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Zooarchaeology of a Focal Resource: Dietary Importance of Beluga Whales to the Precontact Mackenzie Inuit

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ABSTRACT. Ethnohistoric records indicate that the economy of early historic Mackenzie Inuit was centred on the summer hunt for beluga whales (*Delphinapterus leucas)*. However, no systematic attempt has been made to quantify the dietary importance of beluga whales to earlier, precontact-period Mackenzie Inuit societies. This issue is addressed herein through analysis of over 2000 beluga bones recovered from a semisubterranean house at Gupuk, a Mackenzie Inuit archaeological site on the East Channel of the Mackenzie River. The amount of meat and fat available from beluga whales is compared to that from all other prey species at the site to assess the relative dietary contribution of each taxon. The results indicate that beluga whales were a truly focal resource in the local economy, probably providing over half of the food available to residents of Gupuk and other communities in the Mackenzie Delta for at least half of each year.

Key words: beluga whale, white whale, *Delphinapterus leucas*, Gupuk, Kittigazuit, Mackenzie Inuit, Inuvialuit, Mackenzie Delta, zooarchaeology, archaeology

RÉSUMÉ. Les relevés ethnohistoriques indiquent que l'économie des Inuit du Mackenzie du début de l'époque historique était centrée sur la chasse estivale au bélouga (*Delphinapterus leucas*). Aucun essai systématique n'a cependant été réalisé dans le but de quantifier l'importance alimentaire du bélouga pour les anciennes sociétés inuits du Mackenzie d'avant le contact avec les Européens. Cet article se penche sur la question grâce à l'analyse de plus de 2000 os de bélougas récupérés dans une habitation semi-souterraine de Gupuk, site des Inuit du Mackenzie sur le chenal est du fleuve Mackenzie. On compare la quantité de viande et de gras venant du bélouga à celle de toutes les autres espèces de proies sur le site afin d'évaluer la contribution alimentaire relative de chaque taxon. Les résultats indiquent que le bélouga était véritablement une ressource primordiale dans l'économie locale, fournissant probablement plus de la moitié de la nourriture disponible aux résidents de Gupuk et des autres communautés du delta du Mackenzie pendant au moins six mois de l'année.

Mots clés: bélouga, baleine blanche, *Delphinapterus leucas*, Gupuk, Kittigazuit, Inuit du Mackenzie, Inuvialuit, delta du Mackenzie, zoo-archéologie, archéologie

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INTRODUCTION

Beluga whales (*Delphinapterus leucas*) are important to the modern-day Inuvialuit of the Mackenzie Delta, both as a source of food and as a focus of social activity. Each summer, pods of beluga are intercepted at a number of points along their migration route between the Bering and Beaufort Seas. Accounts of Inuvialuit elders, as well as the earliest ethnohistoric records, indicate that this focus on summer beluga hunting has a long history, and reached its peak importance in communities located on the East Channel of the Mackenzie River. However, no systematic attempt has been made to quantify the dietary importance of beluga whales to precontact Mackenzie Inuit society.

We address this issue through the analysis of over 2000 beluga bones recovered from a semisubterranean house at Gupuk (NiTs-1), a precontact period Mackenzie Inuit site on the East Channel of the Mackenzie River (Fig. 1). The amount of available meat provided by beluga whales is compared to that from all other species at the site, in order to assess the relative contribution of each species.

HISTORIC USE OF BELUGA WHALES BY MACKENZIE INUIT

The earliest ethnohistoric records indicate that the Mackenzie Inuit lived in several regional subgroups distributed along the Beaufort Sea coast between the Yukon-Alaska border and Cape Bathurst (McGhee, 1974; Morrison, 1990). The most densely settled region was at the mouth of the East Channel of the Mackenzie River. There, residents utilized a

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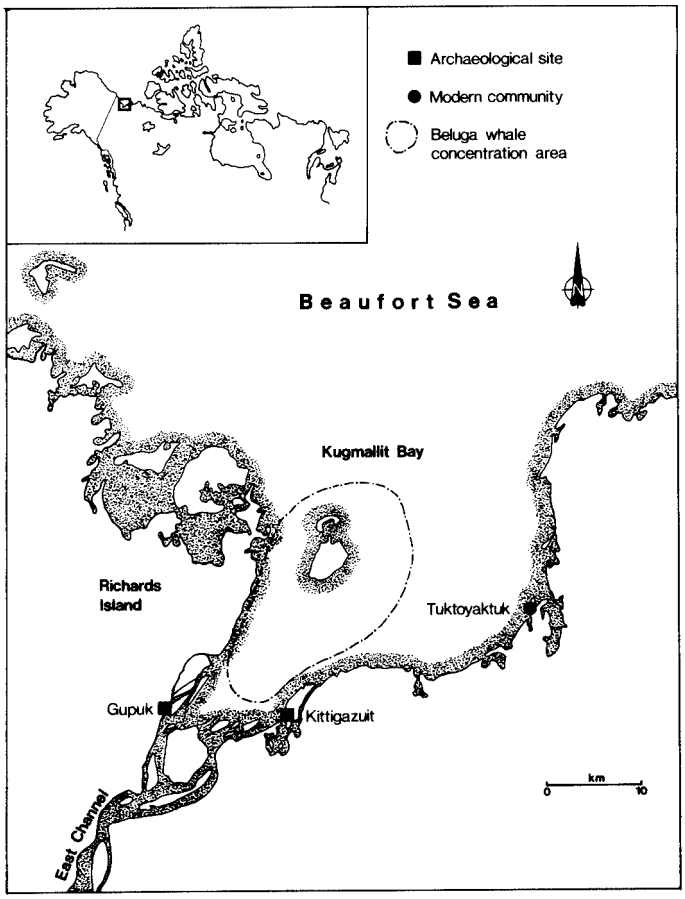

FIG 1. Map of the Kugmallit Bay region, indicating sites mentioned in text.

broad range of food resources, including arctic and subarctic terrestrial fauna, river and lake fish, waterfowl, and marine mammals. The most important resource, however, consisted of the large pods of beluga whales which enter Kugmallit Bay, at the mouth of the East Channel, during the summer months.

The belugas of the Mackenzie Delta belong to the Beaufort stock of the Bering Sea population. This stock numbers at least 11 500 individuals which migrate to the eastern Beaufort Sea from the Bering Sea each summer (Seaman et al., 1985). Up to 7000 whales enter the Mackenzie River Estuary between late June and mid August (Fraker, 1980) and, more importantly, up to 2500 beluga whales have been observed at a single time in Kugmallit Bay (Fraker et al., 1978), near the former Mackenzie Inuit settlements of Kittigazuit and Gupuk (Fig. 1). Beluga whales probably congregate in estuaries during the warm season to provide a relatively warm environment for birth and early growth of calves, where a minimum expenditure of energy is needed to maintain body heat (Sergeant, 1973; Fraker et al., 1979).

In the nineteenth century, Mackenzie Inuit of the East Channel assembled at large summer camps where activity revolved around beluga whale hunting (Whittaker, 1937; Nuligak, 1966; Krech, 1989). When belugas were observed, hunters would set out in their kayaks, preceded by a temporary hunt leader (Whittaker, 1937; Nuligak, 1966). As many as 100 kayakers (Stefansson, 1919) would form a line, spaced about 40 metres apart (Whittaker, 1937). They would advance on the whales, shouting and splashing the water with their paddles to drive entire whale pods into shallow water where they were harpooned and lanced.

After the whales had been towed to the summer camps, they were skinned and butchered. Meat and blubber were either consumed at these camps or prepared for storage by caching in pits, drying, or storing in oil-filled bags after being cut into small squares (Whittaker, 1937). In addition to their use as food, beluga whales were important to the Mackenzie Inuit for their skins, which were used for boat covers, dog harnesses, harpoon lines, boot soles, and tent covers (Whittaker, 1937; Stefansson, 1919); and their stomachs, which were used for harpoon floats, bags, and windows (Stefansson, 1919).

Oral histories indicate that this pattern of large-scale beluga hunting and processing was employed principally by residents of the settlements of Kittigazuit and Gupuk, both located in the outer Mackenzie Delta (Stefansson, 1919). These settlements were occupied during both winter and summer seasons. While hunting belugas in the summer months, the people congregated in large tent camps on the banks of the river. Once the carcasses were processed, meat and blubber were cached at nearby winter villages, which consisted of semisubterranean houses with sod-covered driftwood superstructures. Following the whale hunt, many of the inhabitants of these summer camps travelled to temporary fall camps where fish and caribou were procured. In the winter, the people returned to the large villages, where they subsisted largely on stored food. Finally, with the arrival of spring, trips were made onto the sea ice to hunt seals, and to interior lakes to fish through the ice.

ARCHAEOLOGICAL INVESTIGATIONS AT GUPUK

The archaeological site of Gupuk (also referred to as Kupuk) is located on the east side of Richards Island in the outer Mackenzie Delta. This location places it near extensive shallows suitable for drive hunting of beluga whales (Friesen and Arnold, in press), and directly across the East Channel from the village of Kittigazuit. Gupuk appears to have been abandoned prior to the influx of European travellers to the region, probably because the continual accumulation of silt made the location unsuitable for beluga hunting and processing (Stefansson, 1919). The earliest written record of the site is in a report by de Sainville (1984), a French explorer who spent the period 1889–94 in the lower Mackenzie River area. In that report, de Sainville published a map with a location marked "vieux village" in the vicinity of Gupuk, which can be interpreted as indicating that Gupuk had been abandoned by the late nineteenth century. The earliest archaeological reconnaissance of the site occurred as part of MacNeish's (1956) survey of the region in 1954, and limited testing was performed in 1972 by Gordon (1972). The current research is based on more extensive excavations conducted by the Prince of Wales Northern Heritage Centre between 1986 and 1989 (Arnold, 1988, 1994).

The terrain at Gupuk consists of a series of hills composed of fine sands and gravels which descend approximately 30 m to the shore of the East Channel. Archaeological remains were found mainly on the erosional fans and spurs which moderate the steep slopes at irregular intervals. The extant portion of the site, consisting of at least 19 large semisubterranean winter houses as well as many caches and additional features, extends along the shore for a distance of approximately 800 m. These features represent only a fraction of the number originally present, as indicated by the fact that large areas of the site have been lost because of high water levels and ice scouring during spring breakup. The site is rich, with dense scatters of artifacts on the surface and in excavated contexts. Beluga bones are ubiquitous throughout the site, and comprise a significant proportion by volume of excavated house fill and midden matrix (Fig. 2).

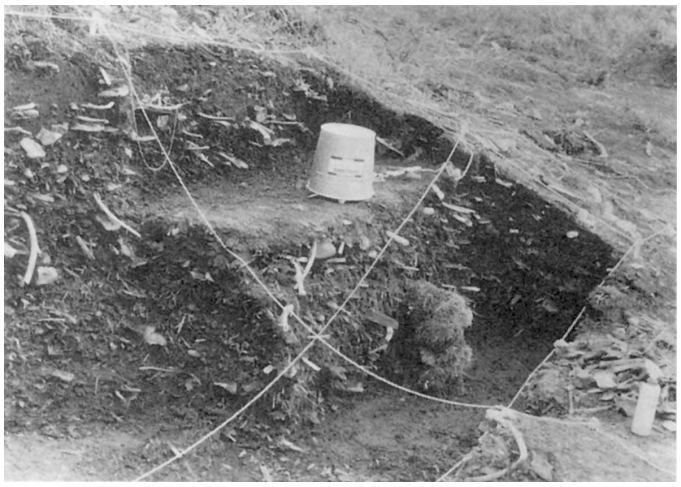

FIG. 2. Midden in Gupuk Area 2 during excavation. All large bones observable in the vertical sections are derived from beluga whales.

Because of its size, the site was divided into six areas, separated from one another by sterile zones, valleys, or other natural features. Area 1 contained one house depression (House 1), which is the source of the beluga bone sample discussed in this paper. In addition, 16 ground caches and several graves were recorded in Area 1 (Fig. 3). Upon excavation, the house was determined to be of the cruciform type which is common in the area (Arnold and Hart, 1992). This house type has three interior alcoves which are raised above floor level and a long entrance passage which extends toward the water. The floor, interior benches, walls and roof were constructed of driftwood.

House 1 was excavated by trowel, and all deposits in culture-bearing zones were screened through 6 mm (quarter-inch) mesh. Artifacts recovered *in situ* were recorded in place, and faunal materials were bagged by 10 cm level within each 2 m^2 excavation unit. Beluga bones were collected separately, and were analyzed as a single large sample. Forty square metres were excavated in House 1, with some of the units extending down more than a metre before sterile deposits were encountered. Three dates have been obtained for House 1, as follows: 730 ± 80 BP (AECV-1001C), on unidentified small terrestrial mammal bone; 360 ± 80 BP (AECV-1002C) on caribou bone; and 650 ± 40 BP (RIDDL-550), an accelerator date on a bone tool. As it lies between the other two dates, the accelerator date on the bone tool is provisionally accepted as indicating the age of House 1.

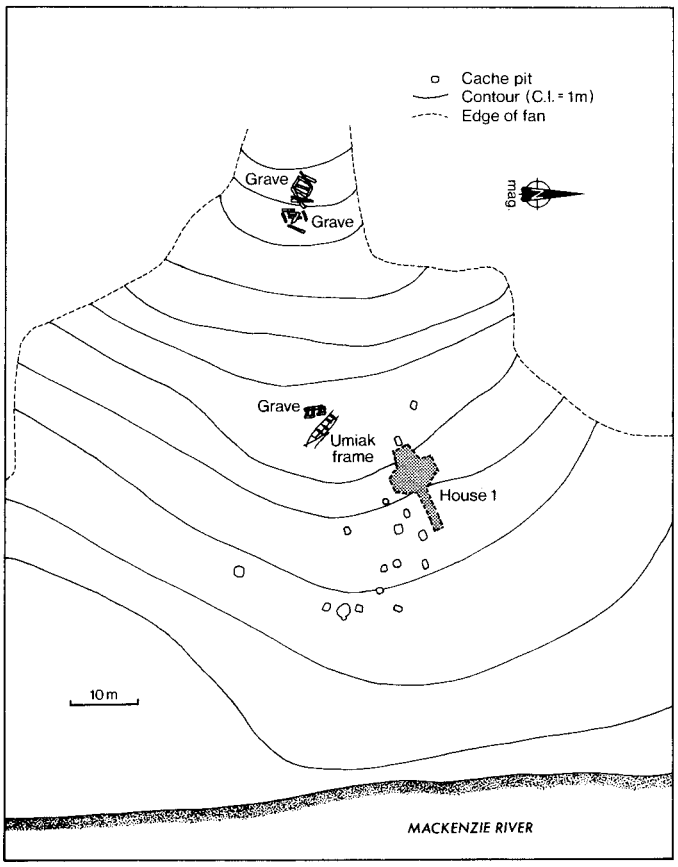

FIG. 3. Map of Gupuk Area 1, indicating the clustering of cache pits in the vicinity of House 1.

THE BELUGA BONE SAMPLE FROM GUPUK

All beluga bones recovered from House 1 were identified to element and side, and assessed for evidence of cut marks, burning, and carnivore gnawing. In total, 2266 specimens were identified, representing a minimum of 19 individuals. The relative frequencies of the different beluga elements were quantified in terms of minimum number of elements (MNE), which were calculated using side, age, and size information for each bone or bone fragment. Subsequently, minimum animal units (MAUs) were calculated by dividing the MNE of a given element by the number of that element which occurs in a complete skeleton. Skulls, for example, were divided by one, scapulae by two, and cervical vertebrae by seven (Table 1; cf. Binford, 1984; Lyman, 1994). The purpose of calculating MAUs is to provide a standardized measure of the variation in frequency of anatomical units for a given species. Differences between MAUs calculated for a range of elements can be used to interpret biases in body part

representation, due either to human transport decisions or to post-depositional taphonomic factors. An anatomical unit with a high MAU is present in a disproportionately high frequency, while one with a low MAU is relatively rare.

TABLE 1. Beluga element frequencies from Gupuk House 1.

Element	Minimum number of elements (MNE)	Elements per complete skeleton[1]	Minimum animal units (MAU)
Skull	19	1	19.0
Mandible	24	2	12.0
Hyoid	7	1	7.0
Cervical vertebra	25	7	3.6
Thoracic vertebra	14	11.5	1.2
Lumbar vertebra	29	9	3.2
Caudal vertebra	61	22	2.8
Rib	71	23	3.1
Sternum	1	1	1.0
Scapula	8	2	4.0
Humerus	4	2	2.0
Radius	7	2	3.5
Ulna	12	2	6.0
Carpal	31	16	1.9
Phalanx	79	50	1.6

[1] Beluga element frequencies based on information in Kleinenberg et al. (1964). In cases where element frequencies vary between individual whales, an average number of elements per skeleton has been estimated.

The MAU frequencies for the Gupuk sample indicate that bones of the head, most notably skulls and mandibles, are present in relatively high frequencies; while all other anatomical units are present in lower frequencies (Table 1). This variability in element frequencies probably results from a combination of natural and cultural factors. The high frequency of skulls may be partially explained by the fact that skulls were identified on the basis of auditory bullae, which are among the densest and most compact bones in the beluga skeleton, and are therefore resistant to destruction. Their small size also makes them likely candidates for loss prior to disposal (Schiffer, 1987). Mandibles, too, are among the most dense bones in the beluga skeleton. However, the fact that hyoids are also present in relatively high frequencies indicates that the frequency of skulls is probably not due only to differential bone density. Some bone destruction by dogs is indicated by the fact that 12.9% of all beluga bone fragments exhibit evidence of carnivore gnawing. Such destruction tends to differentially affect bones of low density (Lyman, 1984). As the preservation in House 1 is generally excellent, taphonomic factors other than carnivore gnawing, such as weathering and desiccation, probably do not influence beluga element frequencies.

Despite the presence of carnivore gnawing, some of the observed variation in anatomical representation probably results from a complex series of decisions by site occupants as to which body parts to consume, transport, or store during the different seasons. The ethnohistoric data outlined above indicate that during the summer hunt beluga carcasses were towed to shore near the site, where they were skinned and butchered. Certain body portions were consumed or discarded at these summer camps, while others were prepared for transport to fall or winter camps (Stefansson, 1919), or cached at Gupuk in preparation for the winter occupation. On their return to Gupuk in the winter, the inhabitants would select from among the cached body portions for consumption in the winter houses. Following this consumption, many bones would be removed from the house and discarded as refuse in a midden or elsewhere. The combined effect of these activities would leave only a partial and biased sample to be excavated from within the house (Fig. 4).

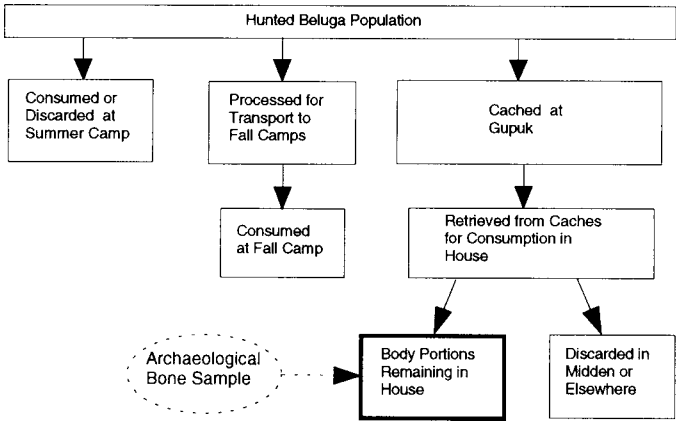

FIG. 4. Flow chart indicating bone transport decisions inferred to have affected the faunal sample in Gupuk House 1.

The transport decisions were likely based on the food utility of different body parts (Binford, 1978), as well as on cultural preferences. Meat and fat utility are particularly important for this interpretation; however, they cannot presently be fully addressed because utility indices have not been calculated for beluga whales. In general, though, it seems likely that parts of highest utility would be selected for transport away from Gupuk, and that low- and medium-utility parts should remain at the site. This circumstance may partially explain the high frequency of skulls, which probably represent relatively low meat and fat utility. An additional consideration is the fact that beluga skulls are large and heavy, further reducing the desirability of transporting complete beluga heads away from Gupuk.

DIETARY CONTRIBUTION OF BELUGA WHALES

The primary goal of this study is to assess the importance of beluga whales to the diet of the Mackenzie Inuit in the precontact period. This question can be addressed through a comparison of the Gupuk House 1 beluga sample with all non-beluga bones from the same context. The latter sample was identified using the faunal collection at the Canadian Museum of Nature (Balkwill, 1988). Nineteen species of mammals, 17 species of birds, and 11 species of fish were identified, indicating the great diversity of resources available to the prehistoric inhabitants of Gupuk (Table 2). Within

this combined sample, beluga whales are the most frequently occurring species in terms of number of identified specimens (NISP), with 2266 specimens, and the fourth most frequently occurring species in terms of minimum number of individuals (MNI), with a minimum of 19 beluga whales represented.

In order to understand the importance of beluga whales to the diet, the available meat from all species at the site must be approximated. Because meat weight estimates based on bone weights have been shown to be seriously flawed (Grayson, 1984; Jackson, 1989), we determined meat weights by multiplying the MNI for each species by an average weight for that species (White, 1953). The resulting figure was then multiplied by a constant which represents the percentage of the total weight of a carcass which is useable meat and fat, as opposed to skin, bone, and other inedible substances. These constants were derived from White (1953) for birds and mammals, and from Wing and Brown (1979) for fish. Standard mammalian species weights were based on an average of adult male and female weights, extrapolated from Banfield (1974). Some error arises from estimation of weights for fish (McPhail and Lindsey, 1970; Scott and Crossman, 1973) and birds (Bellrose, 1976; Godfrey, 1986; Bergerud and Gratson, 1988; McIntyre, 1988), because precise published data are lacking.

Beluga whale weights were considered separately because of their central importance to this study. Beluga body size varies among populations throughout the circumpolar region (Sergeant and Brodie, 1969; Doidge, 1990), and body weights of the Beaufort stock are reported to be approximately 1075 and 675 kg for adult males and females, respectively (Martell et al., 1984), yielding an average adult weight of 875 kg. However, because many of the belugas from Gupuk are juvenile or immature (Friesen and Arnold, in press), a conservative estimate of 400 kg per whale was used for the present meat weight calculations.

Several mammalian species were excluded from meat weight calculations, because they were probably not used as food by the inhabitants of Gupuk House 1. Small burrowing rodents, such as lemmings and voles, were excluded because they are most likely intrusive. Arctic ground squirrels, on the other hand, were not excluded, because they are known to have been utilized by Inuit (Stefansson, 1919). The one bowhead whale specimen was excluded because it is a rib, which was most likely brought to Gupuk as raw material for tool manufacture. Many implements at Gupuk, ranging from

[1] Probable intrusive taxon, excluded from calculations.

[2] Bowhead whale rib probably introduced to site as raw material, excluded from calculations.

TABLE 2. Calculation of dietary contribution of all species recovered from Gupuk House 1.

Taxon	NISP	MNI	Weight per individual (gm)	Edible tissue % of weight	Available meat (gm)	% of total available meat
Mammals						
Snowshoe hare	30	4	1800	50	3600.0	0.0
Arctic ground squirrel	40	6	744	70	3124.8	0.0
Brown lemming[1]	8	5				
Collared lemming[1]	10	2				
Brown/Collared lemming[1]	10					
Muskrat	805	47	1090	70	35 861.0	0.4
Meadow vole[1]	12	6				
Tundra vole[1]	2	2				
Meadow/Tundra vole[1]	29					
Vole sp.[1]	2					
Lemming/Vole[1]	38					
Beluga whale	2 266	19	400 000	70	5 320 000.0	66.0
Bowhead whale[2]	1	1				
Dog	99	3	20 000	50	30 000.0	0.4
Arctic fox	25	5	3 200	50	8 000.0	0.1
Red fox	41	3	5 200	50	7 800.0	0.1
Arctic/Red fox	19	1	4 200	50	2 100.0	0.0
Polar bear	1	1	420 000	70	294 000.0	3.6
Polar/Grizzly bear	5					
Marten	49	2	828	70	1 159.2	0.0
Wolverine	17	1	12 700	70	8 890.0	0.1
Bearded seal	5	2	280 000	70	392 000.0	4.9
Ringed/Harbour seal	251	9	91 000	70	573 300.0	7.1
Caribou	191	3	95 350	50	143 025.0	1.8
Moose	5	1	401 500	50	200 750.0	2.5
Caribou/Moose	1					
Unidentified mammal	1 390					
Birds						
Red-throated loon	2	1	4 000	70	2 800.0	0.0
Arctic loon	2	2	4 000	70	5 600.0	0.1
Common loon	5	1	4 500	70	3 150.0	0.0
Tundra swan	8	2	7 200	70	10 080.0	0.1
Trumpeter swan	10	1	12 600	70	8 820.0	0.1
Snow goose	2	1	2 700	70	1 890.0	0.0
Canada goose	4	1	2 700	70	1 890.0	0.0
Goose sp.	2					
Oldsquaw	1	1	900	70	630.0	0.0
Common scoter	2	1	1 100	70	770.0	0.0
Duck	3	3	1 000	70	2 100.0	0.0
Willow ptarmigan	2	1	600	70	420.0	0.0
Rock ptarmigan	5	2	600	70	840.0	0.0
Sharp-tailed grouse	8	3	800	70	1 680.0	0.0
Ptarmigan/Grouse	188	10	667	70	4 669.0	0.1
Whimbrel	2	1	500	70	350.0	0.0
Red phalarope	1	1	500	70	350.0	0.0
Jaeger	4	2	2 000	70	2 800.0	0.0
Glaucous gull	5	2	2 000	70	2 800.0	0.0
Gull sp.	4					
Grey jay	2	1	500	70	350.0	0.0
Unidentified bird	47					
Fish						
Pacific herring	1	1	563	85	478.6	0.0
Arctic char	2	1	4 500	85	3 825.0	0.0
Lake trout	60	10	10 000	85	85 000.0	1.1
Arctic char/Lake trout	75	1	7 250	85	6 162.5	0.1
Salmoninae sp.	1					
Arctic cisco	23	6	1 350	85	6 885.0	0.1
Least cisco	48	18	312	85	4 773.6	0.1
Arctic/Least cisco	8					
Lake whitefish	3	2	5 800	85	9 860.0	0.1
Broad whitefish	36	10	2 000	85	17 000.0	0.2
Lake/Broad whitefish	41	9	3 900	85	29 835.0	0.4
Coregonus sp.	113					
Inconnu	797	41	9 000	85	313 650.0	3.9
Coregoninae	445					
Salmonidae	35					
Northern pike	37	7	10 000	85	59 500.0	0.7
Longnose sucker	1	1	2 000	85	1 700.0	0.0
Burbot	1 391	84	6 200	85	442 680.0	5.5
Unidentified fish	2 893					
Class unidentified	43					
Total	11 714	351			8 056 948.7	99.6

snow knives to sled runners, were manufactured from bowhead whale ribs. An additional consideration is that the closest location where bowhead whales are known to have been hunted is Atkinson Point (McGhee, 1974), approximately 120 km distant.

Meat weight estimates cannot be considered precise for a number of reasons. First, meat weights must be based on an average weight for each species, which may be elusive since the weight of all species varies with age, sex, and season (Speth, 1983). An allied problem is that the percentage of the total weight which represents edible meat or fat can also vary. Second, meat weight calculations measure a hypothetical quantity of *available* meat, which is not necessarily the amount which was actually consumed on the site (Stewart and Stahl, 1977; Lyman, 1979; Binford, 1984). Individual animals whose bones are recovered from a site may not have been completely consumed, or parts of them may have been consumed at different sites or during different seasons.

As discussed earlier, the various beluga whale skeletal elements are not represented equally in the Gupuk House 1 bone sample (Table 1), and therefore belugas may not have been consumed in their entirety at the site. However, all other species in the faunal sample are also represented by incomplete skeletons, indicating that they, too, may have been only partially consumed on site. One means of addressing the variability in relative skeletal completeness is to calculate the NISP/MNI ratio for each species. This ratio will indicate the number of complete and fragmentary bones which have been identified per individual animal, and as such is a potential indicator of both skeletal completeness and degree of element fragmentation (Shipman, 1981; Klein and Cruz-Uribe, 1984; Schick et al., 1989). In the Gupuk sample, beluga whales are represented by a higher NISP/MNI ratio (119.3) than are all other mammalian species, which vary from 1.0, for polar bear, to 63.7, for caribou.

However, the NISP/MNI ratio is closely related to sample size; and therefore the relationship between NISP/MNI and NISP must be assessed prior to interpretation of the NISP/MNI statistic (Grayson, 1978, 1984). In the case of the 15 taxa of utilized mammals from Gupuk (fish and birds will not be considered here, as they have different skeletal structure), the relationship of NISP to NISP/MNI, based on log-transformed data, yields the regression equation $\log_{10}(\text{NISP/MNI}) = .234 + .532(\log_{10}\text{NISP})$ ($r = 0.86$, $p \leq .001$). Based on this equation, the observed beluga $\log_{10}$NISP/MNI ratio of 2.08 is calculated to be slightly higher than, but within the 95% confidence limits of, the predicted beluga $\log_{10}$NISP/MNI ratio of 2.02. These calculations indicate that the NISP/MNI ratio for beluga whale skeletal elements is equivalent to the NISP/MNI ratios for other species consumed at the site, when corrected for sample size. Therefore, factors such as differential bone transport which affect skeletal completeness probably did not affect beluga whales more than other species, and are therefore significantly reduced as a source of potential error for the present meat weight estimates.

A final potential problem with meat weight estimates results from their dependence on the calculation of MNIs, which are simply *minimum estimates* of species abundance based on the most frequently occurring element from each species. As such, they must not be considered to represent absolute species frequencies. Problems with the use of MNIs include the strong tendency for small sample sizes to exaggerate MNIs; that is, MNIs decrease proportionally as sample size increases (Grayson, 1978). Because of this effect, MNI calculations will be strongly affected by the unit of aggregation. An MNI calculated for an entire site will be significantly lower than the total of MNIs based on smaller sampling units within a site, such as features or strata (Grayson, 1984; Brewer, 1992). For the Gupuk sample, however, the problem of sample aggregation is reduced because the entire faunal sample from House 1 was analyzed, and no other winter houses were observed in Area 1.

A second problem with MNIs is that they will vary depending on the criteria used in their calculation. For example, if the analyst utilizes only element and side (left or right), the resulting MNI will be lower than calculations based on the same sample which incorporates additional variables such as age and bone size (Bokonyi, 1970; Chaplin, 1971). For the present study, MNIs were calculated on the basis of element, side, age, and size. Because of these considerations, meat weights based on MNIs are best considered as an approximation of relative, rather than absolute, dietary importance (cf. Grayson, 1984: 174).

The results of meat weight calculations for the Gupuk faunal sample show a remarkable degree of importance for beluga whales (Table 2). Available meat from beluga whales represents approximately 66%, or about two thirds of the site total, while all other species comprise the remaining 34%. Not only do belugas represent a great proportion of the available meat, but there is no species which represents a clear secondary resource in terms of dietary importance (Fig. 5). With beluga whale providing a minimum of 5.3 metric tonnes of available meat, the next most important taxon, consisting of small (ringed and harbour) seals, provided a minimum of only 0.6 metric tonnes, or less than one-eighth of the figure for beluga. Therefore, despite the reservations expressed earlier regarding calculation of meat weights on the basis of MNIs, the pattern is pronounced enough to clearly indicate beluga whales as the resource which formed the focus of Inuvialuit subsistence at Gupuk. A secondary inference from these data is that if the beluga hunt were to fail, famine could result (McGhee, 1974), while failure of any other resource would probably be more of an inconvenience than a potential catastrophe.

As a final methodological issue, we note that Driver (1993) has suggested that in certain instances meat weight estimates based on NISPs may be more accurate than those based on MNIs. In the case of the present analysis, however, we believe that MNIs represent a more accurate approximation of species abundance than do NISPs, for three reasons mentioned earlier: 1) aggregation of faunal samples is reduced as a problem because the contents of an entire house were analyzed and no other houses were observed in Area 1 of the site; 2) preservation of faunal remains is generally

excellent; and 3) the sample size is relatively large. Although our primary emphasis is on meat weights calculated on the basis of MNIs, it is instructive to note that meat weights calculated on the basis of NISPs would show an even greater emphasis on beluga whales. NISP-derived meat weights would indicate that beluga whales contributed 93.4% (634 480 000/679 126 243 gm) of available meat.

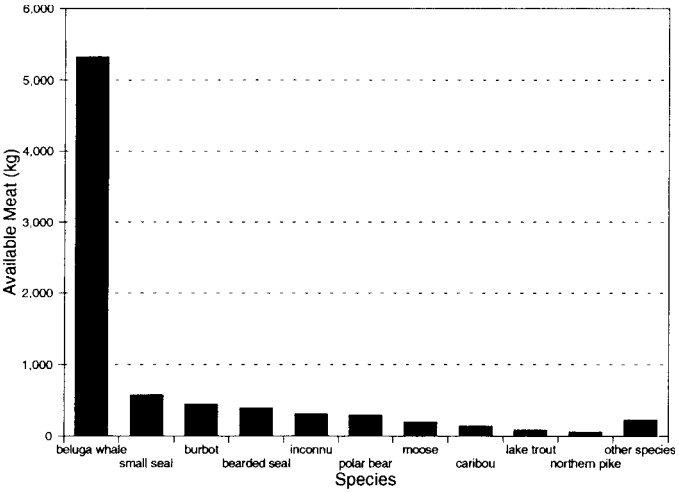

FIG. 5. Minimum available meat represented by all identified food species from Gupuk House 1.

DISCUSSION

There are no directly comparable faunal analyses from the Mackenzie Delta, although McGhee (1974) engaged in field analysis of the large bones recovered during his excavations at Kittigazuit. McGhee reported very high percentages of beluga bones, with NISPs ranging from 79% to 87% of the identified sample. These figures serve to indicate the great importance of beluga whales at Kittigazuit; however, they cannot provide an accurate picture of subsistence because the sample sizes were small and the field methods did not employ screens for recovery of small bones. In contrast, the beluga bones from Gupuk represent only 30.9% (2266/7341) of specimens identified below the level of class, or less than half of the beluga frequencies reported for Kittigazuit.

The data from Gupuk and Kittigazuit can be made more comparable by tabulating only the six taxonomic categories reported by McGhee (1974): beluga, fox, small seal, caribou, moose, and waterfowl (Table 3). When these categories are calculated for the Gupuk sample, beluga bones represent 79.8% (2266/2840) of the sample, which is within the range reported by McGhee for Kittigazuit. Therefore, dependence on beluga at the two sites of Kittigazuit and Gupuk can be provisionally considered to have been roughly equivalent. Of course, confirmation of this hypothetical equivalence would require additional excavations at Kittigazuit which employ methods designed to recover complete faunal samples.

In summary, two primary interpretations have been presented in this report. First, Gupuk was, as suggested by ethnohistoric sources, a major beluga whale-hunting site comparable to Kittigazuit. Its large size, coupled with the high frequencies of beluga bones observed in all areas of the site, indicates a long-term economic emphasis on beluga whales during both summer and winter occupations. The similarity between the two sites is most clearly suggested by a comparison of the frequencies of beluga whale bones in relation to those of a limited number of other prey species. This observation carries with it important implications for the interpretation of the archaeological remains from Gupuk. Because the economies of Gupuk and Kittigazuit have been demonstrated to be similar, the much richer ethnohistoric record from Kittigazuit can be cautiously used to interpret other, less easily recovered categories of prehistoric activity from Gupuk.

TABLE 3. Comparison of NISP percentages for six taxa recovered from Kittigazuit and Gupuk.

	Kittigazuit[1]				Gupuk
	M-1 n = 338	M-2 n = 177	M-4 n = 1357	OH n = 217	House 1 n = 2840
Beluga	80	79	87	81	79.8
Fox	–	–	–	3	3.0
Small seal	1	3	2	–	8.8
Caribou	17	13	7	12	6.8
Moose	–	0.6	1	–	0.2
Waterfowl	2	4	3	4	1.4
Total	100.0	99.6	100.0	100.0	100.0

[1] Percentages from Kittigazuit based on McGhee (1974).

Second, beluga whales constituted a truly focal resource for prehistoric inhabitants of Gupuk and, by extension, other sites on the East Channel of the Mackenzie River. Although meat weight estimates must be interpreted with caution, belugas clearly provided a large proportion, probably well over half, of the available meat during winter occupations. Although summer occupations at the site are archaeologically invisible, it is likely that they represented an even greater reliance on beluga whales. This concentrated and productive resource allowed a populous and successful culture to flourish in the Mackenzie Delta, and must also have meant that hard times would ensue if the beluga hunt failed.

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