib	middle 60%	l	I+	stria	possible cut marks across line of rib
NW-17	*Phoca hispida*	rib	middle 40%	r	I+		
NX-1	*Rangifer tarandus*	patella	whole	l	I+		
NX-2	*Rangifer tarandus*	vertebra, th.7	whole minus epiphyses	m	I		
NX-3	*Vulpes lagopus*	skull	left+right maxilla & teeth	m	I+		3incisors, 2canines, 5premolars, 4molars
NX-4	*Vulpes lagopus*	mandible +teeth	whole	l	I+		2 premolars, 3 molars
NX-5	*Phoca hispida*	mandible +teeth	middle 60%	l	I+		canine & 4 post canines
NX-6	*Phoca groenlandica*	skull	right tympanic bulla	m	I+		
NX-7	*Phoca groenlandica*	skull	occipital bone	m	I+		
NX-8	*Phoca groenlandica*	skull	right tympanic bulla	m	I+		
NX-9	*Phoca hispida*	vertebra, c.5	whole	m	I		epiphyses unfused
NX-10	*Phoca groenlandica*	innominate	80%	l	I+		
NX-11	*Phoca hispida*	scapula	glenoid fossa & distal 25%	l	I+	break	coracoid process broken off cleanly
NX-12	*Phoca hispida*	mandible	proximal 50%, no teeth	l	I+		
NX-13	*Rangifer tarandus*	talus	whole	r	I+		all edges very eroded
NX-14	Phocidae sp.	ulna	whole minus dist. epiph.	r	I		
NX-15	*Phoca* sp.	radius	proximal 25%	l	I+		
NX-16	*Phoca* sp.	tibia	middle 40%	l	I+		
NX-17	*Phoca vitulina*	fibula	middle 60%	l	I+		
NX-18	Phocidae sp.	metatarsal I	whole	r	I+		
NX-19	Phocidae sp.	phalanx, prox.I	whole	r	I+		

APPENDIX A

SPECIMEN IDENTIFICATIONS BY PROVENIENCE

#	Taxon	Element	Portion	Side	Age	Taph.	Comments
NX-20	Phocidae sp.	metatarsal III	90%	r	I+	chop	ventral side of each end chopped off
NX-21	Phocidae sp.	metatarsal III	90%	l	I+		edges very eroded
NX-22	Phocidae sp.	phalanx	middle 80%	?	I+		
NX-23	*Canis* sp.	skull	occipital bone	m	?*		*very tiny, but no J cortex. prob. I
NX-24	Mammal	scapula	?	?	I+	chop	severed perpendicular to spine. no stria
NX-25	Anatidae sp.	femur	middle 70%	l	I+		similar in size to Somateria sp.
NX-26	*Phoca* sp.	rib, middle	middle 40%	r	I+		probably Phoca vitulina
NX-27	*Phoca* sp.	rib, middle	vertebral 30%	r	I+		
NX-28	*Phoca* sp.	rib	middle 25%	r	I+		
NX-29	*Phoca groenlandica*	rib	middle 50%	r	I+		
NX-30	*Phoca groenlandica*	rib	middle 40%	l	I+		
NX-31	*Phoca* sp.	rib	middle 50%	l	I*		very tiny, probably immature
NX-32	Aves	ulna	distal end		I+		probably Anatidae sp.
NX-33	*Erignathus barbatus*	fibula	proximal 80%	l	I+	chop	distal end chopped off diagnally
NX-34	*Erignathus barbatus*	rib	middle 90%	l	I+	punct	canine punctures
NX-35	*Rangifer tarandus*	scapula	distal 25%	r	I+		
NX-36	*Phoca groenlandica*	scapula	spine & posterior edge 25%	l	I+	chop	possible chop mark in glenoid fossa area
NX-38	*Rangifer tarandus*	metatarsal	posterior shaft fragment	l	I+		
NX-39	*Rangifer tarandus*	phalanx, prox.	whole	?	I+		
NX-40	*Phoca* sp.	phalanx*	proximal 90%	l	I+		*proximal II
NX-41	Phocidae sp.	phalanx*	distal 80%	?	I+		*middle III
NX-42	Phocidae sp.	metatarsal V	whole minus dist. epiph.	r	I	stria	shallow transverse cut marks on mid-bone
NX-43	Phocidae sp.	metapodial	whole minus epiphyses	?	I		
NX-44	*Phoca* sp.	ziphisternum	whole	m	I+		
NX-45	*Phoca* sp.	sternebra	whole	m	I+		
NX-46	*Phoca* sp.	sternebra	whole	m	I+		
NX-47	Phocidae sp.	baculum	distal 90%	m	I+		
NX-48	*Phoca* sp.	vertebra, L.	ventral fragment of body*	m	I		anterior lumbar, no epiphyses
NX-49	*Phoca hispida*	vertebra, atlas	whole	m	I+		
NX-50	*Phoca groenlandica*	rib, posterior	proximal 90%	l	I+		
NX-51	*Halichoerus grypus*	humerus	middle 50%	l	I+		Haliaeetus leucocephalus. very fragile
NX-52	*Rangifer tarandus*	rib, posterior	sternal 90%	l	I+		
NX-53	*Phoca groenlandica*	rib, middle	middle 50%	r	I+	gnaw	possible gnaw marks on distal end
NX-54	Phocidae sp.	tibia & fibula	proximal epiphyses	l	I		
NX-55	Balaenidae sp.	vertebra caudal	body minus 1 epiphysis	m	I		
NX-56	*Phoca* sp.	mandible	middle 40%, no teeth	r	I+		
NX-57	*Phoca* sp.	innominate	ischium minus acetabulum	l	I+		cojoins with NX-58
NX-58	*Phoca* sp.	innominate	pubis minus acetabulum	l	I+		cojoins with NX-57
NX-59	Phocidae sp.	fibula	diaphysis	l	I+		
NX-60	Phocidae sp.	tibia	proximal diaphysis 30%	l	I+		
NX-61	*Phoca* sp.	tibia	proximal diaphysis 50%	r	I+		
NY-1	*Erignathus barbatus*	humerus	90%	l	A	gnaw	carnivore gnawing on epiphyses
NY-2	*Phoca vitulina*	humerus	distal epiphysis	r	I		
NY-3	*Erignathus barbatus*	humerus	distal epiphysis	r	I		
NY-4	*Phoca hispida*	femur	diaphysis	l	I		
NY-5	*Phoca hispida*	femur	middle 90%	r	A		
NY-6	Phocidae sp.	femur	middle 40%	r	I+		

APPENDIX A

SPECIMEN IDENTIFICATIONS BY PROVENIENCE

#	Taxon	Element	Portion	Side	Age	Taph.	Comments
NY-7	Phocidae sp.	radius	proximal 60%	l	I+		
NY-8	*Phoca* sp.	radius	distal 60%	l	SA		
NY-9	*Phoca vitulina*	tibia	middle 90%	l	I		
NY-10	*Phoca groenlandica*	tibia	middle 65%	l	I+		
NY-11	*lepus arcticus*	mandible +teeth	whole	r	I+		1 incisor, 1 premolar, 2 molars in place
NY-12	*lepus arcticus*	mandible +teeth	whole	l	I+		2 premolars, 2 molars in place
NY-13	*lepus arcticus*	ulna	proximal 60%	l	A		
NY-14	*lepus arcticus*	radius	whole	l	A		
NY-15	*Vulpes lagopus*	mandible +teeth	whole	r	I+		
NY-16	*Vulpes lagopus*	vertebra, L.6	whole minus epiphyses	m	I		
NY-17	*Canis* sp.	vertebra, c.6	whole minus epiphyses	m	I		
NY-18	*Phoca hispida*	vertebra, L.5	body minus epiphyses	m	I		
NY-19	*Rangifer tarandus*	vertebra, s.1	body	m	I+		
NY-20	*Phoca* sp.	vertebra, th.*	arch & body frag, no ep.	m	I		* thoracic number 13 or 14
NY-21	*Phoca groenlandica*	vertebra, th.*	body & arch, no epiphyses	m	I		* posterior thoracic
NY-22	*Phoca* sp.	phalanx prox.II	whole	l	I+		
NY-23	Phocidae sp.	metatarsal V	whole	l	I+		
NY-24	Phocidae sp.	metatarsal I	whole	l	I+		
NY-25	Phocidae sp.	phalanx, mid.II	whole	?	I+		
NY-26	*Phoca groenlandica*	rib, anterior	whole	l	I+		
NY-27	*Phoca* sp.	rib, posterior	vertebral end, 40%	r	I+		
NY-28	*Phoca groenlandica*	rib, posterior	vertebral end, 25%	r	I+		
NY-29	*Cystophora cristata*	rib, anterior	whole	l	I+		
NY-30	*Phoca hispida*	rib, anterior	middle 80%	l	I+		
NY-31	*Erignathus barbatus*	rib, middle	middle 25%	r	I+		
NY-33	*Phoca hispida*	rib	sternal end, 60%	l	I+		
NY-34	*Phoca hispida*	rib, posterior	middle 60%	l	I+		
NY-35	*Phoca* sp.	rib	middle 25%	?	I+		
NY-36	*Erignathus barbatus*	fibula	middle 35%	r	I+		
NY-37	*Phoca* sp.	phalanx	middle 80%	?	I		
NY-38	*Phoca* sp.	fibula	middle 50%	?	I+		
NY-39	*Phoca groenlandica*	mandible +teeth	distal 80%	l	I+		1 canine & 1 premolar in place
NY-40	*Vulpes* sp.	tooth, canine	whole	r	?		
NY-41	*Lepus arcticus*	humerus	middle 60%	l	I+		
NY-42	*Lepus arcticus*	ulna	distal end of diaphysis	l	I		
NZ-1	*Phoca hispida*	innominate	illium & ischium	l	I+		
NZ-2	*Phoca groenlandica*	innominate	acetabulum & illium	r	I+		
NZ-3	*Erignathus barbatus*	skull	15%, along nuchal line	m	I+		
NZ-4	*Phoca groenlandica*	skull, temporal	temporal bulla	r	I+		
NZ-5	*Phoca vitulina*	skull, temporal	temporal zygomatic process	l	I+		
NZ-6	Phocidae sp.	talus	whole	r	I+		probably Phoca sp.
NZ-7	Phocidae sp.	talus	whole	l	I+		probably Phoca sp.
NZ-8	Phocidae sp.	calcaneum	whole	r	I+		probably Phoca sp.
NZ-9	*Vulpes* sp.	mandible	middle 75%	l	I+		probably Vulpes lagopus
NZ-10	*Phoca groenlandica*	mandible	whole	r	I+		
NZ-11	*Phoca groenlandica*	mandible	middle 60%	l	I+		
NZ-12	*Lepus arcticus*	femur	distal 25%	l	A		

APPENDIX A

SPECIMEN IDENTIFICATIONS BY PROVENIENCE 11

#	Taxon	Element	Portion	Side	Age	Taph.	Comments
NZ-13	*Lepus arcticus*	femur	distal 95%	l	A		
NZ-14	*Ursus maritimus*	patella	proximal 50%	r	I+		
NZ-15	Phocidae sp.	radius	middle 50%	l	I		
NZ-16	Phocidae sp.	femur	1/2 distal epiphysis	l	I		
NZ-17	Phocidae sp.	tibia	proximal 60%	r	SA	stria	possible cut marks
NZ-18	Phocidae sp.	tibia	middle 60%	l	I+		probably Phoca sp.
NZ-19	*Phoca* sp.	tibia	proximal epiphysis	r	I		
NZ-20	*Phoca groenlandica*	vertebra, th.16	left 1/2 of body	m	I+		
NZ-21	*Phoca* sp.	vertebra, c.	whole	m	I+		
NZ-22	*Phoca hispida*	vertebra th./L.	arch fragment	m	I+		a posterior thoracic or a lumbar vert.
NZ-23	*Rangifer tarandus*	vertebra, th.	spinous process	m	I+		
NZ-24	Phocidae sp.	humerus	middle 60%	r	I+		
NZ-25	*Rangifer tarandus*	rib, middle	middle 75%	r	I+		
NZ-26	*Phoca* sp.	rib	sternal end, 60%	?	I+		
NZ-27	*Phoca* sp.	rib	middle 30%	?	I+		
NZ-28	*Erignathus barbatus*	rib	middle 50%	l	I+		
NZ-29	*Phoca* sp.	rib	middle 70%	?	I+		
NZ-30	*Phoca* sp.	rib	vertebral end, 25%	r	I+		
NZ-31	*Phoca* sp.	rib	middle 70%	r	I+		
NZ-32	*Phoca hispida*	metatarsal I	whole	l	I+		
NZ-33	*Phoca* sp.	phalanx, prox.I	whole	l	I+		
NZ-34	*Phoca* sp.	phalanx, prox.	proximal 50%	?	I+		
NZ-35	Anatidae sp.	humerus	middle 80%	l	I+		
NZ-36	*Larus argentatus*	tibiotarsus	distal 30%	r	I+		
NZ-37	*Phoca groenlandica*	vertebra, c.6/7	left articular process	m	I+		
NZ-38	*Rangifer tarandus*	ulna	semi-lunar notch	r	I+		
NZ-39	*Ursus maritimus*	scapula	glenoid fossa & distal 30%	r	I+		
NZ-40	*Rangifer tarandus*	humerus	distal 30%	l	I+	chop	diaphysis chopped off across bone axis
NZ-41	*Phoca* sp.	scapula	posterior edge	l	I+		
NZ-42	*Phoca hispida*	radius	diaphysis	l	I		
NZ-43	*Odobenus rosmarus*	radius	proximal 65%	l	I+		
NZ-44	*Phoca* sp.	rib	sternal end, 90%	l	I+		
NZ-45	*Phoca groenlandica*	scapula & cart.	whole	l	I+		part of scapular cartilage preserved
NZ-46	*Phoca hispida*	vertebra, c.1	whole	m	I+		
NZ-47	*Phoca hispida*	vertebra, c.1	whole	m	I+		
NZ-48	*Phoca groenlandica*	humerus	proximal 50%	r	A	break	spiral fracture of the shaft
NZ-49	*Phoca groenlandica*	vertebra, L.3/4	whole	m	I+		lumbar # 3 or 4
NZ-50	*Odobenus rosmarus*	vertebra, L.	body	m	I+		by exclusion, not Erignathus/Cystophora
NZ-51	*Rangifer tarandus*	humerus	distal 40%	l	I+	chop	diaphysis chopped off across bone axis
NZ-52	*Phoca groenlandica*	ulna	middle 40%	r	I+		
NZ-53	*Phoca hispida*	humerus	whole	r	A		
NZ-54	*Phoca* sp.	scapula	glenoid fossa & post. edge	r	I+		P. vitulina or P. hispida
NZ-55	*Erignathus barbatus*	vertebra th.1/2	body & arch	m	I+	gnaw	thoracic # 1 or 2, canine tooth marks
NZ-56	*Cystophora cristata*	rib	sternal end, 80%	l	I		imperfect match, but juvenile ref. skel.
NZ-57	*Erignathus barbatus*	rib, middle	middle 90%	l	I+	stria	cut marks (?) across rib. Canine punct.s
NZ-58	Phocidae sp.	rib	middle 50%	r	A		

APPENDIX B*

LIST OF SPECIES THAT RANGE INTO EXTREME NORTHERN UNGAVA

MAMMALIA

Lepus arcticus Ross	arctic hare
Peromyscus maniculatus (Wagner)	deer mouse
Clethrionomys gapperi (Vigors)	red-backed mouse
Ondatra zibethicus (Linnaeus)	muskrat
Dicrostonyx hudsonius (Pallas)	Ungava lemming
Dicrostonyx torquatus (Pallas)	collared lemming
Phenacomys intermedius (Merriam)	heather vole
Microtus pennsylvanicus (Ord)	meadow vole
Erethizon dorsatum (Linnaeus)	porcupine
Hyperoodon ampullatus (Forster)	northern bottlenosed whale
Physeter catodon Linnaeus	sperm whale
Delphinapterus leucas (Pallas)	white whale (beluga)
Monodon monoceros Linnaeus	narwhal
Lagenorhynchus albirostris Gray	white-beaked dolphin
Globicephala melaena (Traill)	Atlantic pilot whale
Phocoena phocoena (Linnaeus)	harbour porpoise
Balaenoptera acutorostrata Lacepede	minke whale
Balaenoptera musculus (Linnaeus)	blue whale
Balaena mysticetus Linnaeus	bowhead whale
Canis lupus (labradorius) Linnaeus	gray wolf
Vulpes vulpes (Linnaeus)	red fox
Alopex lagopus ungava (Linnaeus)	arctic fox
Ursus maritimus Phipps	polar bear
Mustela erminea richardsonii Linnaeus	ermine or stoat
Mustela rixosa Linnaeus	least weasel
Mustela vison Schreber	mink
Martes americana (Turton)	marten
Gulo luscus or Gulo gulo (Linnaeus)	wolverine
Lutra canadensis (Schreber)	river otter
Odobenus rosmarus (Linnaeus)	walrus
Phoca vitulina Linnaeus	harbour seal
Phoca hispida Schreber	ringed seal
Phoca groenlandica Erxleben	harp seal
Halichoerus grypus (Fabricius)	grey seal
Erignathus barbatus (Erxleben)	bearded seal
Cystophora cristata (Erxleben)	hooded seal
Rangifer tarandus caribou (Gmelin)	caribou

* from Watson 1988

AVES

Gavia stellata (Pontoppidan)	Red-throated Loon
Gavia immer (Brunnich)	Common Loon
Puffinus gravis (O'Reilly)	Greater Shearwater
Branta canadensis (Linnaeus)	Canada Goose
Aythya marila (Linnaeus)	Greater Scaup
Somateria mollissima (Linnaeus)	Common Eider
Somateria spectabilis (Linnaeus)	King Eider
Camptorhynchus labradorius (Gmelin)	Labrador Duck
Histrionicus histrionicus (Linnaeus)	Harlequin Duck
Clangula hyemalis (Linnaeus)	Oldsquaw
Bucephala islandica (Gmelin)	Barrows Goldeneye
Mergus serrator Linnaeus	Red-breasted Merganser
Buteo lagopus (Pontoppidan)	Rough-legged Hawk
Aquila chrysaetos (Linnaeus)	Golden Eagle
Falco peregrinus Tunstall	Peregrine Falcon
Falco rusticolus Linnaeus	Gyr Falcon
Dendragapus canadensis (Linnaeus)	Spruce Grouse
Lagopus lagopus (Linnaeus)	Willow Ptarmigan
Lagopus mutus (Montin)	Rock Ptarmigan
Charadrius semipalmatus Bonaparte	Semipalmated Plover
Actitis macularia (Linnaeus)	Spotted Sandpiper
Numenius borealis (Forster)	Eskimo Curlew
Calidris pusilla (Linnaeus)	Semipalmated Sandpiper
Gallinago gallinago (Linnaeus)	Common Snipe
Phalaropus lobatus (Linnaeus)	Red-necked Phalarope
Stercorarius parasiticus (Linnaeus)	Parasitic Jaeger
Larus argentatus Pontoppidan	Herring Gull
Larus hyperboreus Gunnerus	Glaucus Gull
Larus marinus Linnaeus	Great Black-backed Gull
Rissa tridactyla (Linnaeus)	Black-legged Kittiwake
Sterna paradisaea Pontoppidan	Arctic Tern
Uria lomvia (Linnaeus)	Thick-billed Murre
Cepphus grylle (Linnaeus)	Black Guillemot
Nyctea scandiaca (Linnaeus)	Snowy Owl
Eremophila alpestris (Linnaeus)	Horned Lark
Corvus corax Linnaeus	Common Raven
Oenanthe oenanthe (Linnaeus)	Northern Wheatear
Anthus spinoletta (Linnaeus)	Water Pipit
Spizella arborea (Wilson)	American Tree Sparrow
Passerculus sandwichensis (Gmelin)	Savannah Spaarrow
Zonotrichia leucophrys (Forster)	White-crowned Sparrow
Calcarius lapponicus (Linnaeus)	Lapland Longspur
Plectrophenax vivalis (Linnaeus)	Snow Bunting
Carduelis flammea (Linnaeus)	Common Redpoll

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Passerculus sandwichensis (Gmelin)	Savannah Spaarrow
Zonotrichia leucophrys (Forster)	White-crowned Sparrow
Calcarius lapponicus (Linnaeus)	Lapland Longspur
Plectrophenax nivalis (Linnaeus)	Snow Bunting
Carduelis flammea (Linnaeus)	Common Redpoll