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CARIBOU EXPLOITATION AT THE TRAIL RIVER SITE, NORTHERN YUKON

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FORWARD

The research reported in Murielle Nagy's monograph was part of a larger project conducted by the Archaeological Survey of Canada, Canadian Museum of Civilization from 1985 to 1989 (Jacques Cinq-Mars, director), under the auspices of the Northern Oil and Gas Action Plan (NOGAP) Secretariat, Indian and Northern Affairs Canada. The NOGAP project was implemented to provide background studies in the social and biophysical realms, in anticipation of the development of hydrocarbon resources in the Beaufort Sea region. The study area for the archaeological component included the Yukon Coastal Plain, the Mackenzie Delta east to the Cape Bathurst Peninsula, the lower Mackenzie River, and portions of the Northwest Passage.

Research on the Yukon Coastal Plain was carried out under my direction during 1985-86. Most of this work involved helicopter surveys covering the Coastal Plain from the north slope of the Richardson, Barn and British Mountains to the rapidly eroding coastline. The work at the Trail River site (NgVh-1), now located in the North Yukon Park, constituted the major part of the limited test excavations which could be conducted during the two field seasons. As indicated in this monograph, this interior site is a large caribou hunting complex with shooting blinds, caches, and an inukshuk line. Although only a very short time could be devoted to the excavation of parts of the site, it produced a fairly large assemblage with a significant amount of information on antler and bone technology, a major focus of Nagy's research.

However, despite the rather rare interior location of the Trail river site in this region, our surveys on the Coastal Plain revealed a wealth of other historic and prehistoric sites with similar features related to caribou exploitation. Most of these were concentrated near the north slope especially along the Trail and Tulugaq Rivers, just as they exit the mountains onto the Coastal Plain. Within this context, Nagy's work represents an important initial statement concerning the largely unknown details of the interior phase of late prehistoric Mackenzie Inuit land use patterns in the northern Yukon.

Raymond J. Le Blanc
Edmonton, Alberta
January, 1990

CARIBOU EXPLOITATION AT THE TRAIL RIVER SITE (NORTHERN YUKON)

by

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Caribou Exploitation at the Trail River Site (northern Yukon)

Abstract

This thesis investigates a poorly-known aspect of the seasonal round of the late prehistoric Mackenzie Inuit, the late spring and summer caribou hunt, through the study of the Trail River site (NgVh 1) in the northern Yukon. Because the site is approximately 25 km from the Beaufort Sea and since coastal Mackenzie Inuit subsistence strategies were mainly oriented toward the exploitation of aquatic resources, it is important to understand why the Mackenzie Inuit used the site and how its use related to the rest of the seasonal round.

It is suggested that the Trail River site was a habitation site where both caribou and bird resources were exploited. Activities related to bone processing, tool manufacture, skin preparation and clothes manufacture are shown to have been carried out at the site. A late spring/early summer time of occupation is indicated by the presence of foetal and neonate caribou. Analysis of the faunal material has demonstrated that 21 species were present, of which caribou and ptarmigan were the most important. Element frequency and the degree of bone breakage suggested that caribou were hunted in the vicinity of the site and transported back to the site for butchery, and marrow and grease extraction.

The site is notable for the heavy concentration of by-products associated with the manufacture of antler objects. There is also some evidence for the production of bone tools. Analysis of antler indicates that all stages in the manufacture of artifacts are represented, with various manufacturing techniques being associated with each stage.

Recognition of two types of gear was substantiated by the analysis of manufacturing techniques performed on the associated by-products. Personal gear, made from antler, was manufactured with considerable effort and skill. These tools would have been prepared in anticipation of future caribou hunting. Situational gear, made from bone obtained on site, was manufactured expediently and meant for immediate use.

Acknowledgments

This study was made possible by Dr. Raymond Le Blanc (now at the University of Alberta) and by Jacques Cinq-Mars (Archaeological Survey of Canada) who gave me the opportunity to work for the NOGAP project in the northern Yukon and in the Mackenzie Delta for the last three summers. The collection from the NgVh 1 site was made available to me by the Canadian Museum of Civilization (Ottawa).

Throughout the writing of the thesis, I have appreciated the support of my collegues at Simon Fraser University. Editing of the many first versions of the present manuscript was provided by Shannon Wood. I am particularly thankful to her as she was a great critic and a very encouraging and patient friend. Diane Lyons read one of the last versions of the thesis and gave me extremely constructive critics. Luke Dalla Bona is responsable for the beautiful maps and edited the last two versions of the manuscript. Geordie Howe took all the pictures and with the help of Mike Rousseau printed them. Diane Hanson and Larry Titus shared their knowledge of the Arctic with me. Ingrid Bell was helpful in so many ways that I could not list them all here. The people of the Inter-Library Loans Department at the SFU Library did a terrific job by obtaining all the books and articles I needed for my research. Financial support was provided by a Graduate Research Fellowship and two Teaching Assistantships from SFU.

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CHAPTER 1. Introduction

1.1 Introduction

Archaeological research on Mackenzie Inuit prehistory has focused almost exclusively on excavations of whaling villages, thereby giving the impression that sea mammal hunting and fishing were the basic subsistence patterns (e.g. McGhee 1974; Stromberg 1986). This interpretation, while agreeing with Stefánsson's ethnographic work on the Mackenzie Inuit at the beginning of this century, obscures the fact that caribou was also an important resource.

Caribou was needed not only for its meat, marrow and hides, but also for its antler and bone which were extensively utilized as raw materials in implement manufacture. Caribou would have been hunted during a specific season depending on the needs of the Mackenzie Inuit. For example, when caribou hides were needed for winter clothing, caribou would have been hunted in late summer and early fall, the season during which their hides are at their prime (Gubser 1965; Skoog 1968; Stefánsson 1919). Indeed, the faunal remains from Saunatuk (see Figure 1), a site occupied in late summer and early fall, have demonstrated that only caribou hides were brought back to the site (Balkwill 1987). Furthermore, caribou hunting during specific seasons might have conflicted with other large mammal hunting. This seems to have been the case in the Tuktoyaktuk peninsula where caribou hunting during mid-summer and fall would have conflicted with whale hunting which required the collaboration of many hunters (Morrison 1987).

In contrast to the Mackenzie Delta proper, where caribou are present year-round, the coastal Yukon saw a major influx of caribou herds only during their spring and summer migrations. Evidence of caribou exploitation is derived primarily from the excavations of the Engiastciak sites (see Figure 1) along the Firth River (MacNeish 1956a, 1956b, 1959; Clark 1976; Hogan 1986). Because only preliminary reports are available, little speculation can be generated as to the nature of caribou exploitation on the Yukon coast. McGhee (1974) has suggested that fishing was the basis for subsistence along the Yukon coast during the aboriginal period. Yorga (1980) has argued for a mixed economy where whale, seal, caribou, fish and waterfowl would have been exploited. Caribou hunting would have been of prime importance in late spring/early summer when aquatic resources were not easily secured due to spring break-up.

1.2 Research Design and Theoretical Implications

This thesis is an analysis of archaeological material recovered from a prehistoric Mackenzie Inuit site (NgVh 1) along the Trail River in northern Yukon (see Figure 1). Since this site is approximately 25 km from the Beaufort sea and 0.5 km west of the Trail River, it is important to understand why the Mackenzie Inuit used this site and how its use was related to the rest of the seasonal round. The purpose of this analysis is to determine the major activities performed at the site.

If fishing was the major reason for occupation, the faunal assemblage should be dominated by fish remains. On the other hand, caribou or other mammals may have been the main reason for site occupation. If subsistence, related to caribou hunting, was the primary reason for occupation, the faunal assemblage should display little modification beyond butchering and bone smashing for marrow and grease rendering. A high caribou MNI should also be expected.

If the primary reason for occupying this site was to obtain antler for making tools, then there should be abundant evidence in the form of preliminary antler debitage, the result of the elimination of bulky and heavy waste.

Even if the major reason for site occupation was to obtain antler material for tools, subsistence activities would not have been neglected. Indeed, a third and more likely reason for site occupation may have been to procure both meat for food and antler material for tools. In this case, butchering and antler reduction for tools would occur.

In order to determine which of the above reasons is most realistic for the site's occupation and how this occupation fits into the seasonal round, the faunal remains were studied to identify the various species exploited at the site, the season of the site occupation, and the types of activities related to food processing.

An analysis of the antler reduction types was undertaken to determine if the site was occupied partly or entirely for the purposes of obtaining tool material such as antler. It is reasoned that if preliminary antler debitage (from sections and cores) is highly represented, then antler procurement was a major activity involving the inhabitants of the site. On the other hand, if secondary debitage is highly represented, then antler would have been brought to the site from previous locations in the form of workable sections to be further manufactured. Manufacturing techniques were also investigated to further detail the manufacturing activities carried out at the site.

1.3 Organization of Chapters

Chapter 2 introduces the Mackenzie Inuit, in particular the Kigirtarugmiut, the sub-group which occupied the northern Yukon coast. Chapter 3 describes the Trail River site (NgVh 1) and discusses the location of the site in relation to the major caribou migration routes. Chapter 4 examines species exploitation, determination of seasonality, and the inference, through the faunal analysis, of the different activities related to food processing performed at the site. Chapter 5 presents the functional categories of the finished artifacts recovered at the site. Chapter 6 briefly introduces the study of bone and antler industries. Chapter 7 discusses the different reduction types recovered at the site. Chapter 8 identifies the different manufacturing techniques utilized on site. Chapter 9 presents the general conclusions, with suggestions for further research on caribou hunting camps in the northern Yukon.

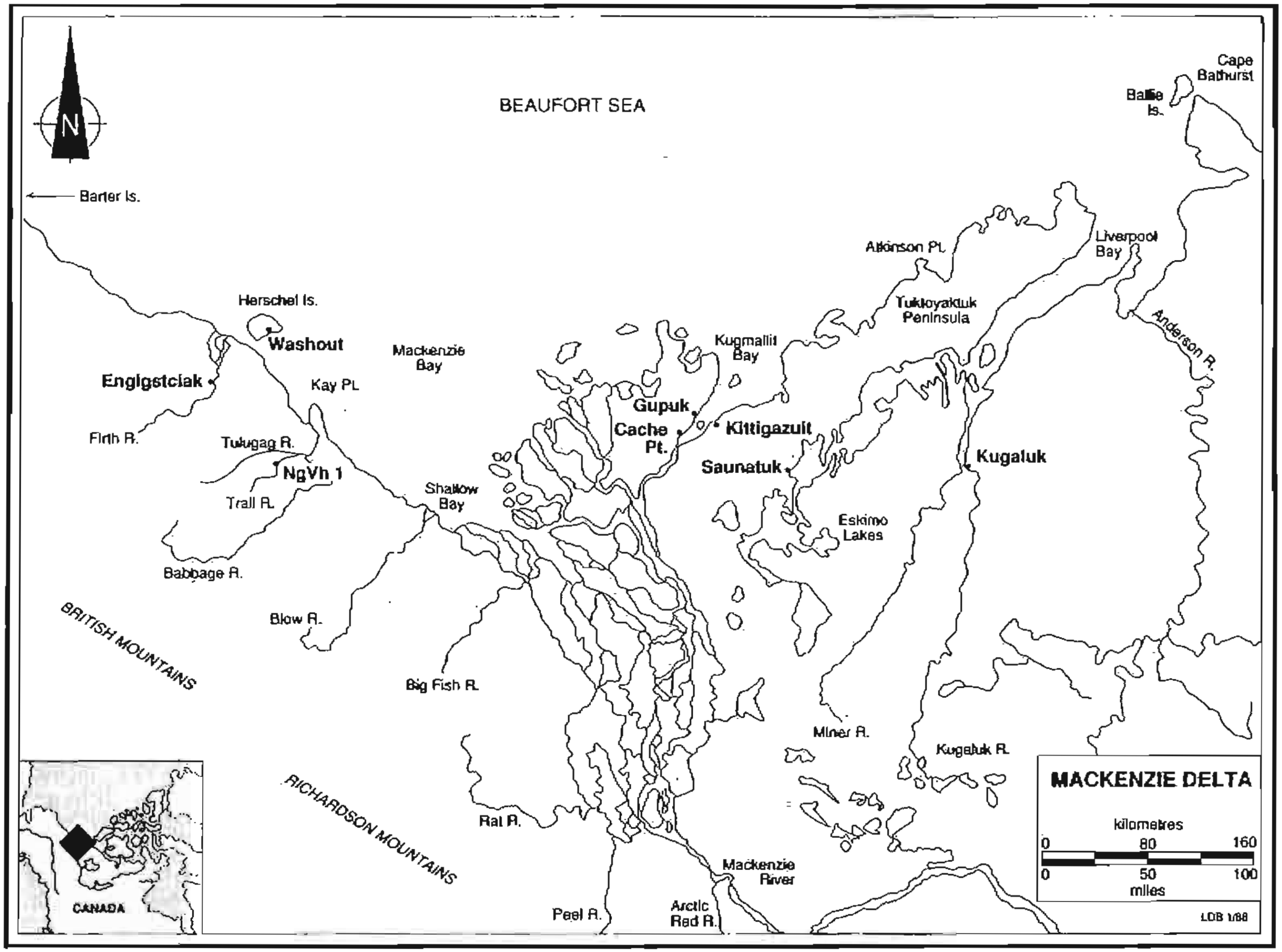

Figure 1. Archaeological sites mentioned in the text (after Snyder 1986: 33)

CHAPTER 2. The Mackenzie Inuit

2.1 Introduction

This chapter presents a short introduction to Mackenzie Inuit prehistory and to the Kigirtarugamiut, the sub-group that inhabited the Yukon coast.

2.2 The Mackenzie Inuit

The people who occupied the Western Arctic sea coast between Barter Island and Cape Bathurst prior to European contact (mid-19th century) have been grouped under the general term of Mackenzie Inuit. Petitot (1876:3) referred to them as the "Tchiglit". These people now call themselves Siglit, Inuvialuit or Kitigaryungmiut. They live mainly in Tuktoyaktuk and Paulatuk on the mainland coast, although many have also established themselves in Inuvik, Aklavik and Sachs Harbour (Lowe 1986:xvii). The mid-19th century population has been estimated to range from 2,000 (Petitot 1876:2) to over 4,000 people (Stefánsson 1913:7). In the late 1800s and early 1900s, epidemics of scarlet fever, influenza, smallpox and measles reduced the Mackenzie Inuit population to less than 10% of the pre-contact levels (Jenness 1964:14).

The Mackenzie Inuit were divided into five major territorial groups as described by Stefánsson (1913, 1919) and Usher (1971) (see Figure 2). These groups are the following:

Kigirtarugamiut from the western edge of the

> Delta to Demarcation Point or Barter Island; Kupugmiut and Kittegaryumuit in the Delta area centered around the mouth of the East Channel; Nuvorugmiut along the Tuktoyaktuk Peninsula centered at Point Atkinson; and Avvagmiut of Cape Bathurst and the adjacent Baillie Islands. Each group was named after a central village or locality: Kigirktayuk on Herschel Island, Kupuk and Kittigaruit on either side of the mouth of the East Channel, Nuvurak on Atkinson Point, and Avvak at Cape Bathurst (McGhee 1974:8).

Each group had different economic adaptations depending upon its region of occupation (McGhee 1974). In the summer, the major activity of the groups located along the East Channel was hunting the beluga whale. Caribou hunting took place from late spring to fall. Winter was spent in large villages of composed mainly of sod and log houses. At this time, people lived primarily on fish and seal.

The material recovered from the excavations at Kittigazuit and Radio Creek led McGhee (1974:93) to conclude that the Mackenzie Inuit material culture was "unique" and showed cultural stability over the last 500 years. Excavations carried out at Cache Point confirmed these two assumptions (Stromberg 1986). McGhee (1974:93) also suggested that it was unlikely that the Mackenzie Inuit culture had evolved locally from a Thule base. Similarities with assemblages from Northwest Alaska indicated to McGhee (1974) that the Mackenzie Inuit culture had probably evolved from an older pre-Thule riverine adapted culture located between the Bering Sea and the Mackenzie Delta.

However, on the basis of the prehistoric Thule occupation of Herschel Island, which was later inhabited by Mackenzie Inuit, and by the fact that all harpoon types found at Cache Point (in the East Channel) were Thule type 2 or 3, a Thule base to the Mackenzie Inuit adaptation is now argued (Yorga 1980 and Stromberg 1986).

It is important to note that when McGhee wrote about Thule culture he was referring to what is now considered the Canadian or Classic Thule culture and not to Western Thule culture, which would have been subsumed in his North Alaskan category (Stromberg1986:5). At present, most archaeologists would agree that the Mackenzie Inuit are the "easternmost branch of the Western Eskimo, the only Western Eskimo in Canada" (Morrison 1987:1).

2.3 The Kigirktarugmiut

As the site under study is located between Herschel Island and Shingle Point and since the dates obtained from the material excavated from Feature 1 at NgVh 1 range between A.D. 1570 and 1665 (see Chapter 3), historical continuity is assumed. It is therefore probable that the people who occupied the Trail River site belonged to the ancestors of the Tareormuit group or "those who dwell by the sea" (Petitot 1887:217; Murdoch 1892). Originally, their territory seems to have extended to Barter Island, as it is here that Jenness (1914) discovered some of their archaeological remains. Furthermore, Franklin (1828) has mentioned that Barter Island was the furthest western area where the people from Herschel Island would travel. During the whaling period in the 1890s, the Tareormuit group clustered around Herschel Island and took the name of Kigirktarugmiut ("small island people") from the name of their main village on the island (McGhee 1974:10). The aboriginal population of the northern coast has been estimated to have been approximately 200-300 people, based on historical sightings (Usher 1971:169). Yorga (1980:35) has argued, however, that in view of the dispersed settlement patterns during the summer, an estimate of 400-500 people seems more reasonable.

McGhee (1974), who has written the only major work on the prehistory of the Mackenzie Inuit, cites three reasons why the Kigirktarumiut were probably quite distinct from the other four major Mackenzie Inuit groups described by Stefánsson. First, the Kigirktarugmiut appear to have been hostile to the North Alaskan Eskimo (Simpson 1875:265) and at the same time to have been frightened of the Mackenzie Delta Eskimo to the east (Franklin 1828:120). Secondly, Stefánsson (1919:381) noted that the aboriginal Herschel Island dialect was quite distinct from that spoken at Kittigazuit (along the East Channel) and that it was in fact closer to the dialect spoken at Cape Smythe (at Point Barrow). Thirdly, the cruciform winter house built by the Eskimo of the East Mackenzie Delta has not been reported archaeologically on Herschel Island. However, in Yorga's opinion, "this may have no significance since the cruciform house represents only one variant of the Mackenzie Eskimo house type" (Yorga 1980:58). The cruciform house, though uncommon, was noted at Shingle Point (Franklin 1828:121); at Avadlek Spit (Yorga 1980:58); and at Barter Island (Jenness 1914:36). All these sites are situated west of the Mackenzie Delta.

Incidentally, Nuligak, a Mackenzie Inuit born at the end of the 19th century, also distinguished between the Inuit of the Coast and those of the Mackenzie Delta (see Nuligak 1966:140).

2.4 Subsistence patterns of the Kigirktarugmiut

Yorga (1980:30-36) has attempted to outline the aboriginial subsistence pattern of the Mackenzie Inuit group living along the Yukon coast from Shingle Point to Demarcation Point in the nineteenth century. During the winter, families aggregated in large villages. Winter subsistence activities included sealing, fishing, caribou hunting and the trapping of small fur bearing mammals. Food surpluses accumulated during the fall were no doubt of importance during winter.

Before break-up in the spring, people moved out from their winter houses into smaller agglomerations of conical tents. Stefánsson (1919:186) mentioned that when ice was still present in the spring, sealing was practiced at floe edge. From late spring to early fall, a great variety of subsistence activities took place: kayak sealing with the bladder dart and caribou hunting by means of drives and surrounds. Along the coast, an important activity was fishing with baleen nets. In July, some parties would travel east of the Mackenzie Delta to hunt the beluga whales which were calving at that time. Waterfowl would have been available in large quantities during late summer and early fall. It is also during this season that baleen whales would have been hunted. In the fall, net fishing, sealing and caribou hunting were intensified along the coast.

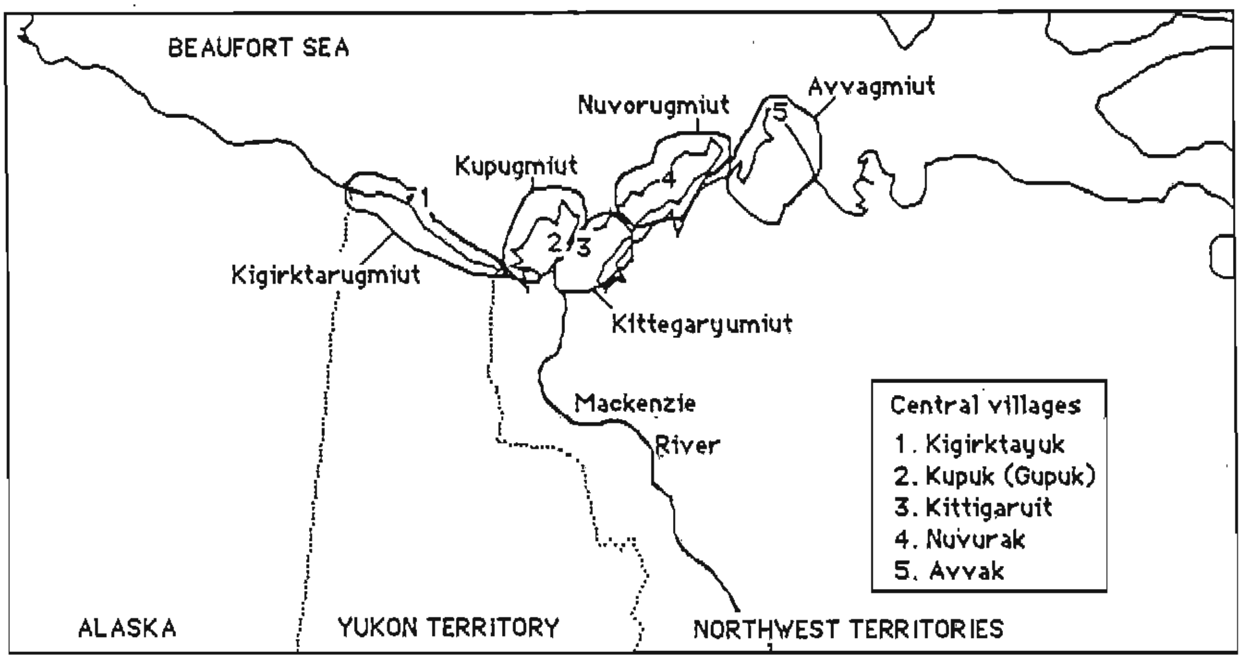

Figure 2. Aboriginal groupings of the Mackenzie Inuit

(after McGhee 1974: 9)

CHAPTER 3. The Trail River Site (NgVh 1)

3.1 Introduction

This chapter introduces the reader to the NgVh 1 site and to a major feature (Feature 1) at the site from which all the archaeological material analyzed in the present study is derived. The caribou spring and summer migrations passing through the Trail River area are then described with hypotheses as to how caribou would have been exploitated during these migrations.

3.2 Description of the Trail River Site (NgVh 1)

The Trail River site was noticed by Jakimchuk et al. (1974:107) while conducting caribou surveys in 1971, but was only recorded in 1983 by Jacques Cinq-Mars (Archaeological Survey of Canada) during a helicopter survey of the Trail River valley. The site is located on the southern end of a large knoll complex about 0.5 km west of the Trail River and 11 km north of the point where the Trail River enters the foothills of the British Mountains, approximately 25 km south of the Beaufort Sea Coast (Le Blanc 1986:40, 1987:23) (see Figures 3 and 4).

In 1983, the only feature recognized was a semi-circular structure composed of piled cobbles designated Feature 1. This feature is studied in the present thesis. It is situated on a break-in-slope, below the crest of the highest point on the southern portion of the knoll complex. It measures 5.25 meters east-west and 3.2 meters north-south. The west wall, the highest, is on average 0.5 m high. Two and half square meters of test excavations were conducted in front of the feature and a small 0.4 meter square test pit was placed in the north-west section of the stone ring (see Figure 5). These test pits revealed the presence of a dense accumulation of well-preserved antler tools and manufacture related by-products as well as a large quantity of faunal remains.

The site was revisited in 1985 and 1986 by another team from the Archaeological Survey of Canada under the direction of Dr. Raymond Le Blanc, in connection with the Northern Oil and Gas Action Plan (NOGAP). In 1985, additional testing of Feature 1 was conducted to supplement the existing artifact inventory and clarify the preliminary interpretation regarding its temporal position and cultural affiliation (Le Blanc 1986:40).

The 1983 test excavations were expanded laterally and downslope by an additional 7.5 square meters. All recognizable artifacts were plotted on a two dimensional plane. As the cultural component was no more than 10 cm deep and there was no evidence of stratification, vertical positioning was not recorded. Due to limitations of time, the matrix was not screened (Le Blanc 1986).

Three AMS dates were obtained on artifacts recovered from Feature 1: worked antler: 260 B.P. ± 120 (RIDDL-365, NOGAP-009); cut bone: < 290 B.P. at 2 sigma (RIDDL-342, NOGAP-010); and cut wood: < 260 B.P. at 2 sigma (RIDDL-343, NOGAP-011) (Le Blanc 1987:23, Cinq-Mars 1988 pers. com.). Using radicarbon calibration tables from Klein et al. (1982:143), the worked antler dates between A.D. 1570 and 1810; the caribou bone between A.D. 1435 and 1665; and the cut wood between A.D. 1490 and 1795. Thus, the possible age of occupation ranges between A.D. 1435 and 1810. Nevertheless, the dates of these samples overlap only in the period between A.D. 1570 and 1665. If, as it is believed by the author, the three samples belong to a single occupation, then the latter occured between A.D. 1570 and 1665. The possibility remains, however, that more than one occupation is represented at the site.

During the 1985 field season, 21 additional features were located at the site. These include five definite tent rings and two other scattered features which may have been tent rings; ten depressions, including three pairs of pits and four isolated pits; five isolated hearths, and a rock alignment (Le Blanc 1986:49) (see Figure 6).

In the summer of 1986, two depressions were tested to determine if the larger of the two represented a dwelling and if the smaller represented a shooting blind. Both tested depressions were located about 60 meters southwest of Feature 1. A test pit dug in the smaller depression uncovered some faunal material and wood pieces that may have been part of a bow. Further excavation is required before ascribing a definite function to this feature. In effect, "such a small pit could have been used for a variety of functions, including ground caches" (Le Blanc 1986:128). Feature 5, the larger depression, appears to have been a small pit house with a main room area containing a small hearth on the west-central side. A sample of bone taken from a fragment of a modified caribou axis vertebra found in this small hearth gave an AMS date of 550 ± 120 years B.P. (RIDDL-544, NOGAP-019) (Le Blanc 1987:30, Cinq-Mars 1988 pers. com.). This implies a date between A.D. 1280 and 1520.

The difference between this date and those obtained for Feature 1 suggests a series of non-synchronous occupations of the Trail River site, ranging in age from A.D. 1280 to 1665.

3.3 Feature 1

Feature 1 was initially thought to have been a wind break (Le Blanc 1986:52) but evidence from the Aasivisuit site, a large interior caribou hunting camp in west Greenland, suggested to Le Blanc (1987) that similar arc-like features may have acted as shooting blinds (see Grønnow et al. 1983, Grønnow 1986). The examples from Aasivisuit are, however, smaller than Feature 1, averaging only 1.5 meters in diameter (Grønnow et al. 1983:45).

Although the functional identification of Feature 1 as a shooting blind seemed plausible, the density and range of materials recovered from it led Le Blanc (1987:127) to speculate that Feature 1 was a habitation site. Feature 1 is probably a tent-ring in front of which many objects and faunal wastes were stored, discarded and/or lost. Ethnoarchaeological study of an Inupiat Eskimo camp has demonstrated that:

> the pattern of artifact disposal near the house, and **especially near the entryway**, parallels ethnographic descriptions of the use of entryways and areas surrounding [...] as repositories for material objects not taken into the house (Spencer 1959) (Chang 1988:148). (emphasis mine)

Such a demonstration of habitation would further indicate the likelihood that the whole Trail River site was a residential camp and not a location site; the first being a place where people lived and to which caribou were brought back, and the latter being the place where caribou were hunted and/or killed (see Binford 1982).

3.4 Caribou migration routes in the Trail River area

NgVh 1 is situated in an excellent locale for caribou hunting. Major herds migrate through the area in late spring and during the summer. It is difficult to assess if the caribou populations were more or less the same over 200 years ago as caribou populations are subject to great fluctuations (Skoog 1968). Nevertheless, Franklin (1828:128), the first European to encounter the Mackenzie Inuit inhabiting the Yukon coast, noted that on July 17 1826, a large herd of caribou was spotted south east of Herschel Island. Herschel Island was "much frequented by the natives at this season of the year as it abounds with deer and its surrounding waters afford plenty of fish (ibid.:131)."

Presently, the caribou that pass through the area north of the British Mountains during the spring and summer migrations are from the Porcupine herd. The composition of herds in terms of sex, age and density varies greatly during each migration. Such information is of importance if one wishes to infer the subsistence strategies employed by the people who occupied the Trail River site.

The Porcupine herd numbers about 100,000 animals (Martell et al. 1984:40). "The composition of the herd is approximately 40-45% cows, 15-20% calves, 30% bulls and 10% yearlings" (Russell Lebond 1979:48). By late May or early June, after spending the winter south of the tree line, the Porcupine herd migrates to the calving grounds. Calving grounds are located on arctic coastal plains and in the foothills of the British Mountains, from the Canning River (Alaska) to the Babbage River (Yukon) just east of the Trail River (McCourt et al. 1974:53). Pregnant cows are the first to arrive to the calving grounds (ibid.) and thus would be the target of caribou hunters on the coastal plain.

Calving takes place from the last week of May through the middle of June. At this time, the herd is segregated into nursery bands composed of cows with their calves and yearlings, and into non-calving groups composed of bulls, non-pregnant cows and yearlings (Martell et al. 1984:40). At the height of the calving period, which occurs around June 5 and 7, the herd is quite sedentary (McCourt et al. 1974:54). During calving, the caribou herds are widely dispersed. Between June 3 and June 17, 1972, groups of various size were observed in the Northern Yukon. The groups numbering between 2-9 animals comprised 59% of the total observations. Groups between 10-49 animals were common (26%) and very few groups of over 500 animals were observed (McCourt et al. 1974:55). The rarity of large groups would force caribou hunters to hunt their prey on a more or less individual basis rather than to employ large scale caribou drives (see Table 1).

After calving nursery bands move west into Alaska along the coastal plain while non-calving groups migrate through the foothills (Martell et al. 1984:40). Thus, if caribou hunters were in the coastal plain area of the Trail River (i.e., in the vicinity of NgVh 1), at this time of the summer, they could hunt only cows, neonates and yearlings.

By early July, huge post-calving aggregations (up to 40,000) composed mainly of cows and calves are found along the coast between the Canning River and Demarcation Point in Alaska (ibid.). Usually most bulls and yearlings move into Alaska through the foothills by late June and early July, but in some years the majority remained in Yukon (McCourt et al. 1974). Incidently, during the 1986 field season, few caribou were present at the Trail River site in late June. Thus during this short period between late June and early July, the only caribou available for hunters would be bulls and yearlings widespread throughout the area (see Table 1).

During the first half of July, most of the Porcupine herd moves eastward through the British Mountains and by mid to late July reaches the northern Richardson Mountains (Martell et al. 1984:41). These are post-calving herds containing a mixture of cows, calves, sub-adults and mature bulls, forming groups over 5,000 animals (McCourt et al. 1974: 59-61). In order to avoid flying insects, caribou travel at night along the foothills and aggregate on ridges of high valleys during the day (ibid). In 1971, during the first half of July, a herd of 70,000 began wandering and broke into several groups along the Tulugaq River (formerly the "Crow" River) and the Trail River drainages (Jakimchuk et al. 1974:22). The next year, in mid-July, 44,200 caribou were located at the head of the Babbage River (McCourt et al. 1974: 58).

At the end of July and in early August, the caribou move back to their wintering grounds in Alaska and the Yukon by travelling along the tree line (Martell et al. 1984:41; Russell LeBlond 1979).

Thus, the first half of July would be an excellent period to hunt numerous caribou by means of drive lines (inuksuk) located in the high valleys of the British Mountain foothills or by surrounds on the coastal plain (see Franklin 1828:137). More than one camp would probably have been occupied at the peak of the summer migration. In fact, helicopter surveys along the Trail River have located three more sites beside NgVh 1 (Le Blanc 1987). One of these sites consists of a semi-circular ring of stones quite similar to Feature 1 at NgVh 1 (ibid.). Archaeological sites along the Tulugaq and Babbage Rivers, running parallel to the Trail River, are likely related to caribou exploitation. This is strongly suggested by the recording of a 3 km long inuksuk located on the east side of the Tulugaq River, just where the river enters the British Mountains (Le Blanc 1987:10). NgVh 1 could belong to an important series of caribou hunting camps and kill sites located in an area intensively occupied by caribou during their spring and summer migrations.

Small herds of caribou in the vicinity of the Yukon coast could have been hunted year around. Indeed, in the mid-1890's and at the beginning of the 1900's, caribou appear to have been present year-round near Herschel Island, as whaling ships were able to secure a large amount of caribou meat there (Harrison 1908: 264; Martell et al. 1984:43; Russell 1898:227; Stone 1900:57). Nevertheless, it is possible that caribou was not always available in sufficient quantities to meet the needs of the Yukon coast population, particularly when hides were needed for winter clothes. Caribou was the most important animal for clothing supplies according to Stefánsson (1919:17). Caribou hides might have been obtained from trading with other groups. Trading is known to have taken place at Barter Island between the coastal Yukon Mackenzie Inuit and their western neighbours (Franklin 1828:130). However, such trading took place in the spring time when caribou hides were not at their prime and involved mostly the trading of furs, seal-skins and oil from the Mackenzie Inuit for iron, knives and beads (ibid.). Franklin (1828) mentioned that during summer, trading occured with the Peel River Loucheux (the Vunta Kutchin) who came from a river south of Herschel Island (probably the Firth River). It is possible that caribou hides were traded from the Kutchin, but hides obtained at this time of year would not be suitable for utilization as winter clothing. It is more likely that the coastal Yukon Mackenzie Inuit traded caribou hides with the Mackenzie Inuit living east of the Delta where caribou was available year-round. The trade between the various Mackenzie Inuit groups would have taken place in mid-fall, winter and spring because summer was the best harvest season (Stefánsson 1914).

MAY		JUNE			JULY		
MONTH	Late	Early	Mid	Late	Early	Mid	Late
Main activity	calving			moving West		moving East	
Groups oomposition in the Trail River area	Nursery bands (cows, oalves, yearlings) Non-oalving groups (bulls, yearlings, non-pregnant oows)			bulls, yearlings		cows, oalves, bulls, yearlings	
Groups density	small groups widely dispersed			small groups		huge groups (> 5,000)	
Hunting strategies	individualistio hunting					communal hunting (e.g. inuksuk)	

Table 1. Caribou groupings composition during late spring and summer migrations in the Trail River area.

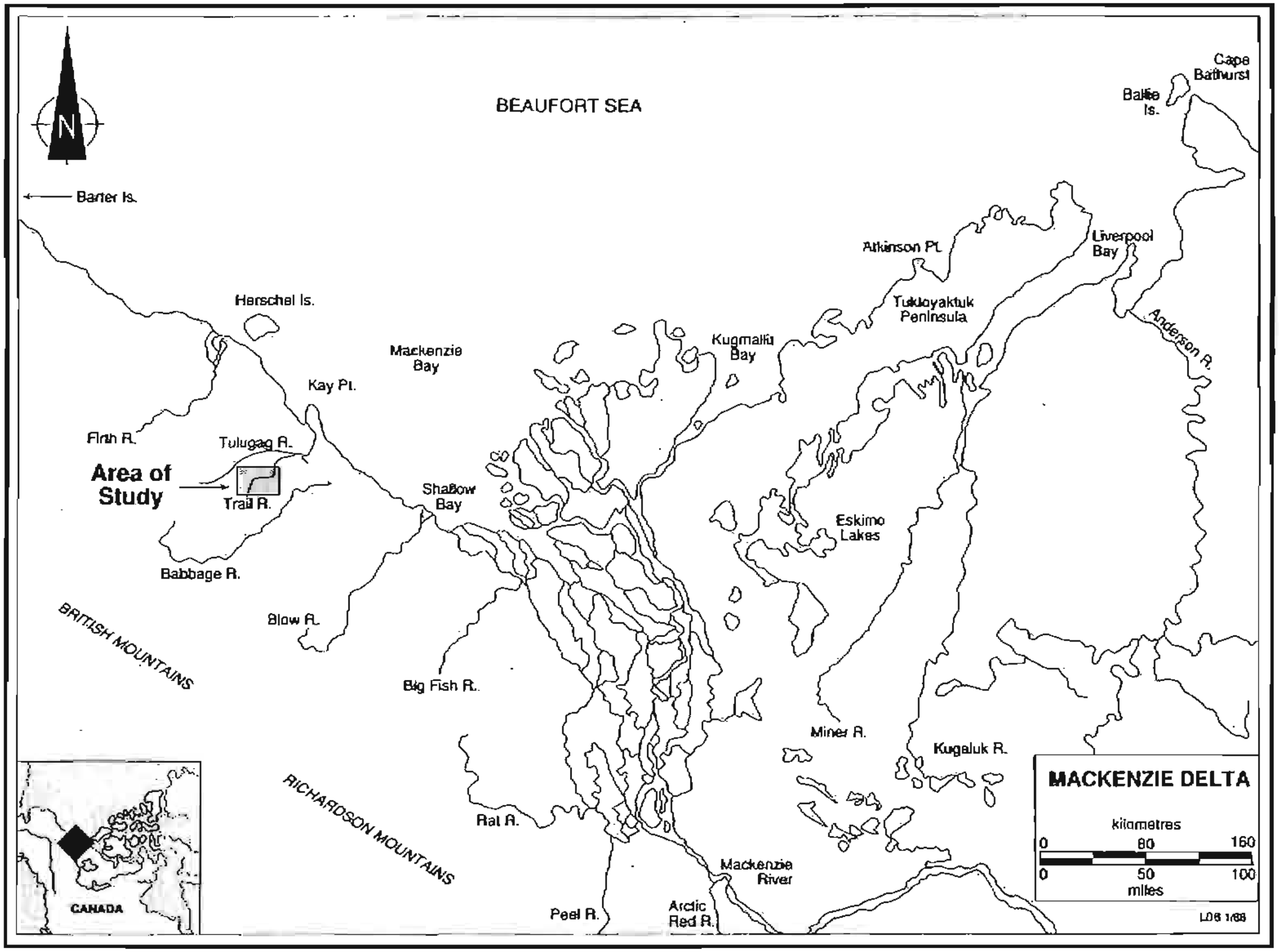

Figure 3. Western North America: Yukon and Northwest Territories (after Snyder 1986: 33)

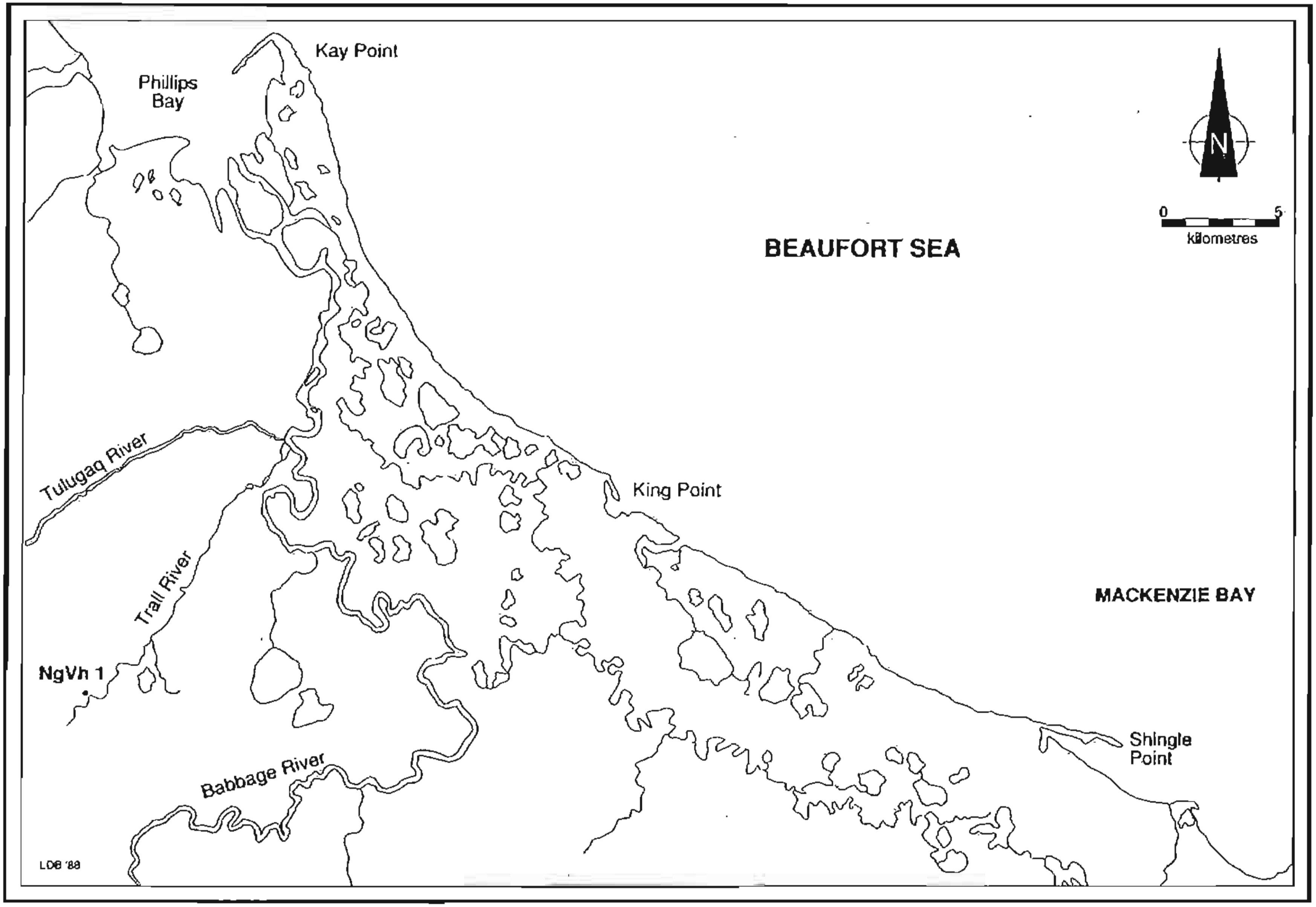

Figure 4. The area of study (after Le Blanc 1986)

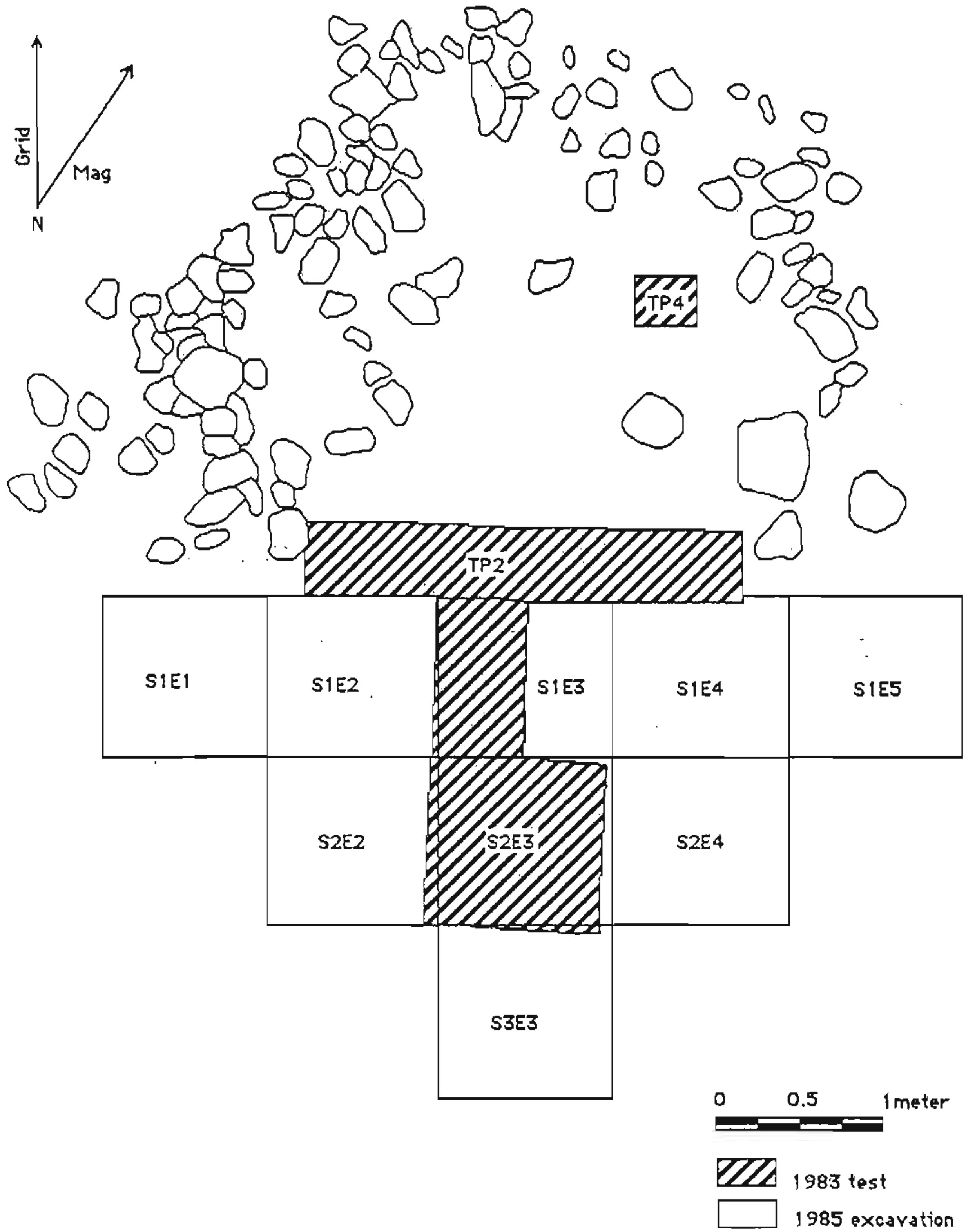

Figure 5. NgVh 1 : Feature 1 (from Le Blanc 1986:41)

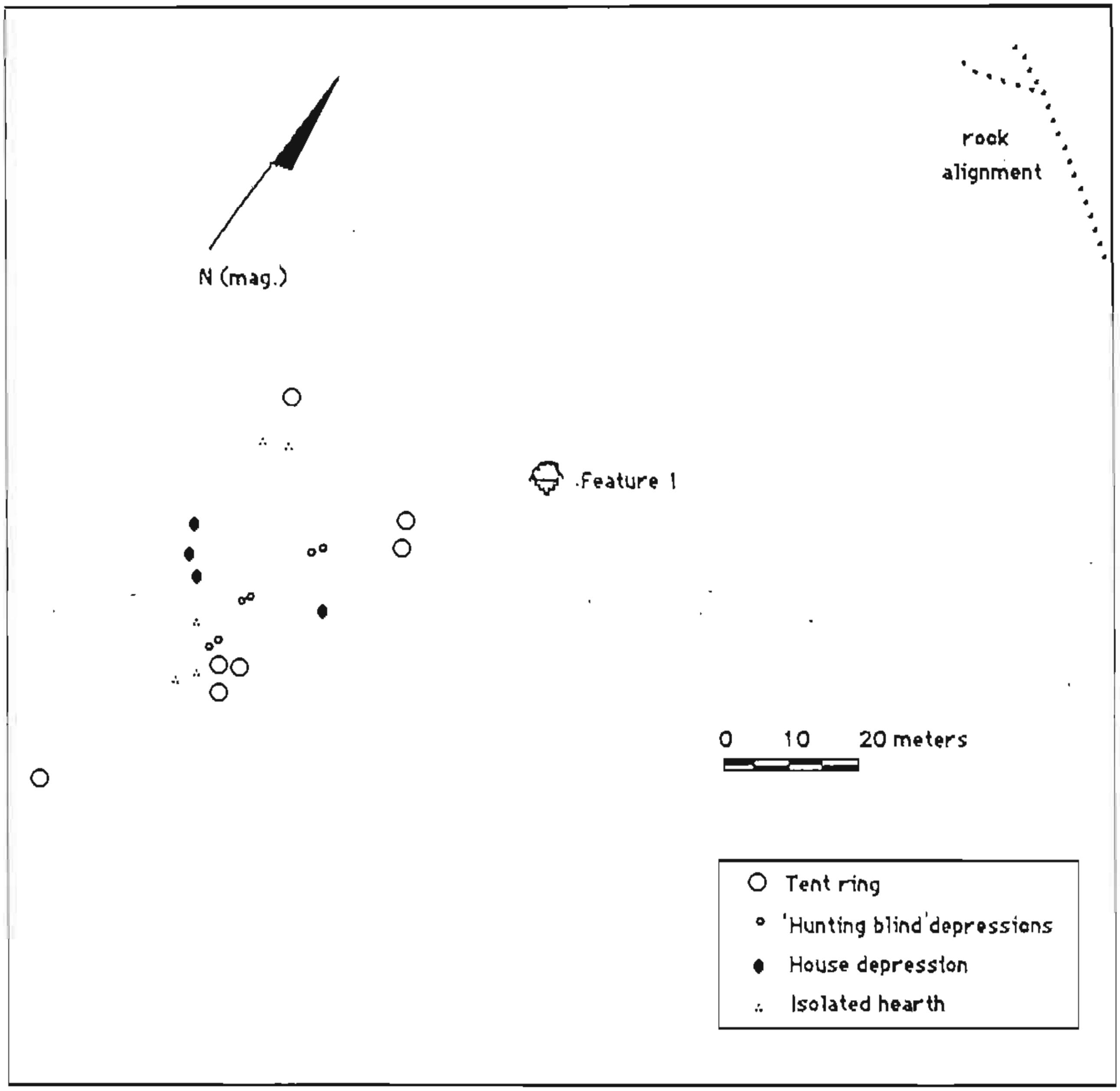

Figure 6. General view of NgVh 1 (after Le Blanc 1986: 50)

CHAPTER 4. Faunal Analysis of NgVh 1

4.1 Introduction

The analysis of faunal remains recovered from Feature 1 at the Trail River site was undertaken for three reasons. First, to identify the different species exploited by the people occupying the Trail River site; second, to estimate the season of the site occupation; and thirdly, to infer the kinds of activities linked to food processing performed at Feature 1. These approaches aim to demonstrate that NgVh 1 was a habitation site where caribou were brought to be processed.

A total of 5276 bones and teeth were analyzed. This number does not include the worked antler. In order to avoid the misrepresentation of some elements, worked bones were included in this total. Due to the fragmented state of most bones, only 32% (N=1658) of the faunal material could be identified to at least the family level. Twenty one species were identified. Of these, seven were mammalian, thirteen were birds, and one was fish. The classes were distributed as follows: 83.4% (N=4401) of all bones identified belonged to mammals, 16% (N=845) to birds and 0.5% (N=27) to fish.

Identifications were made on the basis of the comparative collection of the Zooarchaeological Laboratory at Simon Fraser University. The bones were assigned to a species or genus only when identification was certain. One problem encountered was that of identifying the many immature (i.e., foetuses/neonates and calves) artiodactyls in the recovered material. Uncertainty in speciating the elements occurred because the comparative collection used for the study did not contain immature caribou material. The closest specimens in the collection were those of the foetuses, calves and yearlings of the black-tailed deer. Furthermore, even though caribou are known to be the principal artiodactyls in the area of the Trail River site, muskox and moose also wander through the region (Martell et al. 1984). Thus foetus and calf bones could only be identified to the family level (i.e., artiodactyl), except in the case of dental evidence.

The results of the analysis are presented in Table 2. The table includes two quantification systems; NISP and MNI. The NISP is the number of identified specimens (i.e., bones) belonging to the same taxon. The NISP method has numerous problems when it is used as an indicator of the relative abundance of vertebrate remains (see Grayson 1979, 1984, Klein and Cruz-Uribe 1984). For example, NISP is very sensitive to bone fragmentation. It will thus over-estimate the importance of large mammals, whose bones break into more pieces than those of small mammals. The MNI is the minimum number of individuals represented in a species sample. This quantification method also has some serious flaws (see Grayson 1979). For the present study, the MNI has been calculated using Chaplin's (1971) "matching" method. Elements used for the calculations of ptarmigan and caribou MNI are listed in Tables 3 and 6.

4.2 Fish Remains

Time constraints did not allow for screening during the site's excavation. Thus, small bones from fish were almost certainly missed in the recovery of the faunal remains. This could well be the reason for the small amount of fish bones collected. The only bone identified to the family level belonged to the Pike family, probably a northern pike. All the identified elements were cranial. In the absence of screening this can be easily explained by the fact that cranial bones are larger and more recognizable than most postcranial elements. However, another explanation could be that these are residues of fish processing at the site where the heads were removed and the rest of the fish were transported to another location.

It is difficult to estimate if fish were readily available along the Trail River, east of NgVh 1. In effect, anadromous fish, like char, are most numerous in the Yukon drainages but they migrate downstream to coastal waters between late May and early June (Martell et al. 1984). Thus when NgVh 1 was occupied (see section on seasonality), it is possible that most anadromous fish had already migrated downstream and they were concentrated in spawning areas like those of the Babbage River (see Kendel et al. 1975).

4.3 Bird Remains

A total of 845 bird bones were recovered from the Trail River site. It was possible to identify 616 (i.e. 66.3%) of these bones. If the minimum number of individuals (MNI) is used to distinguish the more abundant from the less abundant species at the site, then ptarmigan (Lagopus sp.), with an MNI of 23, is most numerous (see Table 3).

Both rock ptarmigan (Lagopus lagopus) and willow ptarmigan (Lagopus lupus) are expected to be found in northern Yukon (Godfrey 1986:158, Martell et al. 1986:95). Attempts at distinguishing these two species by comparison of bone lengths proved fruitless and the specimens remained lumped together as 'ptarmigan'.

Other bird bones found in the site belonged to the following species: loon, goose, mallard, northern pintail, duck, hawk, crane, plover, sandpiper, phalarope, gull, and owl. In addition, bones belonging to the Falconiformes and to the Charadriiformes orders were recovered (see Table 2). The elements of each species are listed in Table 4. The fact that elements belonging to the gull species are second in the NISP ranking corroborates with ethnographic data. At Point Barrow gulls were the most important food resource after waterfowl (Murdock 1892:57).

Birds other than waterfowl (i.e., goose, mallard, duck, northern pintail), ptarmigan and gull, were possibly hunted for their plumage. Among the Mackenzie Inuit, bird skins were not utilized for clothes but were transformed into bags for holding lines used in beluga whale hunting; as women's work bags; and in historical time as tobacco bags (Stefánsson 1919:145). The skins of all birds, especially of loons, were used as handwipers (ibid). The possibility exists that these birds were the victims of a fox or a wolf. Nevertheless, this appears unlikely since any alteration on bird bones is quite minimal. Only 0.3% (N=3) of bird bones showed rodent damage and only 0.2% (N=2) showed carnivore damage. Bird bones were probably quickly buried by human (and possibly dog) trampling as only 1.1% (N=10) of the bird bones had been weathered.

It is difficult to infer the kind of processing done on birds as a result of their consumption. Only 0.2% (N=2) of the bones showed cut marks and none of them were burnt. Among the Mackenzie Inuit living at Kittigazuit, "no part of any bird was ever eaten uncooked unless it was dried" (Stefánsson 1919:137). The breast meat of geese, brant and swan was usually dried (ibid.). Fresh birds were generally roasted and when "high" they were boiled. Eggs, which were the subject of a food taboo (Petitot 1889:246, 249, Stefánsson 1919:136), had to be boiled in order to be eaten (Stefánsson 1919:137).

Among the western Inuit, the exploitation of birds was primarily performed by women and by children (Murdock 1892, Stefásson 1919). Thus, the bird remains from NgVh 1 suggest the presence of women and/or children.

The variety of bird remains indicate that while waiting for caribou herds to pass in the area, the people at NgVh 1 had to rely on other resources. Geese would have been particularly welcomed for their high fat content even in late spring (Martell et al. 1984). The large numbers of ptarmigan were consumed only for their meat, as fat represents only 1% of their body weight which averages 1.5 kg (Foote 1965).

Table 2. Relative vertebrate abundance from NgVh 1

TAXON	NISP	% of iden. bones	MNI	MNI%
Mammals				
arctic ground squirrel	44	2.6	3	4.4
muskrat	39	2.3	9	13.2
microtine	3	0.2	_	____
rodent	1	0.1	_	____
canid	4	0.2	_	____
arctic fox	24	1.4	3	4.4
red fox	18	1.0	2	3.0
fox	4	0.2	_	____
marten	6	0.4	2	3.0
caribou	387	23.2	3	4.4
caribou/moose	378	22.6	_	____
artiodactyl (foetuses and calves)	145	8.7	5	7.4
unidentified land mammal	3348	___	_	____
Class subtotals:	4401	___	26	39.7
Birds				
loon	3	0.2	1	1.5
goose	26	1.6	2	3.0
mallard	8	0.5	2	3.0
northern pintail	13	0.8	2	3.0
duck	12	0.7	1	1.5
hawk	6	0.4	1	1.5
falconiformes	2	0.1	_	__
ptarmigan	475	28.4	23	33.8
crane	4	0.2	1	1.5
plover	4	0.2	1	1.5
sandpiper	1	0.1	1	1.5
phalarope	2	0.1	1	1.5

Table 2. Relative vertebrate abundance from NgVh 1 (cont.)

TAXON	NISP	% of Iden. bones	MNI	MNI%
Birds (cont.)				
gull	50	3.0	3	4.4
charadriiformes	9	0.5	—	—
owl	1	0.1	1	1.5
unidentified bird	229	—	—	—
Class subtotals:	845	—	40	58.8
Fish				
pike	3	0.2	1	1.5
salmoniforme	1	0.1	—	—
unidentified fish	23	—	—	—
Class subtotals:	27	—	1	1.5
Class uncertain	3	—	—	—
Grand totals:	5276	100.0	68	100.0

Table 3. List of ptarmigan bones from NgVh 1

ELEMENT	Complete bone sym.	right	left	Frag.	Proximal frag. right	left	Distal frag. right	left	Mid-section right	left	MNI
cranial apex	4			10							
frontal	3			5							
mandible					8	9	2	3		1	
occipital	1										
palatine				1							
premaxilla	1			4							
surangular				6							
cervical vertebra	3										
rib				1		2	2				
synsacrum	2			3			2				
furculum				4		1	6	3	2	1	
sternum				9	9	10					
coracoid		4	5	1	3	5	2	3			10
scapula		4	1	4	9	10	2	3			13
humerus		5	5		5	8	7	14	1	3	19
radius		14	18		7	5	3	2	3	1	23
ulna		12	11		10	7	9	4	5	3	22
carpometacarpus		5	4								5
innominate		2		5							
femur		2			10	12	11	13			13
tibiotarsus		1			10	9	15	23			23
fibula		1			3	3					4
tarsometatarsus		4	3		1	1	1				5
phalanx I,digit 1			1								
phalanx I,digit 2		2									

N=475

Table 4. List of bird bones other than ptarmigan from NgVh 1

ELEMENT	Complete bone			Frag.	Proximal frag.		Distal frag.		Mid-section		MNI
	sym.	right	left		right	left	right	left	right	left	
LOON (N=3)											
mandible									1		
humerus						1					1
ulna					1						
GOOSE (N=26)											
innominate								1			
furculum				4							
rib				1	1		1				
coracoid		1	1					1			2
scapula						2					2
humerus		1					1	1			2
carpometacarpus								1			
f. phalanx II,dig.2		1									
radius				1					1	2	
ulna				1							
tibiotarsus								1			
h. phalanx I,dig.2				1							
h. phalanx II,dig.4				1							
MALLARD (N=8)											
cervical v.	1			1							
rib										1	
radius				1						1	
f.phalanx I,dig.2			1								
h.phlanx I,dig.1			2								2
NORTHERN PINTAIL (N=13)											
maxillary		1									
mandible							1	2			2
coracoid		1									
scapula									1		
carpometacarpus		1	1								
radius									1	1	
tibiotarsus								1			
h.phalanx I,dig.3		1									
h.phalanx II,dig.3		2									

Table 4. List of bird bones other than ptarmigan (cont.)

ELEMENT	Complete bone sym.	right	left	Frag.	Proximal frag. right	left	Distal frag. right	left	Mid-section right	left	MNI
DUCK (N=12)											
mandible				1							
coracoid										1	
sternum				2							
cervical v.	1			1							
ulna									1	1	
tibiotarsus						1					
tarsometatarsus			1								1
h.phalanx II, dig.3			1								1
h.phalanx III, dig.2			1								1
HAWK (N=6)											
frontal					1						
mandible		1	1								
radius									1	1	
h.phalanx I.dig.2		1									1
FALCONIFORME (N=2)											
mandible				2							
CRANE (N=4)											
furculum					1						
scapula						1					
ulna							1				
tarsometatarsus								1			1
PLOVER (N=5)											
coracoid			1								
humerus							1				1
carpometacarpus		1	1						1		
SANDPIPER (N=1)											
humerus					1						1
PHALAROPE (N=2)											
humerus			1								
carpometacarpus			1								1

Table 4. List of bird bones other than ptarmigan (cont.)

ELEMENT	Complete bone sym.	right	left	Frag.	Proximal frag. right	left	Distal frag. right	left	Mid-section right	left	MNI
GULL (N=50)											
frontal	2			1							
premaxilla				1							
maxilla				1							
nasal					1						
sternum				2							
coracoid		1	1								
cervical v.	1										
rib										1	
scapula					2	1					2
humerus							2	1			
radius					1	1			3		3
ulna				1	1	1	1	1	1		
carpometacarpus			2					2			
femur								1			
tibiotarsus		1			1	1					
tarsometatarsus		2			1	2	1	1	1		3
h. phalanx I,dig.2			1								
h. phalanx II,dig.2		1	1								
CHARADRIFORME (N=9)											
premaxilla				1							
furculum						1		1			
sternum				3							
humerus									1		
ulna									1		
h.phalanx I,dig.1		1									
OWL (N=1)											
radius							1				1

In the present study, all faunal material in the 'artiodactyl' and the 'caribou/moose' categories is assumed to belong to the caribou species. This brings the NISP of caribou to 910, representing 54.5% of all identified bones. It also raises the MNI of caribou to 8, representing 11.8% of all the MNI.

The immature artiodactyl remains are probably those of caribou since the dental evidence shows that two erupting deciduous teeth were those of a foetal/neonate caribou (see Table 5). Furthermore, calving herds are known to pass through the Trail River area from late May until late July when they migrate back to southern regions (Jakimchuk et al. 1974). The MNI for the foetal artiodactyls was 3. For the artiodactyl calves, the MNI was 2.

It is not surprising to find foetal remains of caribou. Their skin was suitable for making clothes for children as well as summer clothes for adults (Banfield 1981; Grønnow et al. 1983; Stefánsson 1914). At Point Barrow, Murdock (1892:61) mentioned that many well developed foetal caribou were brought home from the spring hunt and were considered to be excellent eating. Gubser (1965) mentioned that the meat of foetal caribou was a favorite of the Nunamiut Eskimos, particularly the children. Boiled foetal caribou meat tastes like tender chicken (ibid.). Gubser added that among the Nunamiut, cows were hunted in the spring for their foetuses, not for their meat. Murdock (1892) also reported the use of foetal caribou as targets for boys playing with their bows and arrows.

The age range of the population was estimated by aging the caribou teeth. The resulting tooth ages were also used to calculate season of site occupation. Mandibles and individual teeth of immature individuals were aged using methods involving the stage of tooth eruption. This was chosen over stage of tooth wear as tooth wear involves too much individual variation; at best, only broad age ranges can be estimated (Spiess 1979). In the present study, the eruption stage of the teeth was estimated by looking at the degree of apical closure. Criteria used here were from Miller (1974) in his study of the Kaminuriak caribou population. All permanent teeth were grouped under the same category (sub-adults and adults). Age estimations of the erupting caribou teeth from NgVh 1 are listed in Table 5. Age estimations of permanent teeth are listed in Table 6. Three age categories were distinguished: 0-3 months (foetuses and calves); 3-27 months (calves, yearlings and sub-adults) and >27 months (sub-adults and adults).

The caribou MNI of 8 indicates that caribou were not hunted on a large scale at NgVh 1. The site was occupied during calving time, when the widespread distribution of small sedentary groups of caribou allowed only for individualistic hunting. However, as the term implies, MNI values give the minimum and not the actual number of individuals represented by the assemblage. Also, since only a small portion of the NgVh 1 site was excavated, the possibility remains that other features were occupied at the same time and thus could yield more caribou remains. The NISP value (N=910) of caribou is indicative of the fact that the NISP is very sensitive to bone fragmentation and further suggests that bone processing for marrow extraction and grease rendering was undertaken at the site. This inference will be further discussed in section 4.7 in the present chapter.

Table 5. Age estimation of erupting caribou teeth from NgVh 1*

TEETH	Side	Apical closure	Tooth wear	Age estimate¥	Number	MNI
Deciduous Lower Premolar 2	L	not closed	none	0-3 months	1	
Deciduous Lower Premolar 3	L	not closed	none	0-3 months	1	1
Deciduous Lower Incisor 1	L	almost closed	worn	3-25 months	1	
Deciduous Lower Incisor 1	R	almost closed	worn	3-25 months	1	
Upper molar 2	L	almost closed	little worn	10-12 months	1	
Upper molar 2	L	not closed	none	10-12 months	1	
Upper molar 3	L	not closed	none	15-27 months	1	
Upper molar 3	R	almost closed	none	15-27 months	1	
Lower Molar 3	L	not closed	none	15-27 months	2	3
Lower Molar 3	R	not closed	none	15-27 months	2	
Lower Molar 3	R	almost closed	none	15-27 months	1	
Lower Premolar 2	L	almost closed	none	25-27 months	1	
Lower Premolar 2	R	almost closed	none	25-27 months	1	

MNI: 4

* Using only complete teeth
¥ Using data from Miller (1974)

Table 6. Permanent caribou teeth from NgVh 1*

TEETH	Side	Apical closure	Tooth wear	Number	MNI
Lower molar 1	L	closed	worn	1	1
Lower molar 2	L	closed	worn	2	2
Lower premolar 2	L	closed	worn	2	2
Upper molar 1	L	closed	extreme	2	
Upper molar 1	L	closed	worn	1	
Upper molar 1	R	closed	extreme	1	2
Upper molar 2	L	closed	worn	2	
Upper molar 2	R	closed	worn	3	3
Upper molar 3	R	closed	extreme	1	1
Upper premolar 1	R	closed	extreme	2	2
Upper premolar 2	R	closed	little worn	1	1
Upper premolar 3	L	closed	worn	1	
Upper premolar 3	R	closed	worn	1	1
				MNI total	3

* Only complete teeth were used

Small mammals constitue 8.6% (N=143) of all the identified bones and represent 28% (N=19) of all the MNI. It is difficult to assess the importance of small mammals at NgVh 1 as few skeletal elements were found at the site. Arctic fox (MNI=3), red fox (MNI=2), marten (MNI=2) and muskrat (MNI=9) were represented on the site primarily by their mandibles. The absence of post-cranial remains from these species cannot be accounted for solely by taphonomic processes (e.g., carnivore activity) as only two marten bones show rodent damage. The recovery of three worked fox canines suggests that mandibles may have been kept for later modification into tools.

The presence of arctic fox and marten metacarpals suggests that the carcasses of these animals were butchered elsewhere and that only the furs, with head and extremities still attached, were brought back to Feature 1. The relatively high number of muskrats (MNI=9) might indicate that these were eaten by the people of NgVh 1. Petitot (1887:176, 180) mentioned that muskrats were roasted and eaten by the Mackenzie Inuit of the Anderson River. Futhermore, among the Mackenzie Inuit, muskrat furs were of importance in the making of inner coats and for the inside of mittens (Stefánsson 1919:146).

Also recovered from the site were the mandibles, maxillae, and femora of the arctic ground squirrel (Spermophilus parryii). The MNI count here is 3. The siksik (the local name of the arctic ground squirrel) were observed by the field crew to be the site 'landowners' as they were quite numerous and well fed during the site's excavation. It is possible that the remains of siksik are due to taphonomic processes occurring on the site after (or even before) it was occupied. Only one tibia had been chewed by a carnivore. However, as siksik were historically exploited in the Arctic for both their fur and meat (Banfield 1981:122), this could also have been the case in prehistoric times. Although Stefánsson (1919:35) remarked that the siksik were an important food among the Mackenzie Inuit, their skins were not utilized (ibid.:146). Apparently, the skin of these animals was considered taboo since siksik burrow in and under graves (ibid.).

Table 7. List of small mammal bones from NgVh 1

ELEMENT	Complete bone sym.	right	left	Frag.	Proximal frag. right	left	Distal frag. right	left	Mid-section right	left	MNI
ARCTIC GROUND SQUIRREL (N=44)											
lower incisor 1			2								2
mandible		2	1						1	4	3
maxilla				1							
ramus				3							
clavicle			1								
scapula		2	2								2
rib		1	1			1					
femur					1	1					
radius		1	1								
ulna		1									
tibia			1	1							
metatarsal dig. 4		1									
humerus							2				
fibula			2								
phalanx				1							
calcaneum			1								
innominate		3	3	2							3
MUSKRAT (N=39)											
incisor (unid.)				3							
lower incisor 1			1								
molar (unid.)				1							
molar 1			1								
mandible		2	1		7	6			5		9
ramus		4	3	3							
upper incisor 1		1	1								
MICROTINE (N=3)											
lower incisor 1				1							
mandible				1							
upper incisor				1							
RODENT (N=1)											
incisor				1							

Table 7. List of small mammal bones (cont.)

ELEMENT	Complete bone right	left	?	Frag.	Proximal frag. right	left	Distal frag. right	left	Mid-section right	left	MNI
CANID (N=4)											
occipital				1							
molar unid.				2							
lower incisor 1				1							
ARCTIC FOX (N=24)											
upper canine	1			1							
upper premolar 1		1									
upper premolar 2	1										
lower molar 1	1										
mandible	1					2			3	2	3
metacarpal (dig. 5)								1			
tibia						1	1				
metatarsal (dig. 3)	1	1									
metatarsal (dig. 4)	1	1									
f. phalanx 1			3	1							
RED FOX (N=18)											
lower incisor 1	1										
lower incisor 3	1										
lower canine	2										2
lower molar 1		1									
lower premolar 1		1									
mandible				1					1	1	
upper incisor 3	1										
upper premolar 1		1									
upper premolar 2		1									
upper premolar 3	2	1									
upper premolar 4	1										
maxilla		2									
FOX (N=4)											
upper canine	2										
upper molar 1			1								
lower canine	1										
MARTEN (N=6)											
mandible						2			1		2
metatarsal 3			1								
metatarsal 4			1								
metatarsal 5			1								

4.6 Season of Site Occupation

The presence of caribou foetal remains indicates the hunting of pregnant cows. Such hunting took place in late May or early June. Determination of caribou age from teeth has demonstrated that the caribou were killed or died between May and September (see Table 8). The age range of the caribou hunted at Trail River (see Tables 5 and 6) suggests that nursery bands were the target of the hunters. In early June, the calving grounds are populated by small groups of sedentary caribou (McCourt et al. 1974).

The presence of waterfowl such as geese and duck in the faunal assemblage serves as a seasonal indicator. The migration of waterfowl to the northern Yukon in the spring also supports a late spring occupation of the site. This is only a partial corroboration however, as such waterfowl are present in the coastal Yukon region until late fall.

Since ptarmigan inhabit the Trail River area year-round, they are not good indicators of seasonality. Furthermore, no immature specimens were found on the site. Nevertheless, an early summer occupation is suggested by the presence of medullary bone in some of the ptarmigan remains. Medullary bone is a secondary calcium deposit present in the bone of some female birds (depending on species) during the period of reproductive activity. It begins to form soon after mating and accumulates until the last egg of the cluch has been laid. It then takes from 1 to 3 weeks for the medullary bone to resorb (Taylor 1970, Rick 1975). Although the bird bones in this study were not longitudinally cut, as in the method proposed by Driver (1982), it was nevertheless possible to check for this deposit in the many broken limb bones. Medullary bone was found in two left tibiotarus, one right tibiotarsus, and three left ulna of the ptarmigan. No medullary bone, attributable to any other species, was recovered. Deposition of medullary bone in ptarmigan should begin soon after mating in mid-May and end shortly after the completion of the clutch in mid-June (Weeden 1963).

The antler sample from NgVh 1 was not included in the faunal analysis but attempts were made to use shed antler pedicle fragments (N=9) in the determination of seasonality of occupation. Spiess (1978:100) warned that too many variables are involved in the shedding of antlers to fix seasonality, unless one knows the sex and the age of the caribou from which the antler came from. For the present study, sex can be accounted for. The shed antler recovered from Feature 1 belonged to female caribou because of their small diameter (3-4 cm) and because only female caribou shed their antlers in early June after parturition (Skoog 1968). Yearlings, non-pregnant cows and 2-3 year-old bulls shed from late April until mid-May, that is, **before** they migrate to the coastal Yukon (ibid.). Adult bulls retain their antlers until mid-october, **after** they migrate back to their wintering grounds.

The recovery of shed antler thus agrees with the other evidence that indicates the season of occupation was between the beginning of the caribou calving period at the end May until the end of June (see Table 8).

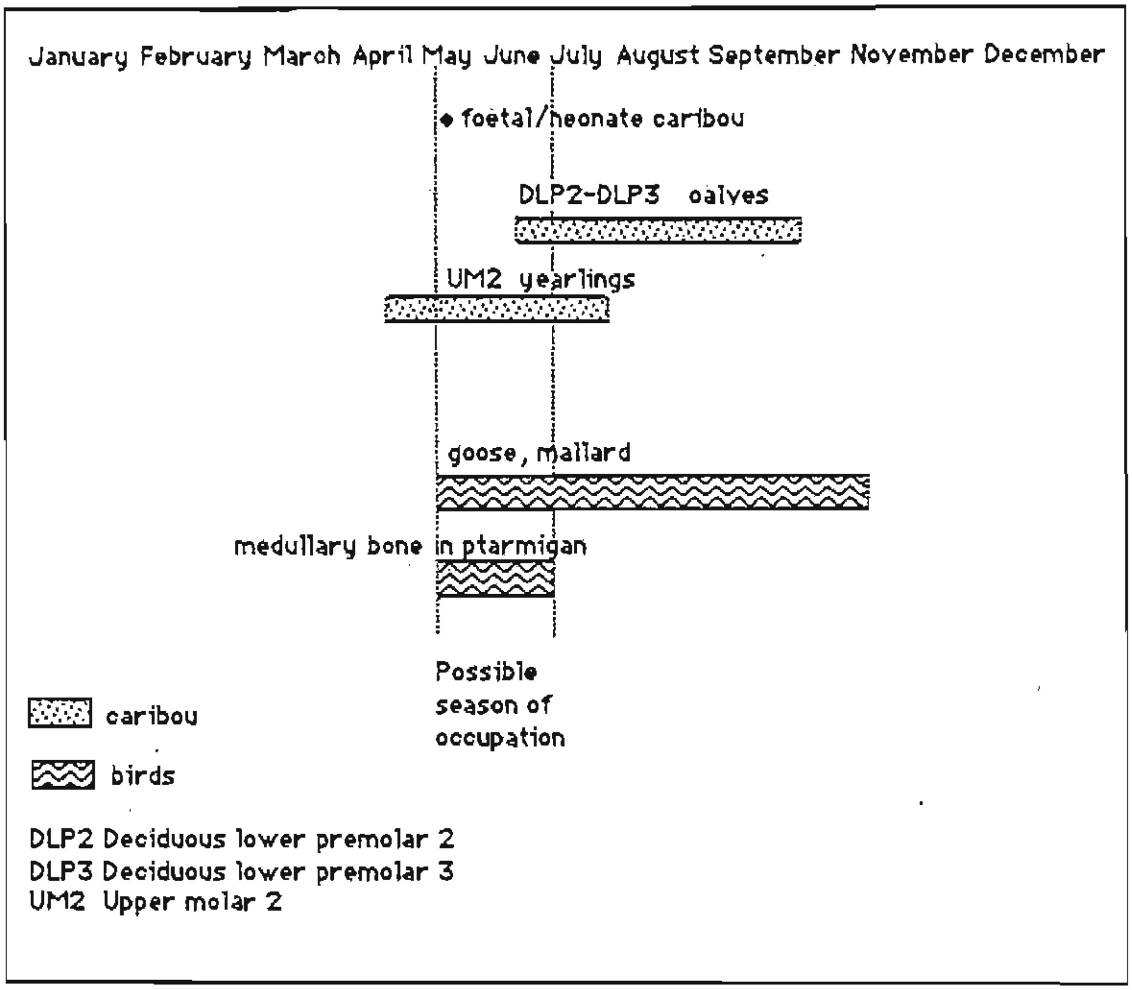

Table 8. Season of site occupation

4.7 Evidence of Bone Processing at the Site

Caribou element parts recovered from Feature 1 are studied as a means of identifying the kinds of food processing-related activites performed at the site. Table 9 records the number of elements of caribou bones. Tools made of caribou bone found at Feature 1 and identified to the element are also included in Table 9. These tools were included in order to avoid the possible impact of bone working on the faunal assemblage (see Driver 1984 on this subject). These tools will be discussed in Chapter 5.

If butchering had been a significant undertaking at Feature 1 one should expect to find cut marks on the articulating parts of caribou bones. However, at Feature 1, only four caribou bones showed cut marks. Three were scapula blade fragments and one was a hyoid fragment. Thus, if cut marks alone are considered, it appears that butchering was minimal at Feature 1. However, grease rendering activities which resulted in crushed bones may have obscured many butchering marks which may otherwise have been present. Vehik (1977) has suggested that in special purpose camps (i.e., hunting camps), grease rendering would occur within a meat processing context:

> The more limited nature of special purpose camps should, ideally, results in the preservation, more-or-less in situ, of by-products of the activity or activities for which the site was occupied (Vehik 1977:173-174).

Thus, if NgVh 1 was an encampment where caribou were processed, one should expect the remains of both activities at the site.

Having suggested that at least some butchering did occur at the site, let us turn to the evidence concerning marrow extraction and grease rendering. The most represented elements recovered at Trail River were fragments of ribs and vertebrae. Only three ribs were complete and all vertebrae were in a fragmentary state. Although ribs are susceptible to breaking by trampling, their very fragmentary state indicates that grease rendering was an important activity at this site.

> Preparation of bone grease involves smashing the bone, heavy limb elements as well as lighter **vertebrae and ribs**, and then boiling the small pieces of bone until the grease is extracted (Speth and Spielmann 1983:19). (emphasis mine)

Caribou phalanges are well represented in the NgVh 1 faunal assemblage. Binford (1978) has hypothesized that bones with low fat values, such as phalanges, would be selected less often for grease rendering and would thus be more visible in the archaeological record. This is the case at the Trail River site since most phalanges are intact.

Many long bone fragments (N=710) were recovered which, although they could not be identified positively to the family level, most likely belonged to the caribou species. These long bones had been cracked open for extraction of marrow and/or smashed and probably boiled for the rendering of the fat content. Indeed, 85% (N=600) of the unidentified long bone fragments from large mammals measured between 0.1 and 5 cm, probably the result of smashing. The resulting destruction of limb bones would tend to skew their representation. It is also possible that long bones were utilized as raw material in the manufacture of implements.

The same pattern occurs with the metapodials. Among the 107 fragments of caribou/moose unidentified metapodials recovered at the site, 66% (N=71) were smaller than 5 cm. They had probably been smashed for grease rendering. The practice of extracting marrow and bone grease rendering was widespread among the Mackenzie Inuit, as in other Arctic groups. Stefánsson (1960:40) noted that the making of bone tallow was accomplished by the long boiling of crushed bones. Reporting on how the bones were broken for the extraction Stefánsson notes that the Mackenzie Inuit of the Eskimo Lakes areas break the long bones

> ...somewhat as we might break the shell of a hard-boiled egg with a knife. They generally use the back of the blade of their hunting knifes (butcher knifes), twirling the bone and tapping it on all sides from one point to the other until the bone is **all cracked into small pieces...** (Stefánsson 1919:162). (emphasis mine)

It is unlikely that carnivores (e.g. wolves) contributed to much bone fragmentation. Only eight caribou bones showed chewed or hacked edges. Futhermore, if wolves were interested in the bones left at Feature 1, it is unlikely that they would have cracked up and chewed the metapodials. Such lower limb elements are by far the most common surviving body parts at wolves kill sites where utilization of all carcasses is high (Haynes 1981:142). Rodent damage to the caribou bones is found on only one bone.

The abundance of cracked and smashed caribou bone may further indicate that people from Trail River had scarce fat sources, due to the fact that caribou hunting was not too successful, or that the caribou themselves did not contain a lot of body fat. Both reasons were probably the case at Trail River site as season of site occupation occured during late spring and early summer. During this period, caribou do not have a lot of fat (Dauphiné 1974). This observation would validate Spiess's reasoning for the presence of smashed bones:

> In sites where there is a concern with fat availability, that is sites with limited food availability or none immediately expected, long bones will not only be cracked for their marrow (as usual) but also smashed for bone-grease extraction (Spiess 1978:173).

Furthermore, Spiess expects these sites to be winter or spring encampments not associated with successful large-scale drives. Such encampments would tend to be composed of small groups of people who hunted a diversified group of species as a resource base (ibid.) This seems to have been the case at NgVh 1, since the site was occupied during calving season when caribou hunting was not practiced on a large scale.

Speth and Spielmann (1983) have hypothezied that in anticipation of seasonal periods when caloric needs could not be met by lean meat consumption, hunters and gatherers would concentrate on subsistence strategies that increased the availability of carbohydrates and/or fat. One of these strategies is to augment the supplies of storable fat through labor-intensive activities such as rendering bone grease. At the Trail River site, grease could have been processed for immediate use, but could also have been transformed into pemmican for future use. Pemmican was made by mixing rendered fat with an equal amount pulverized dried lean meat (Stefánsson 1956:179).

4.8 Comparisons with the Engigstciak Shelter (NiVk 10)

The results of the faunal analysis are briefly compared with those of the Engigstciak shelter (NiVk 10), a caribou hunting site occupied by late prehistoric Mackenzie Inuit. Such a comparison aims to assess whether the subsistence pattern of the people occupying the Trail River site is unique or if it belongs to a more general pattern specific to the Yukon Coast.

Engigstciak is situated about 25 km inland from Yukon's northern coastline on the east side of the Firth River atop a summit that rises 175.3 meters above sea level (Mackay et al. 1961). It is located approximately 50 km west of the Trail River site. Engigstciak consists of several archaeological sites excavated by R. MacNeish in the mid to late fifties (MacNeish 1956a,1956b,1959). In 1976, another site, designated as the Engigstciak Shelter (NiVk 10), was excavated by Dr. D. Clark of the Archaeological Survey of Canada. The shelter consisted of two walls constricting towards an entrance composed of stone piled approximately two stones high (Hogan 1986:5). The site appears to be early historic or terminal prehistoric in age (Clark 1987 pers. com.).

In the faunal sample analyzed by G. Hogan (1986), caribou represented 37.8% (N=210) of all identified bones and 51.7% of all identified mammal bones, with an MNI of 4. This was followed by bones identified as ptarmigan (25.2%, MNI=14) and arctic ground squirrel (24%, MNI=18), the latter accounting for 32.8% (N=133) of all identified mammals. Other mammals include lemming (N=1), muskrat (N=4), dog/wolf (N=3), fox (N=16) and ermine (N=6). Few bones of immature caribou were present. Only two fish bones were found. The season of occupation was estimated to range from late spring to possibly late summer (Hogan 1986).

The low caribou MNI, considered with the wide range of other species exploited at the site, indicates that as in the case of NgVh 1, caribou were not extensively hunted and that people were relying on many other resources. This conclusion is also reached by Hogan (1986) who suggested that the high number of broken phalanges might indicate that people were trying to extract marrow from every bit of bone.

The overall similaries between NgVh 1 and NiVk 10 suggest that on the Yukon Coast, late spring/early summer was a period when, apart from caribou, a wide variety of resources were exploited. Therefore, subsistance strategies at NgVh 1 do not appear to be unique with respect to those of NiVk 10.

4.9 Summary and Conclusions

In summary, elements belonging to caribou (54.5% of all identified bones) and to ptarmigan (28.4% of all identified bones) were the most abundant faunal remains at NgVh 1. The minimum number of individuals percentages (MNI%) indicate that ptarmigan is represented by more individuals (MNI%=33.8%, MNI=23) than caribou (MNI%=11.8%, MNI=8). It is assumed that ptarmigan were hunted to supplement the main caribou diet. Although represented by few elements, the small mammals account for 28% of the total MNI. It is difficult to assess if these were trapped for their meat or solely for their furs. The recovery of only 27 fish bones is explained by the fact that at the time of the site occupation, the major fish species of the Trail River might have already migrated downstream.

The faunal remains indicate that people at NgVh 1 were exploiting a wide range of resources beside caribou. This might be explained by the fact that at the time of site occupation, caribou were not hunted on a large scale. Such interpretation is corroborated by the results on seasonality, which place the site occupation between the end of May and the end of June. At this time of year, only individualistic hunting would have been practiced as the nursery band is dispersed in small groups. Furthermore, during this season, the caribou yield very little fat and labor intensive grease rendering activities would have been needed to extract the fat from the bones. The faunal analysis has shown that this was indeed the case at NgVh 1.

Table 9. List of caribou bones from NgVh 1

(i.e. caribou + caribou/moose +artiodactyls)

ELEMENT	Complete bone				Frag.	Proximal frag.			Distal frag.			Mid-section			MNI
	sym.	right	left	?		right	left	?	right	left	?	right	left	?	
antler					10										
cranium					3										
hyoid	3	2			4										
mandibula					5										
maxilla					4										3
teeth		24	31	7											7
zygomatic					1										
unid. vertebra					4										
lumbar vertebra					25										
thoracic vertebra					19										
epiphysis (ver.)					20										
caudal vertebra	7														
ribs		1	2			58	58	8	8	7	43	30	37	119	
manubrium	2				4										
scapula		2	4		16	5	2	2	2	5	3		2	3	8
humerus												1			
radius					1			1	1					2	
ulna					2				3		3			3	
metacarpal		1	1					1		1				2	
lunate			1												
magnum			1												
pisiform		1	2												
radial		1													
ilium		1			2										1
ischium					4										1
femur					2	3		1			1	3	3	9	4
patella		2			1										2
tibia							1			1	3			3	3
fibula		1													1
astragalus		1													
calcaneum						1	1								
tarsal				1											
metatarsal					5	3	3			2	2	1		21	3
unid. metapodial					107										
sesamoid				16											
phalanx I		2		12				6			10				4
phalanx II				23				3			3			1	
phalanx III				18				1			1				

N=910

Chapter 5. Functional Categories of the NgVh 1 Artifacts

5.1 Introduction

In order to determine the major activities performed at the site, an analysis of the functional categories of artifacts was undertaken. If NgVh 1 was a habitation camp where different activities related to caribou exploitation took place, one should expect to recover debris from the manufacture and repair of personal gear and household gear as well as the discard of worn out items (see Binford 1979). Tools related to activities carried out by men, women and children are also expected to be found. This chapter presents the different finished artifacts found at Feature 1 in order to determine whether NgVh 1 exhibits the characteristics of a habitation camp.

5.2 Implements for tool manufacture

Although it would seem likely that hunters arrived at the Trail River site with at least a minimum of hunting equipment, the manufacture of new tools was an important activity undertaken at Feature 1. Implements used in the production of antler artifacts were found at the site. One such implement is an antler wedge that could be used in the working of antler and wood. Jenness (1918) mentioned that the Copper Inuit frequently discarded such wedges after use as they were easily replaced. Other tools used to work bone and antler include knives and grooving implements. Five antler knife handles were found. Of these, two "side bladed" knife handles were cut transversely, probably after they had

Table 10. Finished artifacts from NgVh 1

FUNCTIONAL CATEGORIES	ANTLER Complete	ANTLER Proxl.	ANTLER Distal	ANTLER Frag.	BONE Complete	BONE Proxl.	BONE Distal	BONE Frag.	TOTAL
<u>LAND HUNTING</u>									
Caribou arrowhead	1	8	14	1		1			25
Bird blunt arrowhead	2								2
Small arrowhead					2				2
<u>SEA MAMMAL HUNTING</u>									
Inflation nozzle	1								1
Harpoon			1						1
Harpoon foreshaft					1				1
Splices reinforcement	1			2					3
<u>TOOL MANUFACTURE</u>									
Knife handle	4			1					5
Grooving tip					3				3
Wedge	1								1
Worked tooth					3*				3
<u>SKIN-WORKING</u>									
Awl				2	4		5	5	16
Boot creaser	1								
Needle	1				1				2
Needle case					1				1
Scraping implement					3			10	14
<u>TRANSPORTATION</u>									
Sled shoe								4**	4
<u>UNIDENTIFIED OBJECTS</u>									
Bone blade fragment								18	18
Bone tube					1				1
Small object with a knob			2						2
Small thin square object						8			8
Spatulated and tanged object					1				1
	Total antler = 43				Total bone = 71				114

* fox canine ** whale bone

been broken. It is difficult to ascertain the purpose of such a cut (see Figure 7c,d). Possibly, they were recycled as toy knives.

A socketed knife handle (see Figure 7e) could have been used for grooving with bone 'engraving' tips. Three small bi-pointed bone objects found in Feature 1 could also have been used for that purpose (see Figure 9c,d). Similar artifacts found at Walakpa (Alaska) and at Point Barrow have been interpreted as engraving tools (Ford 1959:217; Stanford 1976:129). Three worked fox canines may also have been used as engraving tips. These teeth may also have been prepared as pendants and the modifications performed on them were to facilitate the drilling of holes. Working on Magdalenien pendants, Taborin(1977) has demonstrated that the fox canines were first ground and then drilled. This may have been the technique used at the Trail River site.

There is evidence that lithic technology was used for bone and antler tool production at the Trail River site. In particular, a biface burinated longitudinally could have been used for grooving, scraping and/or whittling (see Figure 9c).

5.3 Sea Mammal Hunting Implements

Another aspect of tool manufacture demonstrated at Feature 1 is the manufacture of tools which would be used later in the year. To borrow Binford's (1977) phrase, the hunters were "gearing up" at the site. Tools that were unlikely to be used at Trail River were recovered. These include an inflation nozzle for a dart bladder (see Le Blanc 1986: Figure 21a) similar to specimens found by Ford (1959: Figure 45g) at Point Barrow; three small thin antler plates which could be used to reinforce splices in harpoon shafts (see Ford 1959:100, Bielawski et al. 1986:42), one bone object with one extremity gouged and the other pointed (see Figure 10b) which resembles what McGhee (1974:46) has interpreted as harpoon foreshafts; and the tip of a broken harpoon (see Figure 10e). It is likely that these tools were made on the site in anticipation of sea mammal hunting. The hunting of sea mammals would have taken place at the end of the summer when hunters and their families moved back to the coast, or to Herschel Island (Yorga 1980). It is also possible that personal gear had been carried to the Trail River site and lost or discarded there.

5.4 Land Hunting Implements

A large number of caribou hunting arrowheads were recovered. As preforms of both caribou and bird blunt arrowheads (see Figure 11) were found in the antler assemblage, it is possible that arrowheads were produced at the site. Since many specimens are too fragmentary (see Table 10) to allow for the matching of broken tips (distal part) to broken tangs (proximal part), it is not possible to calculate the exact number of arrowheads represented in the sample. If each fragment is considered to belong to a separate arrowhead, a total number of 25 arrowheads results. This makes this category of artifacts the most numerous of the antler finished products at NgVh 1. If only complete arrowheads and distal fragments are counted, 15 arrowheads are represented.

The only complete unilateral barbed arrowhead recovered (see Figure 12a) is of a type that is wide-spread in the western and central Arctic. In the western Arctic, it is very common in the late prehistoric

Nunamiut site of Aniganigaruk in Alaska (Corbin 1974) and is also found at Point Barrow (Ford 1959: Figure 58a-b, Murdock 1892, Matthiassen 1930: Plate 9.1), Barter Island (Jenness 1914:14), Herschel Island (MacNeish 1959: Plate X-5), and at Kittigazuit (McGhee 1974: Plate 5c). In the central Arctic, they are found at the Thule site on King Williams Land (Mathiassen 1927) and in Copper Inuit sites (e.g. McGhee 1972: Plate 2c). One of the broken antler arrowheads from NgVh 1 had been transverally cut through its broken end, possibly for reuse as a bird blunt arrowhead (see Figure 12d). Similarly reused antler arrowheads were found at Barter Island (Jenness 1914).

5.5 Skin-working Implements

The presence of women on the site is inferred from the recovery of sewing and skin working implements. The large number of awls (N=16), a needle case, and two needles indicates that clothes were manufactured and/or mended at the site.

As illustrated by the recovery of caribou and sandstone scraper implements, skin preparation was performed at the site. This interpretation is strengthened by the recovery of two chert bifaces (see Figures 9a-b) and two ground slate fragments (see Figures 9d-e) which could also have been utilized as cutting tools. Miscellaneous wood fragments also present at Feature 1 may have originally belonged to wooden sticks used to stretch the caribou hide. Caribou scapula scapers were the most abundant bone scrapers at NgVh 1 (see Figure 13). Nine specimens were found. It should be noted that worked scapulae have also been identified as fish 'scalers' from the Thule sites of Washout (Yorga

1980: Plate 21k,l) and Clachan in the Coronation Golf (Morrison 1983: Plate 20). Yorga (1980) quotes Hall (1971) for such an interpretation. Hall based his assumption on the fact that use-wear left on these scapulae "resembled" that found on lithic implements used as fish scalers by Semenov (1970:160). It is more likely however, that these implements were used as hide scrapers, like those found at Walakpa (Stanford 1976:55) and at Barter Island Jenness (1914).

5.6 Transportation Implements

Three sled shoe fragments made from whale bone were recovered at Feature 1 (see Figure 10f). Their presence supports the occupation of the Trail River site in late spring when snow was still present and sleds would have been required for transportation.

5.7 Summary

The categories of tools recovered at the NgVh 1 site are those belonging to what Binford (1979) postulates are representative of habitation sites. The most commonly represented categories of artifacts are those related to skin-working, land hunting, and tool manufacture. This suggests that a wide-range of activities was undertaken at the site. The site is unlikely to be a kill or a butchering site for caribou, because a more restricted range of activities would be represented. It is proposed that the artifactual evidence identifies NgVh 1 as a habitation camp from which hunts for caribou were made. The faunal remains and the abundant antler material also support this interpretation.

Figure 7. Antler Knife Handles from NgVh 1

a) NgVh 1: 529

b) NgVh 1: 528

c) NgVh 1: 50

d) NgVh 1: 4

e) NgVh 1: 507

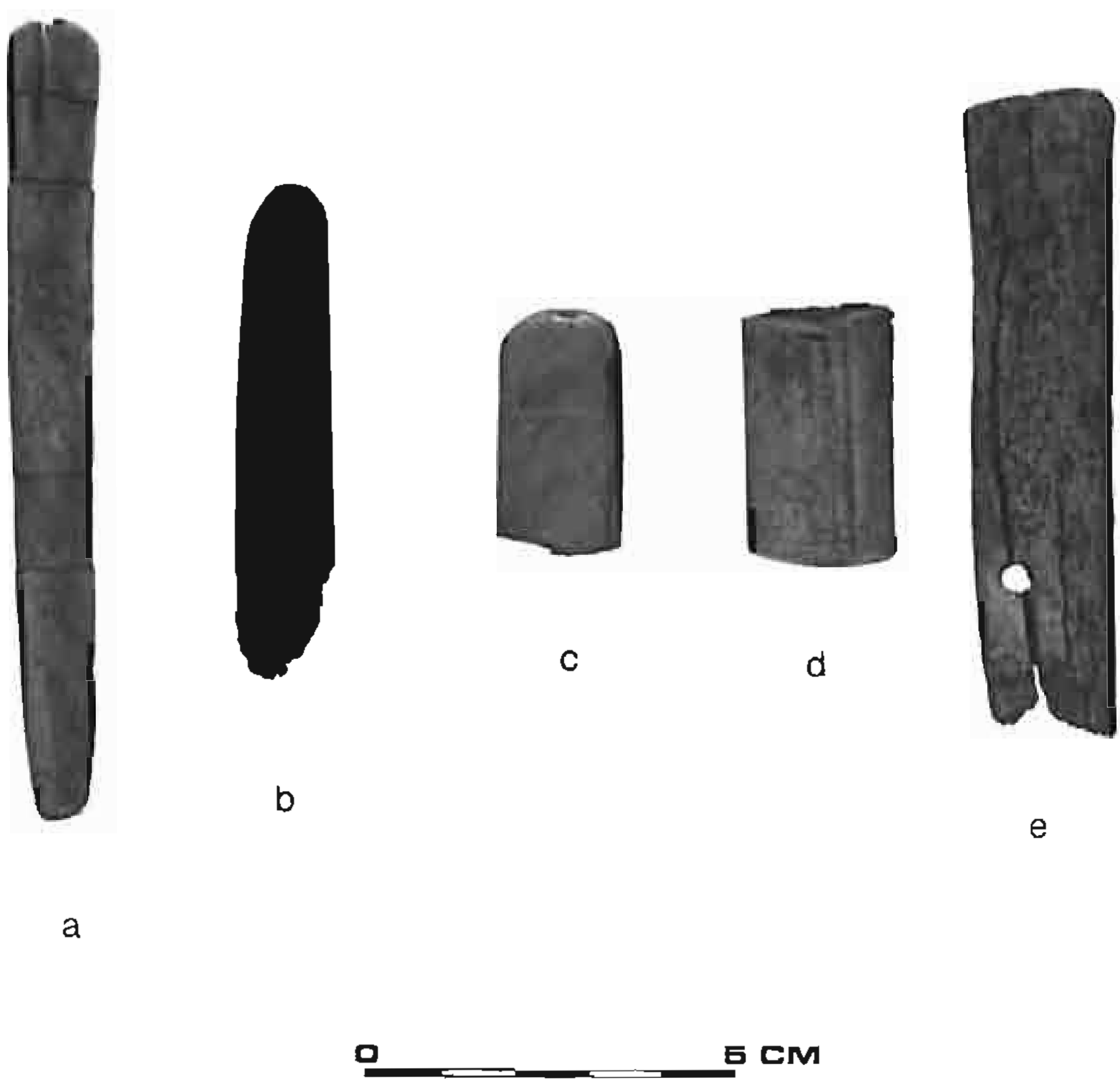
a
b
c
d
e
0
5 CM

Figure 8. Bone Artifacts from NgVh 1

a) Small bone point (NgVh 1:130)

b) Unidentified bone object (NgVh 1:626)

c) Engraving bone tool (NgVh 1:538)

d) Engraving bone tool (NgVh 1:369)

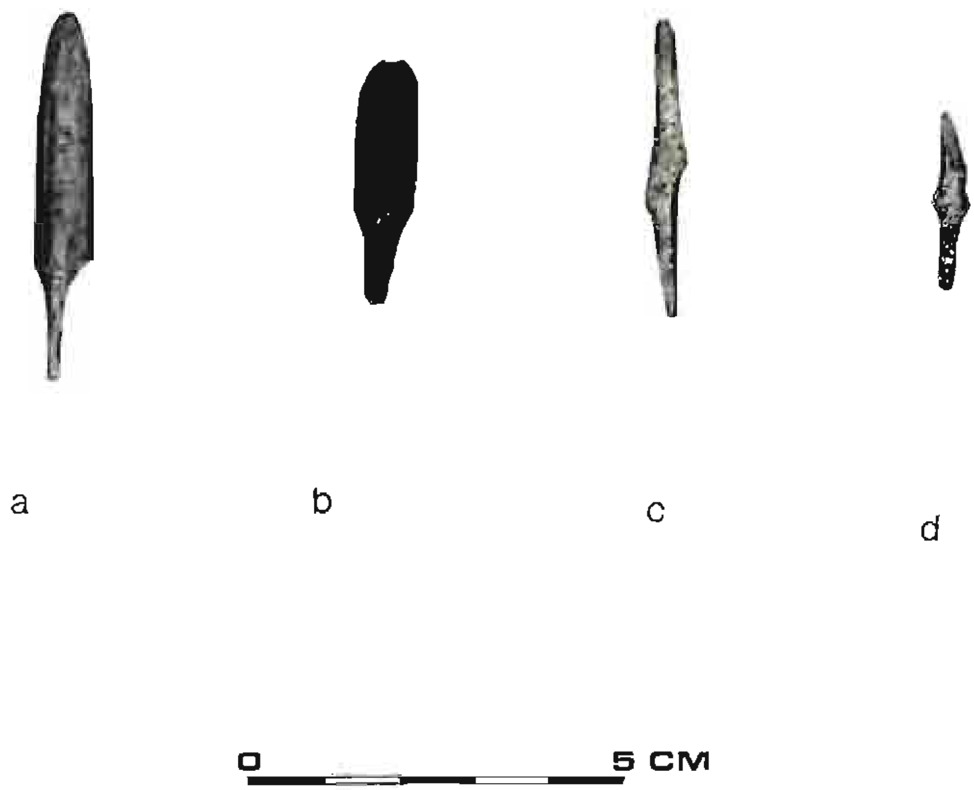
a
b
c
d
0
5 CM

Figure 9. Lithic Artifacts from NgVh 1

a) Chert biface (NgVh 1:126)

b) Chert biface (NgVh 1:751)

c) Chert biface burinated longitudinally (NgVh 1:356)

d) Ground slate fragment (NgVh 1: 127)

e) Ground slate fragment (NgVh 1: 471)

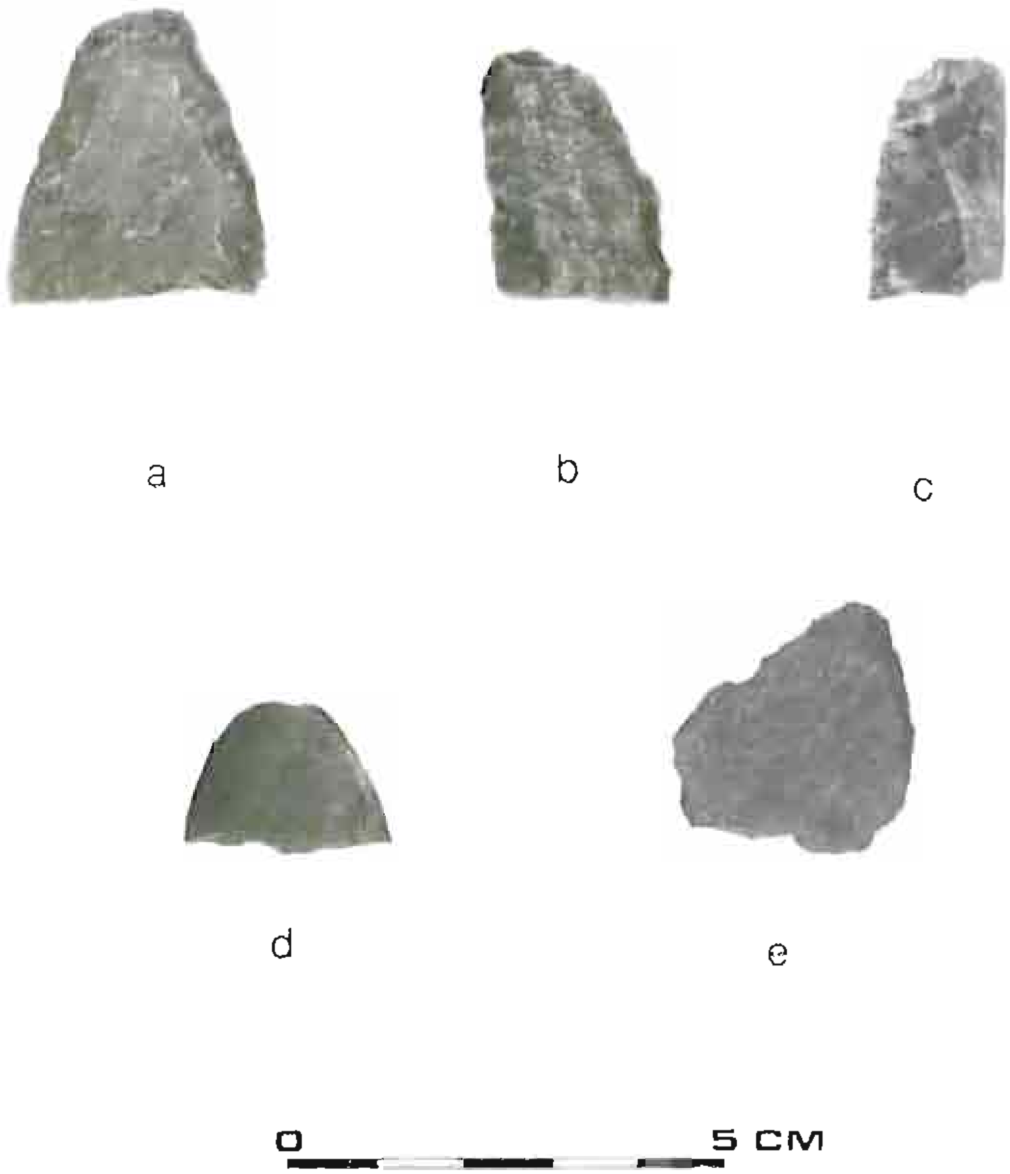
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Figure 10. Miscellaneous Bone and Antler Artifacts from NgVh 1

a) Antler wedge (NgVh 1:541)

b) Harpoon foreshaft (NgVh 1:539)

c) Awl fragment (antler) (NgVh 1:7)

d) Needle case (bone) (NgVh 1:606)

e) Broken harpoon tip (antler) (NgVh 1:622)

f) Sled shoe fragment in whale bone (NgVh 1:44)

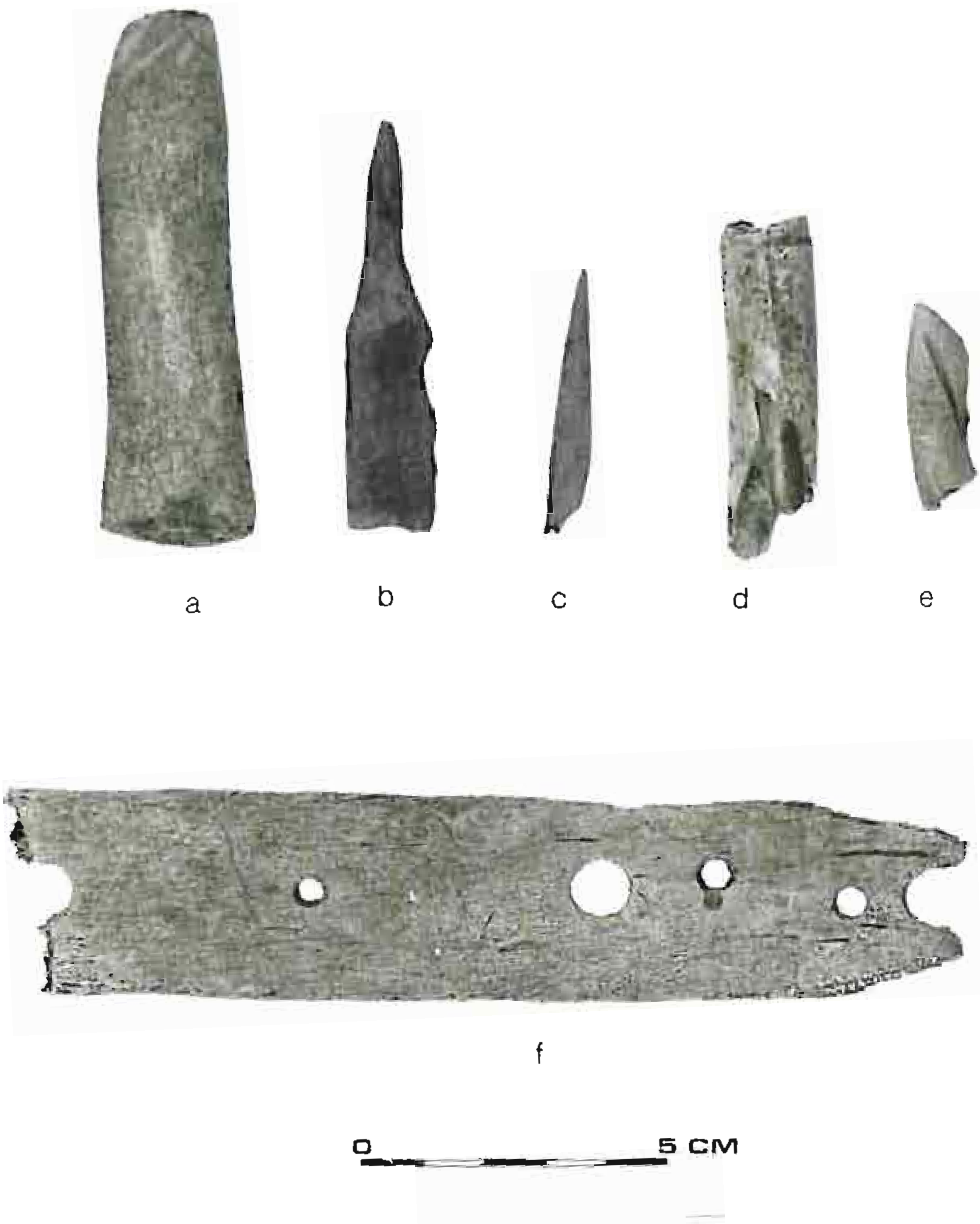
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Figure 11. Antler Blunt Arrowheads from NgVh 1

a) Blunt arrowhead preform (NgVh 1:10)

b) Broken blunt arrowhead (NgVh 1:137)

c) Broken blunt arrowhead (NgVh 1:383)

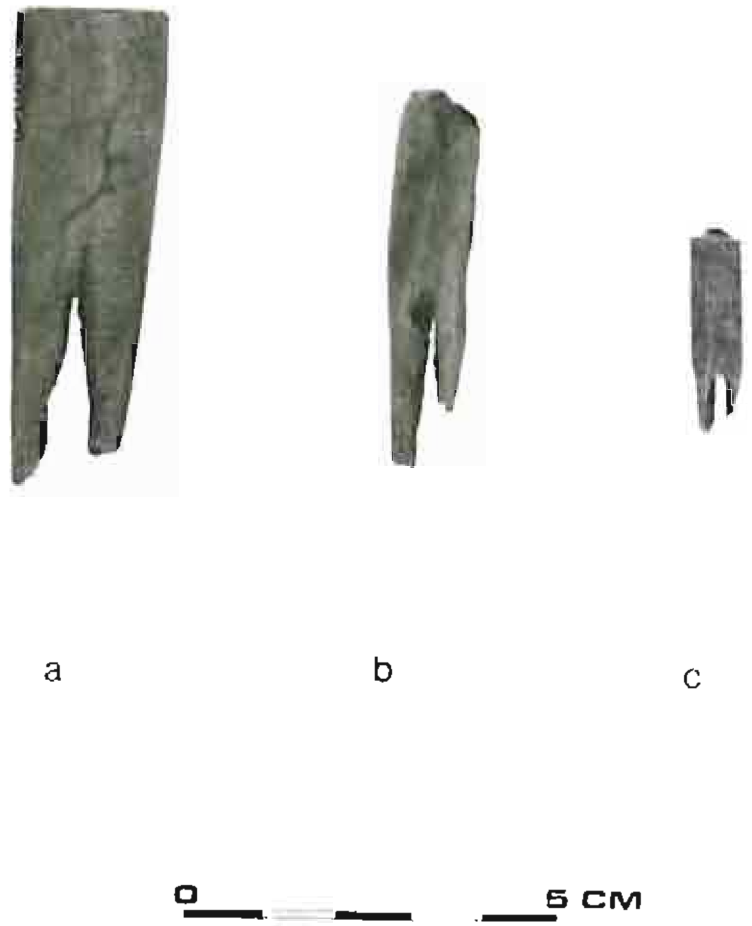
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Figure 12. Antler Arrowheads from NgVh 1

a) Single barbed arrowhead (NgVh 1:473)

b) Arrowhead, proximal fragment (NgVh 1:619)

c) Barbed arrowhead, distal fragment (NgVh 1:688)

d) Arrowhead, proximal fragment (NgVh 1:311)

e) Arrowhead, distal fragment (NgVh 1:451)

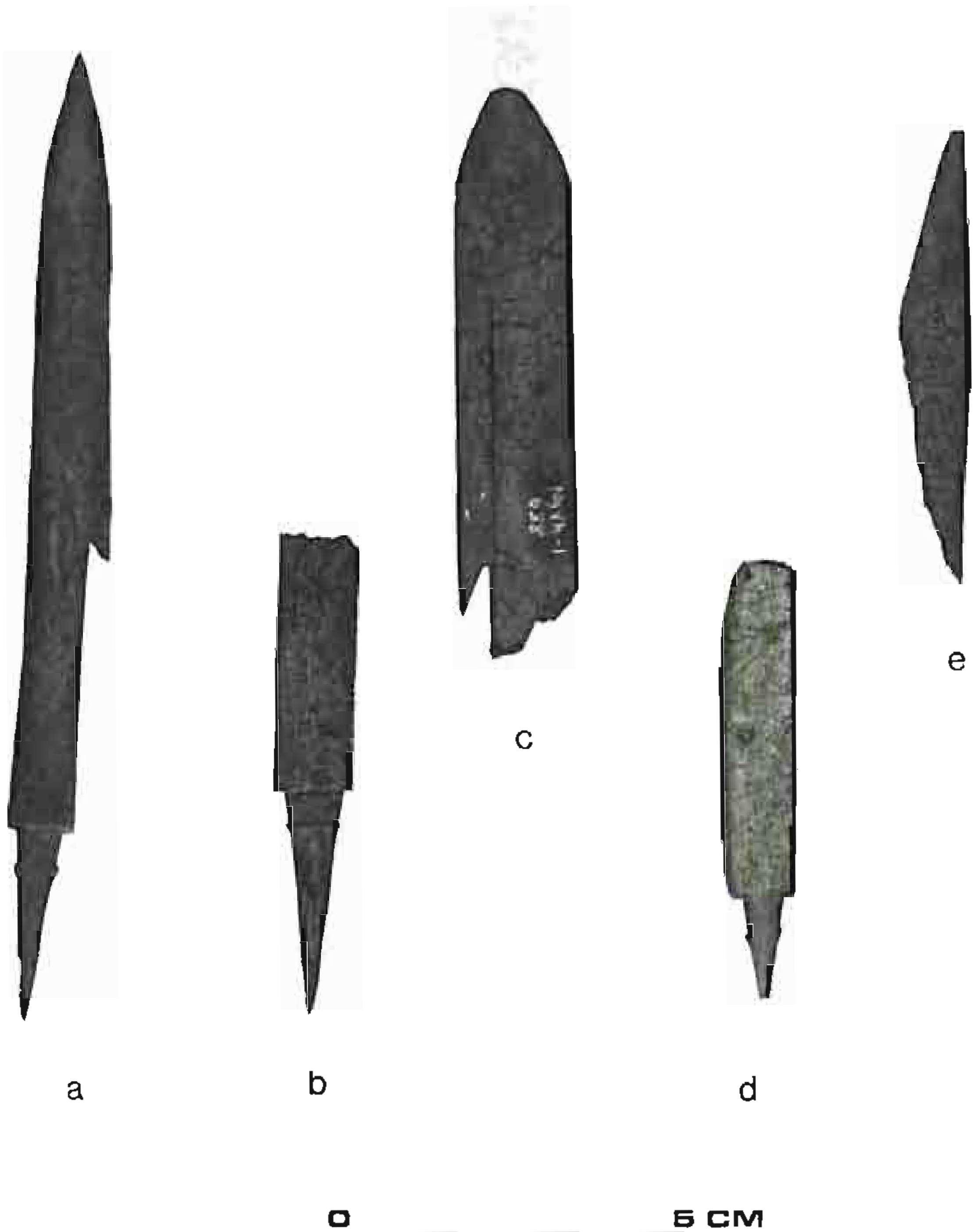
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Figure 13. Scapula Scrapers from NgVh 1

a) NgVh 1: 782

b) NgVh 1: 108

c) NgVh 1: 97

d) NgVh 1: 109

a b c d

0 5 cm

CHAPTER 6. Introduction to Bone and Antler Technology

6.1 Introduction

Evidence for the manufacture of bone and antler tools at NgVh 1 is important in interpreting the function of the site as it can reveal information concerning activites carried out at the site and the duration of stay of its occupants. Lack of manufacture debris would indicate an emphasis on subsistence activities only. High frequencies of manufacturing debris would indicate that one of the main activities carried out by the site's occupants was procurement of raw material and/or tool manufacture. The types of reduction debris recovered can provide information concerning the degree to which antler procurement and/or tool manufacture was undertaken.

This chapter reviews the literature on studies of bone and antler industries and presents the reduction model utilized in the analysis of the bone and antler material from NgVh 1. It also provides a background to the analysis presented in Chapter 7.

6.2 Review of Literature

Finely made bone and antler implements first appear in the European Upper Paleolithic. Such an improvement in the technique of bone tool manufacture appears to be linked to the use of flint blades and burins (Campana 1980; Semenov 1970). Technological analysis of bone industries is primarily concerned with the production and use of bone and antler objects. Studies of the different processes of manufacture account not only for finished products but also for the bone debitage and by-products found at sites. In fact, at sites where tool manufacture took place, archaeologists are more likely to find a higher frequency of debitage and preforms than of actual finished products.

A common method of dealing with bone industries is to classify a given object by function (e.g. 'arrowhead', 'harpoon'). Incisions, grooves or striations are unlikely to be recorded unless they are considered to have a decorative function. By-products of bone tool manufacture are rarely mentioned and when they are, only a rough approximation of their quantity is given. Most archaeologists are interested only in interpreting the finished product.

When reviewing ethnographic accounts of material culture, one soon realizes that a great deal of attention has been paid to objects made of bone (e.g. Nelson 1877; Murdoch 1892; Hodge 1920; Osgood 1920; Jenness l946). Manufacture processes have generally been ignored.

In the last decade, this imbalance has been somewhat rectified with an increase in research and publications concerned with European bone industries. Literature on the orientation and nomenclature of bone artifacts is abundant (see Camps-Fabrer, Bourrelly and Nivelle 1974; Camps-Fabrer and Stordeur 1979; Camps-Fabrer 1977, 1979 Bonnichsen and Will 1981; Prost 1971, 1972; Stordeur 1977, 1978). Replication of bone artifacts has led to a better understanding of how bone manufacturing could have been carried out as well as the various types of tools used in their production (see Bouchud 1974; Campana 1980; Camps-Fabrer and d'Anna 1977; Dauvois 1974; Desse and Rodriguez 1982; Leroy-Perost 1974; Newcomer 1974a, 1974b,1977; Poplin 1974, 1983; Rigaud 1972, 1984; Taborin 1977). Use-wear analyses on bone implements and the experimentally produced replicas are yielding promising results as to the functional nature of these artifacts (see Campana 1980; Bouchud 1977; d'Errico et al. 1982-84; LeMoine 1985; Peltier and Plisson 1986; Runnings 1984). Articles dealing with the analytical and statistical methodologies associated with the study of bone industries have also been published (Dewez 1974; Hahn 1974; Stordeur 1977; Voruz 1982).

Nevertheless, syntheses on the evolution of a specific type of bone implement still comprise the bulk of the research concerning bone industry, as illustrated by studies published on Magdalenien harpoons (Julien 1982), Aurignacien points (Leroy-Prost 1975) and Paleolithic needles (Stordeur-Yedid 1979). Bone and antler industries of the Neolithic and the Metal Age have been the subject of recent publications (see Camps-Fabrer (ed.) 1985).

Despite this extensive research on bone industries, studies of bone and antler by-products are few and far between. In Europe, studies have been published on the parts of antler selected in the making of axe handles in Holocene sites (Billamboz 1979; Ramseyer and Billamboz 1979; Billamboz and Schifferdecker 1982). In North-America, Corbin (1975) has studied the antler technology of the Aniganigaruk site in Alaska. Blaylock (1980) has researched the bone and antler material from a Thule site on Somerset Island. Stordeur-Yedid (1980) has considered the harpoons from Igloolik (eastern Arctic). Mary-Rousselière (1984) investigated the Dorset caribou bone and antler industry from northern Baffin Island. Hahn (1977) and Cole-Will (l984) have studied the antler technology from Copper Inuit sites on Banks Island. Morlan (1973) and Le Blanc (1984) have also dealt with Athapascan bone and antler technology in the northern Yukon. Recently, Morrison (1986) has compared Inuit and Kutchin bone and antler industries in northwestern Canada.

These studies primarily focused on the techniques of manufacture utilized in the production of antler, bone and ivory tools. Hahn (1977) identified which parts of the antler were selected by the Copper Inuit of Banks Island in the making of specific objects. Blaylock (1980) and Cole-Will (1984) experimented with different techniques of manufacture on bone and antler. Their work aided them in recognizing the actions performed on raw material by prehistoric artisans.

6.3 Methodology

In order to understand how antler or bone is worked, it is useful to schematize the different stages of reduction undergone by the raw material. It also allows for a better understanding of how antler was proccessed into a finished product.

Four previous studies (Corbin 1975, Blaylock 1980, Le Blanc 1984 and Cole-Will 1984) dealing with the analysis of bone and antler technology from Arctic and sub-Arctic sites have inspired the reduction model utilized in the present study.

Corbin's (1975) reduction model was expanded upon for the study of antler material from the Aniganigaruk site, occupied by Nunamiut Eskimo around 1878. This widely applicable model is ideally suited for use in the analysis of the antler industry from the Trail River site.

6.4 Description of the Reduction Model

This section, drawing mainly on the work of Corbin (1975) defines the different reduction types produced during the manufacture of an antler tool.

The reduction process begins when a **section** from an antler is selected for use (see Figure 14). The choice of a specific part of the antler to be used as a section is directed by its shape and the amount of cortex present. In most archaeological specimens, it is possible to determine from which part of the antler a section was secured due to its exhibiting characteristics of original form. Figure 15 illustrates the different parts of the caribou antler.

The second step of tool production involves the preparation of a **core** (see Figure 14). Cores may be obtained either by the "groove and splinter" technique as described by Thompson and Clark (1953) or by sawing a section longitudinally. The "groove and splinter" technique encompasses grooving a section longitudinally to obtain two parallel grooves from which a core is splintered off (see Figure 16). Dependant upon the size of the groove, splinters may also be produced.

During the replication of the 'groove and splinter' technique, common to the Upper Paleolithic, Gerasimov (in Semenov 1970:150) and Newcomer (1977:294) used a small bone wedge to free the core from the beam. In his experiments dealing with Magdalenian material, Rigaud (1984) used a bone chisel to splinter off a core. Small depressions found on the parts of the antler where the chisel was used were also identified on Madgalenien antler cores. Similar depressions are described in Semenov (1970:150). These depressions were not observed on the cores recovered from the Trail River site. This may be due to the fact that a metal tool was used for the grooving. The efficiency of metal tools allows one to splinter the core off without the use of a chisel (Blaylock 1980).

If a core is directly worked upon (without further reduction) it is considered to be a **blank**. Blanks are separate divisions of a core made into workable units of specific shape and size. At Anigarigaruk, when a blank was removed, the remaining portion was handle-shaped (Corbin 1975). This "handle" would have been held to manipulate the core during blank preparation. Cores with handles were also found in the Trail River assemblage (see Figures 14 and 17).

After a blank is made, it is transformed through different manufacturing processes such as grooving into a **preform** (see Figure 14). As the name implies, a preform bears the general outline of the finished product.

The next step in tool manufacture is the formation of the finished product through different manufacturing processes such as whittling and polishing. If it is intended to be a tool, it will show use-wear after a certain amount time. It may need to be maintained (e.g. resharped) or it may be reshaped into another tool.

Through all stages of manufacture a great deal of **debitage** and specific by-products are produced. Cole-Will (1984) differentiates between "preliminary" and "secondary" debitage. Preliminary debitage is related to the cleaning of antler to produce a workable section. Thus, small tines, parts of the pedicle, section of palms and other sectional debitage belong to this category (see Figure 18). Therefore, preliminary debitage consists of section debitage and core debitage. Secondary debitage includes all the by-products from the other stages of manufacture such as preform preparation. This debitage accounts for the splinters and shavings resulting from surface treatments such as whittling carried out in the final stages of production (see Figures 19 and 20). Therefore, secondary debitage consists of blank remnants, blank splinters, preform remnants and preform shavings.

The stages of bone implement manufacture are essentially the same as those described for antler manufacture. However, the distinction between bone sections and cores is somewhat obscured due to the differing structural morphologies of bone and antler. The preparation of bone blanks employs some of the techniques performed on antler. For example, the "groove and splinter" technique can be performed on long bones to obtain bone blanks (Yesner and Bonnichsen 1979).

Working on historical material from a Mackenzie Inuit site, Morrison (1986) has identified a reduction technique for the preparation of blanks from caribou metapodials that involves two "sequences". In the first sequence, the metapodial is split in the coronal plane, separating the metatarsal into anterior and posterior halves. In the second sequence, the bone is split sagittally, separating lateral and medial halves. In the case of the Trail River bone assemblage, the fragments of two scraping implements (possibly beamers) were made utilizing the first sequence of reduction. They are the only example of worked metapodials at the site.

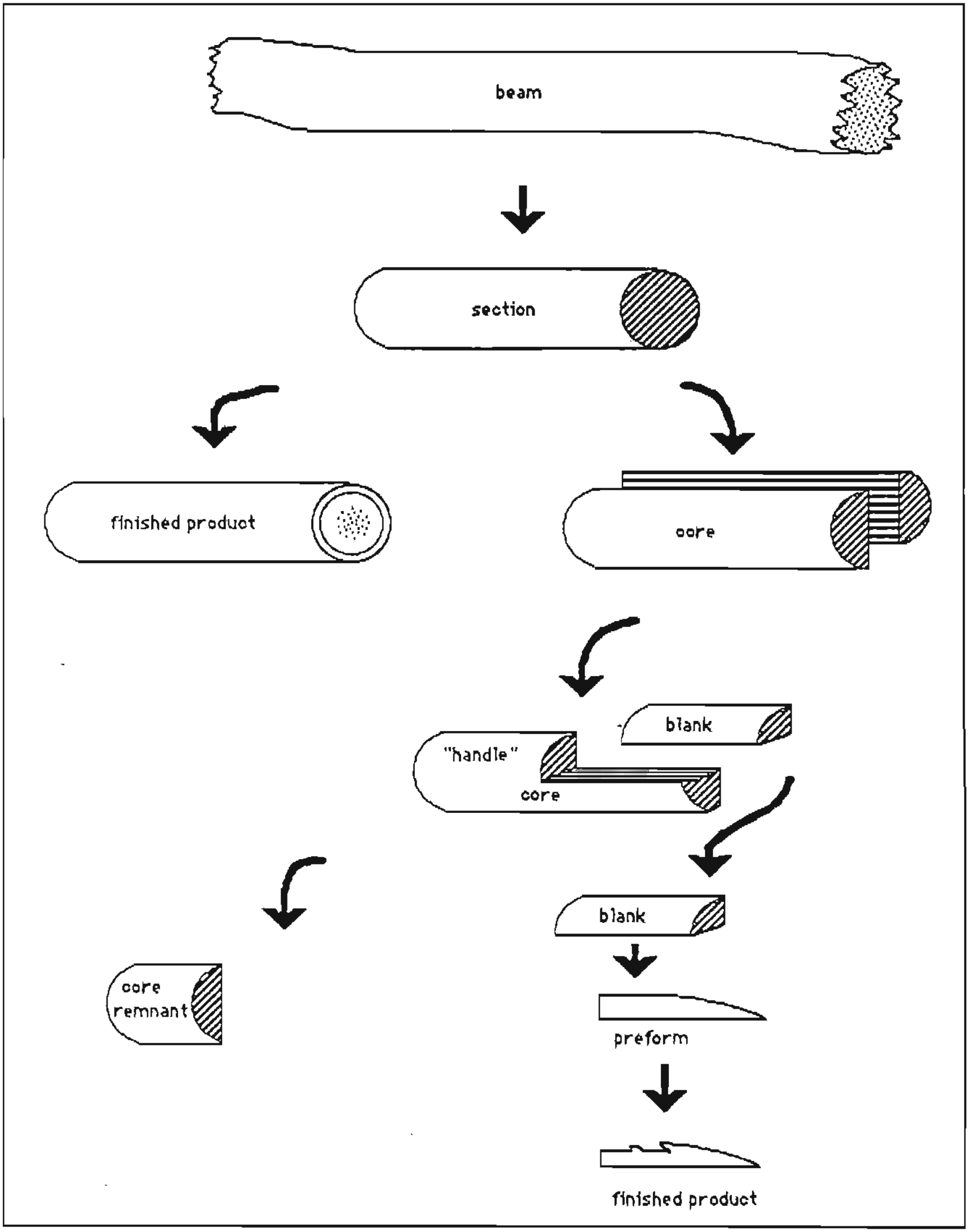


Figure 14. Antler reduction model (after Corbin 1975)

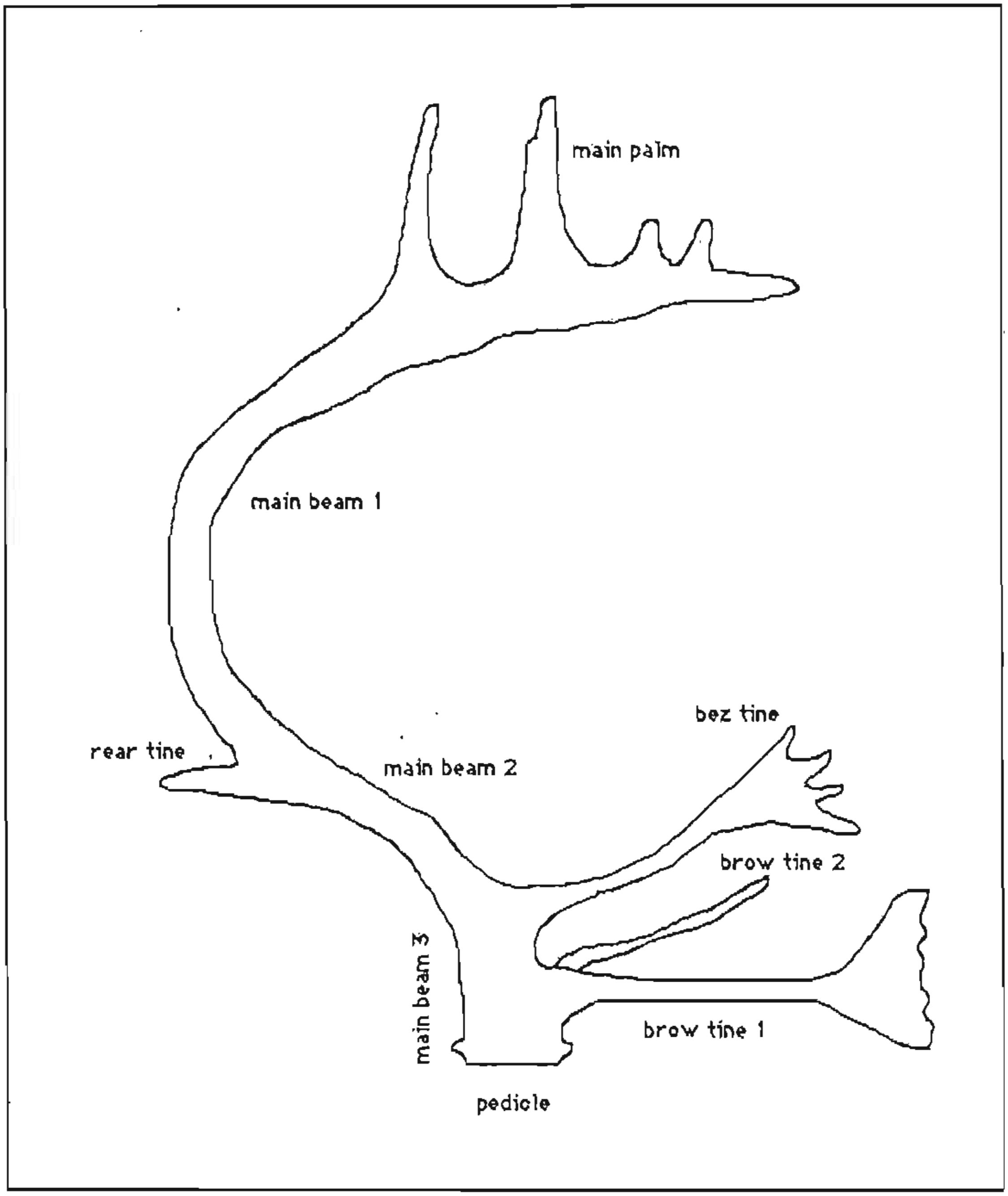


Figure 15. Antler parts (after Corbin 1975)

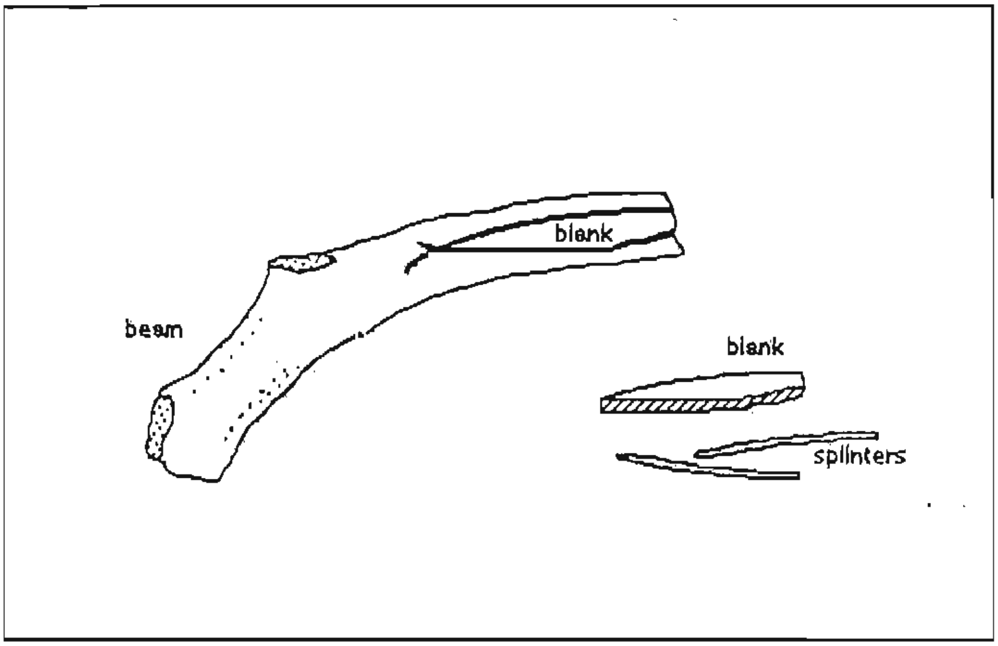


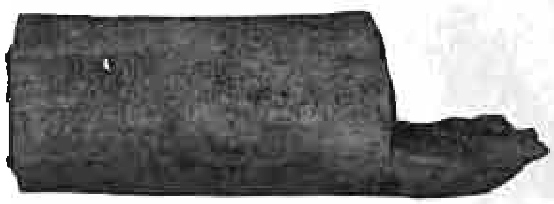
Figure 16. The "groove and splinter" technique

Figure 17. Antler Cores from NgVh 1

a) Antler core (NgVh 1:93)

b) Antler core "handle" (NgVh 1: 593)

a



b

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Figure 18. Preliminary Antler Debitage from NgVh 1


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Figure 19. Secondary Antler Debitage from NgVh 1

a) Triangular debitage

b) Palm debitage

c) Splinters

d) Preform debitage

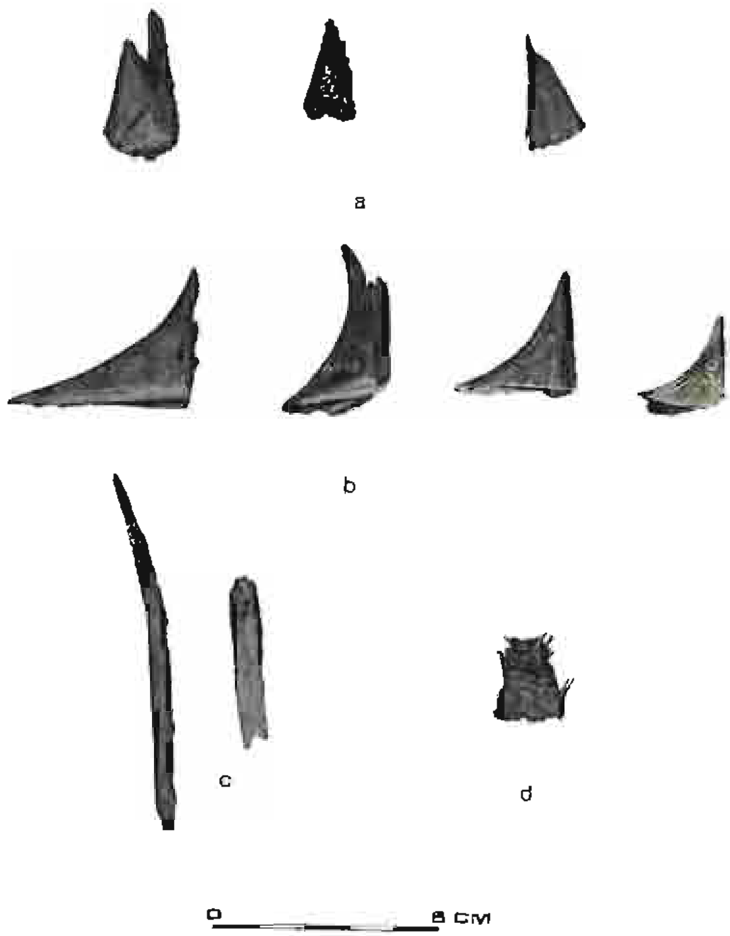
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Figure 20. Secondary Antler Debitage from NgVh 1: Shavings


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Chapter 7. Antler Reduction Types from NgVh 1

7.1 Introduction

The analysis of different reduction types recovered from Feature 1 was undertaken to verify if NgVh 1 was primarily occupied to obtain antler and/or to manufacture tools. If preliminary debitage (as discussed in Chapter 6) is highly represented, then the site was more likely to have been utilized to secure antler and finished products would not have been manufactured at the site. Rather, workable sections and cores would have been carried to a more permanent place to be further manufactured (Binford 1979). On the other hand, if secondary debitage has higher representation, then antler was more likely to have been brought to the site from previous locations to be intensively manufactured into tools. The manufacture of tools is expected to be associated with habitation sites (Binford 1979).

7.2 Reduction Types from NgVh 1

The results of the reduction type analysis revealed that the antler assemblage was composed of the complete range of reduction types discussed in Chapter 6 with a large amount of debitage (65.3%, N=376). Analysis of the bone assemblage indicated that it was composed mainly of debitage (41.8%, N=56) and of finished products (53.0%, N=71) (see Figure 21 and Table 11). The fact that not all the reduction stages are represented in the bone assemblage can be explained by the fact that the bone artifacts were not manufactured on site or that the techniques involved in their manufacture did not produce the different types of debitage observed in the antler assemblage. The latter is the case. The bone artifacts were probably 'expedient' tools, easily made by sharpening the edges of broken bone (see Johnson 1985). This will be tested and further discussed in Chapter 8. In the present chapter, the bone reduction types are not considered because they are principally composed of debitage and finished products.

At Feature 1, preliminary antler debitage made up 13% (N=49) of all the debitage while secondary antler debitage made up 87% (N=329) of the total antler debitage assemblage (see Table 12). The preliminary debitage percentage is low when compared with those from three Copper Inuit sites in which preliminary debitage accounted for 64.5% (N=147), 71.4% (N=20) and 36.6% (N=11) of each debitage assemblage (Cole-Will 1984:128). Cole-Will (1984:152) explains that such high percentages may be due to a sampling bias, in that larger material (i.e., preliminary debitage) was more likely to be visible on the surface and these sites had only been surface collected. Smaller pieces of debitage were more frequently collected during the excavations of tent-rings (ibid.).

The low percentage of preliminary debitage indicates that the NgVh 1 site was not an area where antler procurement occurred. The majority of the bulky preliminary debitage would have been discarded in the area where the antler was originally obtained. Only workably-sized sections and/or cores would have been brought back to the site. Rather, as Binford (1977, 1979, contra Bamforth 1986) expected with raw materials, antler procurement appears to have been embedded in the basic subsistence strategies of the occupants of the site. This is further suggested by the recovery of nine shed pedicle fragments among the preliminary debitage. These antler sections could have been scavenged from the area around the site during the site occupants' search for caribou or birds. Only shed antler and fully grown antler without velvet are considered suitable for working. Growing antler (on which the velvet still adheres) cannot be used in the manufacture of implements as the cortex is almost nonexistant (Bouchud 1974:23).

The high frequency of secondary debitage indicates that the site was an area where tool manufacture took place. Secondary debitage, including splinters and shavings, is generated during the later stages of tool manufacture. Maintenance, in the form of reworking tools, will also produce secondary debitage.

After debitage, the largest categories in the antler assemblage are composed of blanks 13.3 % (N=77) and preforms 11.4 % (N=66). The high frequency of blanks (N=77) and preforms (N=66) would indicate that they were intentionally discarded or set aside for use at a later date. Although some preforms would have been set aside for immediate use, the majority (97%, N=64) were broken and thus discarded by the site's oocupants. The analysis of the preforms provided an indication of the various categories of implements manufactured. Only 50% (N=33) of the antler preforms could be assigned a functional category based on general shape. Arrowhead preforms were identified and accounted for 35% (N=23) of all preforms. Also identified were the preforms of awls (N=6), blunt arrowheads (N=1) and bolas (N=3).

If Feature 1 was simply a wind-break or shooting blind (see Le Blanc 1986), then the amount of time spent there would not have exceeded a few days. It is possible that a few hunters, waiting for better weather or for caribou, could have begun to work on antler sections, but it is unlikely that as many as seventy-seven antler blanks would be discarded on the site (assuming that only one occupation is represented). Rather, the enormous quantity of faunal material and antler artifacts recovered argues favorably for a tent being occupied for a few weeks (see discussion of seasonality in Chapter 4). At Feature 1, hunters were preparing their gear by making antler arrowheads for caribou hunting and blunt antler arrows for hunting waterfowl.

"Gearing up" would explain why so many blanks (N=77) were found at the site. They were not discarded or lost all at once; their loss about the site was the result of a continuous range of activities and behaviour performed over time by the site's occupants. Although some blanks would have been worked into tools, a surplus of blanks would have been accumulated to be worked at a later date. In fact, this corresponds with Binford's expectations of processes of tool manufacture drawn from analogies with the Nunamiut:

> The manufacture of tools for personal and household gear [was] executed in a staged manner for many items; that is, the manufacturing process would take place in episodes -certain modifications would be made and then the items would be stored for some time before the next "stage" of manufacture would occur (Binford 1979:268).

7.3 Summary

The analysis of the antler reduction types has compared percentages of preliminary debitage and secondary debitage at the site. It has revealed that manufacture of antler implements took place. The variety of reduction types and finished products recovered indicates that personal items were manufactured in the context of a habitation site. The small percentage of preliminary debitage (only 13%) indicated that antler was not procured at the site. Rather, as Binford (1977, 1979) expected with raw materials, antler procurement was embedded in the basic subsistence strategies of the occupants of the site.

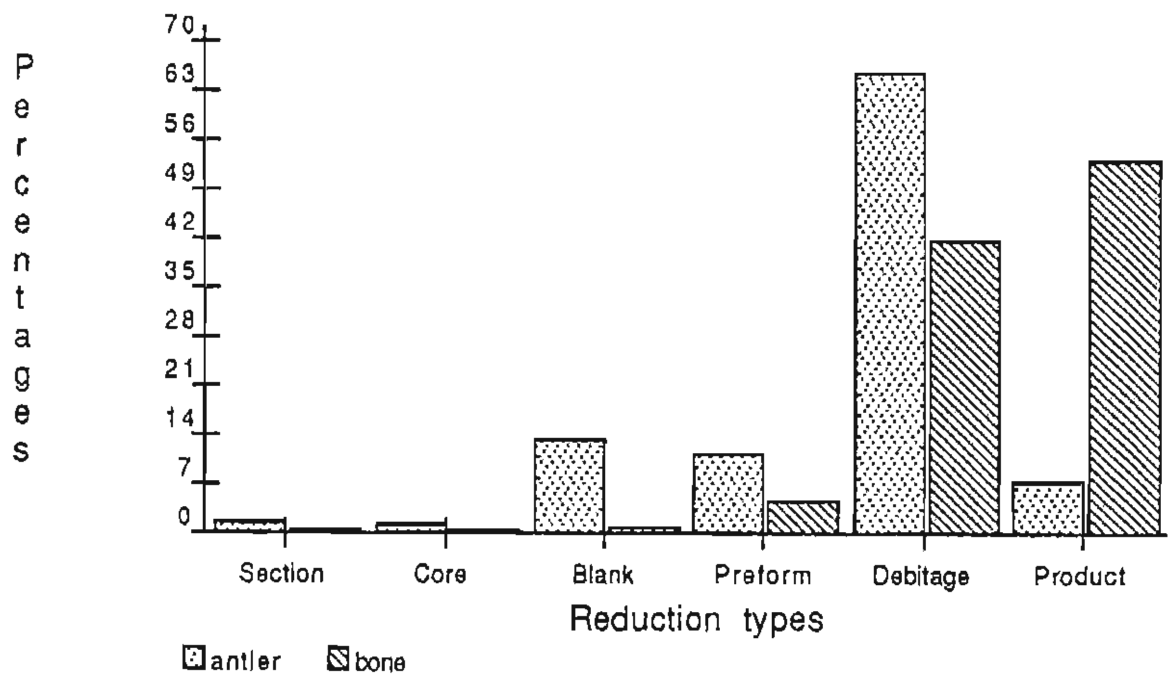

Figure 21. Percentages of the bone and antler reduction types from NgVh 1 (antler N=579, bone N=134)

Table 11. Percentages and frequencies of antler and bone reduction types from NgVh 1

REDUCTION TYPE	ANTLER N	ANTLER %	BONE N	BONE %
Sections	9	1.6	0	0
Cores	6	1.0	0	0
Blanks	77	13.3	1	0.7
Preforms	66	11.4	6	4.5
Debitage	378	65.3	56	41.8
Finished products	43	7.4	71	53.0
Total	579	100.0	134	100.0

Table 12. Types of Debitage from NgVh 1

	PRELIMINARY DEBITAGE		SECONDARY DEBITAGE			
	Section Debitage	Core Debitage	Blank Remnant	Blank Splinter	Preform Remnant	Preform Shaving
N	31	18	82	43	36	168
%	8.2	4.8	21.7	11.4	9.5	44.4
	N=49 (13%)		N=329 (87%)			

CHAPTER 8. Technological Analysis of Bone and Antler Material

8.1 Introduction

A technological analysis of the bone and antler material was undertaken to identify personal gear, situational gear and their associated debris. Binford originated the idea of situational gear and personal gear and defines them as follows:

> Situational gear is that which is gathered, produced, or "drafted into use" for the purposes of carrying out a specific activity [...] there is little investment in the tool-production aspects of "situational gear"; edges are used if appropriate, minimal investment is made in modification, and replacement rates are very high if material is readily available (Binford 1979:261-267).

Personal gear is composed of items carried by individuals in anticipation for future conditions or activities. Examples provided by Nunamiut informants include such items as bone cutters, bows, arrows and sewing kits (Binford 1979:262-263).

> Personal gear was much more likely to be manufactured according to quality considerations unaffected by constraints on time or immediate availability of appropriate material, since this activity is intended to meet anticipated future needs, rather than immediate needs (Binford 1979:267).

Recognition of the amount and type of work performed on the recovered artifacts aids in the identification of situational gear and personal gear and their associated debris. Binford (1979) expects personal gear to be associated with residential sites and situational gear to be associated with "field" conditions. The recognition of these types of tools from the artifacts would thus provide further insights into the nature of the site itself and the reasons for its occupation. Intensity of work on tools will be investigated through the identification of the manufacturing techniques carried out by the prehistoric artisans. It is expected that personal gear will exhibit a high degree of work while situational gear will show minimal work.

A total of 713 antler and bone artifacts were recovered from Feature 1. In the present analysis, the term "artifact" includes all the reduction types associated with tool manufacture as discussed in Chapter 6. Antler artifacts represent 81.2 % (N=579) and bone represents only 18.8 % (N=134) of the assemblage. It is not surprising that antler occurs much more frequently than bone since antler was widely utilized throughout the Arctic because of its abundance and ease of manufacture (Blaylock 1980; Guthrie 1983). Experiments have shown that although antler has less resistance than bone, it has more flexibility and thus is easily bent into different forms (Albercht 1977; Blaylock 1980). Antler is also an excellent material because of its ability to hold an edge, for its ease with which stone can be attached or inserted, for its flexibility in withstanding impact damage, and for its ease of repair (Guthrie 1983).

This functional explanation has been challenged by McGhee (1977) who has proposed a symbolic explanation for the use of antler and ivory. Using data from five Thule sites, McGhee has attempted to demonstrate that antler was associated with men's tool kits and with implements used in hunting land mammals while ivory was associated with women's tools and with implements used in sea mammal hunting. Although this symbolic approach is appealing, the sample size used in his study is, as McGhee himself admits, inadequate for statistical testing. None of the six sea mammals hunting implements from NgVh 1 was made of ivory. Clearly, the choice of raw material relies on something other than its symbolic meaning.

8.2 Methodology

Manufacturing actions performed by prehistoric artisans will be analyzed in order to determine which raw material was more heavily worked. It is hypothesized that a heavily worked raw material is associated with personal gear while one less worked is associated with situational gear (Binford 1979). Nine manufacturing actions have been identified from the technological study of the Trail River assemblage. They are: 1) Abrading, 2) Chopping, 3) Cutting, 4) Drilling, 5) Grooving, 6) Incising, 7) Polishing, 8) Scraping and 9) Whittling.

Each action can be linked to modification types found on the raw material. Previous studies and experiments carried out on antler and bone were considered in the recognition of each 'manufacturing action' (e.g., Blaylock 1980; Campana 1980; Cole-Will 1984; d'Errico et al. 1982-84; Newcomer 1974a, 1974b, 1977; Peltier and Plisson 1986; Semenov 1970).

During the analysis of the Trail River material, each object was examined on six facets: proximal, distal, superior, inferior, right and left. In order to standardize the observations carried out in this analysis, the following designations were made. As outlined by Prost (1971;1972), the distal portion of the artifact corresponds to its active part. In the case of sections, cores and blanks, the distal part was arbitrarily defined as the portion having the smallest width. The superior surface is that surface showing the most work or exhibiting a convex surface (see Camps-Fabrer and Stordeur 1977). The right and left facets are determined relative to the superior and inferior facets.

All modifications were observed either with the naked eye or by the use of a microscope (maximum magnification: X 40). Their specific location on the artifact was recorded. This information was organized using the database program Reflex, designed for Apple Macintosh personal computers. A total of 1,294 modification attributes were recorded; 74.4 % (N=963) were found on the antler artifacts and 25.6 % (N=331) on the bone artifacts.

In order to retrieve information on a specific manufacturing action, a count was generated by the computer, for each artifact showing the attributes of a specific action. For example, if three modification attributes, associated with grooving, were found on only **one facet** of the same artifact, it was counted as 1. If three modification attributes belonging to grooving were found on **three different facets** then it was counted as 3.

The results of the analysis are presented in Tables 13 and 14. These tables give the frequency of modification attributes for each manufacturing action (e.g. cutting, grooving) found in each major category of reduction types (e.g. cores, blanks). The percentages are based upon the total sum of modification attributes recorded separately for each reduction type. Thus, a given pecentage does not represent the number of **artifacts**, rather it represents the relative number of **attributes** recorded which correspond to a specific action.

Table 13. **Frequencies and percentages of manufacturing attributes (associated with each specific action) per antler reduction types from NgVh 1**

Manufacturing actions		REDUCTION TYPES Section	Core	Blank	Preform	Debitage	Products	
ABRADING	Total	0	3	22	52	20	34	
	%	.0	18.8	7.8	23.3	7.5	21.9	
CHOPPING	Total	1	1	23	5	36	4	
	%	5.9	6.3	8.1	2.2	13.5	2.6	
CUTTING	Total	12	6	72	56	41	18	
	%	70.6	37.5	25.3	25.1	15.4	11.6	
DRILLING	Total	0	0	0	0	0	4	
	%	.0	.0	.0	.0	.0	2.6	
GROOVING	Total	4	3	91	24	72	15	
	%	23.6	18.8	31.9	10.8	27.0	9.7	
INCISING	Total	0	0	10	3	6	11	
	%	.0	.0	3.5	1.4	2.3	7.1	
POLISHING	Total	0	0	6	15	7	25	
	%	.0	.0	2.1	6.7	2.6	16.1	
SCRAPING	Total	0	2	40	60	55	31	
	%	.0	12.5	14.0	26.9	20.6	20.0	
WHITTLING	Total	0	1	21	8	30	13	
	%	.0	6.3	7.4	3.6	11.2	8.4	
	TOTAL	17	16	285	223	267	155	**N=963**
	%	100	100	100	100	100	100	

Table 14. **Frequencies and percentages of manufacturing attributes (associated with each specific action) per bone reduction types from NgVh 1**

Manufacturing actions		REDUCTION TYPES Blank	Preform	Debitage	Products	
ABRADING	Total	0	6	0	68	
	%	.0	26.1	.0	28.3	
CHOPPING	Total	0	0	0	4	
	%	.0	.0	.0	1.7	
CUTTING	Total	0	1	0	8	
	%	.0	4.3	.0	3.3	
DRILLING	Total	0	0	0	4	
	%	.0	.0	.0	1.7	
GROOVING	Total	0	1	9	13	
	%	.0	4.3	13.4	5.4	
INCISING	Total	0	0	17	3	
	%	.0	.0	25.4	1.3	
POLISHING	Total	0	9	21	97	
	%	.0	31.3	16.5	40.4	
SCRAPING	Total	0	3	9	23	
	%	.0	13.4	25.7	9.6	
WHITTLING	Total	1	3	11	20	
	%	100.0	16.4	31.4	8.3	
	TOTAL	1	23	67	240	**N=331**
	%	100.0	100.0	100.0	100.0	

8.3 Manufacturing actions

> Technological analyses of archaeological remains focus on linking morphological patterns recorded on the surface of specimens to the processes responsible for their creation (Bonnichsen and Will 1981:15).

The following section defines each manufacturing action performed on the raw material and lists the different modification types found in association with these actions. The modification attributes are also discussed in the context of previously published work concerned with bone and/or antler technology. The marks left on bone or antler associated with a specific action are listed in Table 15.

Abrading

Abrading (also refered to as "grinding") is a surface reduction technique performed with the use of a grinding implement to complete this activity (Blaylock 1980). The people occupying the Trail River site were probably using abrasive stone.

In the assemblage from NgVh 1, abrading was recognized by the presence of a non-lustrous smooth surface. One type of striation was identified. It consisted of short, thick striations crossing each other and visible to the naked eye. They resemble the type of striations associated by d'Errico et al. (1982-84:53) and by Peltier and Plisson (1986:73) with sandstone abrading. Both types of striations were identified by Campana (1980:93) while experimentally abrading a bone point.

Chopping

Chopping is a direct percussion technique which reduces and shapes the raw material. It creates notches which protrude from different angles to the worked surface (Blaylock 1980). Adzes were used to perform such an action (ibid.). Chopping with an iron adze "tends to take off short shavings that are thicker on one end than the other, and leaves hinges where the adze has stopped or become hung up" (Blaylock 1980:137). The diabase adze utilized by Blaylock (1980:145) in the making of an experimental antler tool tended to mash the worked surface, leaving ragged cuts. Cole-Will (1984:69) noticed that an iron adze left V-shaped incisions.

Cutting

Cutting marks are produced by a sharp tool, like a knife utilized in such a manner that there is pressure combined with a pulling and/or a pushing action. This action produces thin cuts on the material's surface Blaylock (1980:69). This back and forth movement is, in fact, a "sawing motion" as described by Semenov (1970) and Stordeur-Yedid (1980). In the present study, the term 'sawing' can be used interchangeably with the term 'cutting'.

> A (metal) saw is nothing more than a composite burin: each saw tooth is in fact a burin, and in terms of cutting, cuts and removes the material in the same way (Corbin 1975:96).

The term 'sawing' brings with it the connotation of sawing with a metal blade. The use of metal to saw bones produces striations with deep channels (Bonte 1975, Hahn 1977:342). With the Trail River assemblage, deep channels were recognized. Although no metal artifacts or residues were found, it is possible that the people occupying the site used metallic tools. Copper tools have been found in Mackenzie Inuit sites dating over the last 400 years (Franklin et al. 1981) and iron was utilized by Thule Eskimos of central Canada (McCartney and Mack 1973).

Grooving

A grooving action is a combination of downward pressure coupled with a pulling action directed towards the user with a burin-like tool (Blaylock 1980:41). The square or 'V' shape of the burin tip shaves off narrow strips of material, producing a longitudinal or transverse groove (ibid.). Stone bifaces and flakes were used by Bonnichsen and Will (1981) to groove antler and bone. No discrete morphological patterns were revealed through microscopic examination of those grooves (ibid.).

Experiments done by Cole-Will (1980:68) with an iron grooving tool produced straight square-bottomed grooves with long thin parings as debitage. D'Errico et al. (1982-84:35) reported V-shaped grooves produced by the edge of a dihedral burin after the tool slipped out of the groove (see Figure 23). Both types of grooves were observed in the Trail River assemblage. The striations found on the inner surface of the grooves were semi-parallel, partially overlapping striae running along the length of the groove (see Figure 26). Artifacts exhibiting the remnants of grooving were identified through a concave edge showing a small ridge of cortex or cancellous bone.

At Trail River, grooving was a technique utilized to secure blanks (see Figure 16). It was also a method for the preparation of knife blade slots. The groove diameters found on finished artifacts from NgVh 1 are much smaller than the edge thickness of the lithic tools that might have been utilized in tool manufacture. Tables 16 and 17 compare the groove diameters with the edge thickness of lithic tools The average groove diameter is 0.08 cm, the same diameter that convinced Alexander (1987:36) and Blaylock (1980) that metal tools had been used on the antler and bone.

Drilling

Drilling is a combination of pressure and rotation to cut and abrade a hole in the material. The action was most likely performed with a bow drill, holding either stone or metal drill bits (see Figure 24). Drilling was also a technique employed to cut antler or other bone material (e.g. whale bone). The drilled holes were aligned and then snapped longitudinally. Boas (1974:524) mentioned that the Baffin Island Inuit used this technique when iron was rare and an "effective" saw could not be produced. A good example of this technique is discussed in Blaylock (1980:91). This technique was not found among the Trail River assemblage.

Incising

Incisions are very fine and shallow cuts in the raw material. Contrary to cutting, incising is not directed towards removing parts of raw material. In the Trail River assemblage, the majority of the incisions were made for decorative reasons. Some decorative patterns may have represented ownership marks (see Boas 1974, Kaplan and

Fitzhugh 1980). The three types of incisions found in the antler assemblage at NgVh 1 are illustrated in Figure 22. They were all observed on arrowheads.

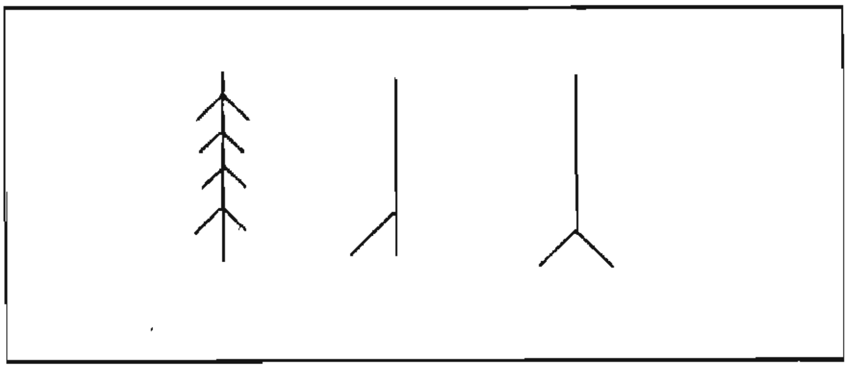

Figure 22. Different ownership marks from antler arrowheads from NgVh 1

Scraping

In her study of harpoons from the Igloolik site, in the Eastern Arctic, Stordeur-Yedid (1980:87) defined scraping as a technique in which the sharp edge of a tool is employed in a back and forth movement perpendicular to the edge of the tool (see Figure 25). Scraping was generally performed to flatten the inferior aspect of objects.

Rigaud (1972) claims observable differentiation of marks left on bone by a burin facet, an end scraper, or a retouched blade. Newcomer (1974b:151) and Stordeur-Yedid (1980:87) disagree, contending that it is impossible to identify the type of tool utilized for scraping; it could be a either burin or a knife.

Two types of marks are left on the material being scraped. The first type is characterized by long striations. Stordeur-Yedid (1980) feels that these striations represent either irregularities on the tool's edge or those of the surface on which the scraping is performed. These striations were also observed by Peltier and Plisson (1986) on an experimental antler tool made by scraping its surface with a stone burin. Bone points, scraped with a flint scraper (see Campana 1980) or with a burin (see Camps-Fabrer and d'Anna 1977) also produced long striations which tended to undulate back-and-forth due to lateral tool movements. Some longitudinal striations were also observed on the antler artifacts from Trail River (see Figure 26).

The second type of mark left on the material is characterized by undulations or 'chattermarks' which are perpendicular to the striations (see Figure 27). These undulations have the tendency to be amplified if one continues to scrape on the same spot (Rigaud 1972, 1984, Newcomer 1974a, 1974b). D'Errico _et al._ (1984:31) also noted the formation of waves on the antler while using a flint end-scraper. Rigaud (1972:106) explains that these undulations are due to the phenomenon of the vibration of the blade against the working surface. Campana attributes a more complex cause to the chattermarks:

> It may be caused by the tool edge being forced too deeply into the work. As a result, instead of a smooth shaving being produced, an improperly shaped chip is formed, the bit is stressed and the bit edge bounces out of the work. Chatter of this sort is the effect of a combination of excessive tool pressure and a tool edge with too steep an angle of approach to the work (Campana 1980:84).

In the Trail River assemblage, chattermarks were observed particularly on finished products such as awls, confirming that scraping was performed in the latter stages of tool manufacture.

Whittling

Whittling is a technique employing a forward pressure applied to the working surface by the short terminal edge of a burin or a knife (see Figure 28) (Stordeur-Yedid 1980:88). This push can be given only by the strength of the wrist or by percussion with a percussor on the proximal end of a chisel (ibid.). It is used to smooth torn edges and bumps found on the bone or antler (Semenov 1970:159).

Marks left by whittling are visible to the naked eye. These are longitudinal striations which present small, flat bottomed channels ending in a cul-de-sac (see Figure 29a). The same types of striations were experimentally reproduced by d'Errico et al. (1982-84:33) with an unretouched flint blade. Hinges are also the result of whittling longitudinally on a worked surface. Blaylock (1980:62) and d'Errico et al. (1982-84:35) observed hinges on material where whittling had stopped, creating a break in the otherwise even surface. These raised areas on the material, running perpendicular to the striations created by the tool, were also observed among the Trail River assemblage (see Figure 29b).

Blaylock's (1980:150) experiments revealed that metal knifes were more effective in the removal of larger, thicker and longer shavings than a chert knife. Cole-Will's (1984:69) experiments with an iron whittling knife produced thin curly shavings. Shavings of this type have been identified by Desse and Rodriguez (1983) at a Neolithic site in Spain. They were also able to experimantally obtain similar shavings by working with a burin on the longitudinal axis of an antler. The width of the shavings corresponded to the diameter of the burin edge (Desse and Rodriguez 1983:110). Shavings were found in large quantities (N=168) at the Trail River site.

Polishing

Polishing is fine abrasive technique, similar to abrading. It gives a lustrous appearance to the material and is one of the last manufacturing techniques performed in the production of a tool. Polishing is done with the use of a fine abrasive stone.

> Polishing makes surfaces worked with various stone tools more uniform and shinier. The striae left by such tools become fainter and almost disappear as polishing proceeds ... (d'Errico et al. 1984:51).

On a polished surface, randomly oriented scratches can been seen under a microscope. Polished surfaces may also result from use-wear. Campana (1980) and Peltier and Plisson (1986) were able to distinguish manufacturing marks from those left by use. Striations caused by manufacture (e.g. polishing) are found everywhere on the tool and are grouped in regular series (due to the movement of the tool-maker). Striations and polishing caused by tool use are uniquely localized on the extremities of the active part of the tool (Campana 1980; Peltier and Plisson 1986). These criteria were used to distinguish between intended polishing and use-wear in the present analysis.

Table 15. Modification attributes found on NgVh 1 artifacts

Manufacturing action	Modification attributes
Abrading	-smooth surface (but not lustrous) -short striations crossing each other; visible with unaided eye
Chopping	-notches
Cutting	-cut marks
Drilling	-complete perforation -incomplete perforation
Grooving	-groove V-shaped -groove U-shaped
Incising	-incisions -decorative incisions
Polishing	-small scratches randomly orientied (seen under microscope only)
Scraping	-long parallel striations -chattermarks
Whittling	-long striations ending in a "cul-de-sac" and showing small channels with flat bottom

Table 16. Groove diameters from Trail River artifacts

Material	Morphology	Type of groove	Groove diameter (in cm)
Antler	Arrowhead	V-shaped	.01
Antler	Arrowhead	V-shaped	.04
Antler	Arrowhead	V-shaped	.11
Antler	Knife handle	V-shaped	.05
Antler	Knife handle	V-shaped	.06
Antler	Knife handle	V-shaped	.09
Antler	Knife handle	V-shaped	.11
Antler	Knife handle	V-shaped	.17
Antler	Small knobbed object	V-shaped	.15
Bone	Scraping implement	U-shaped	.13
		mean =	.08

Table 17. Edge thickness of lithic artifacts from Trail River

Material	Morphology	Portion	Edge thickness (in cm)
Slate	Ground slate	Distal fragment	.05
Slate	Ground slate	Distal fragment	.05
Chert	Biface	Distal fragment	.17
Chert	Retouched biface	Distal fragment	.2
Chert	Biface, burinated long.	Distal fragment	.2
		mean =	.1

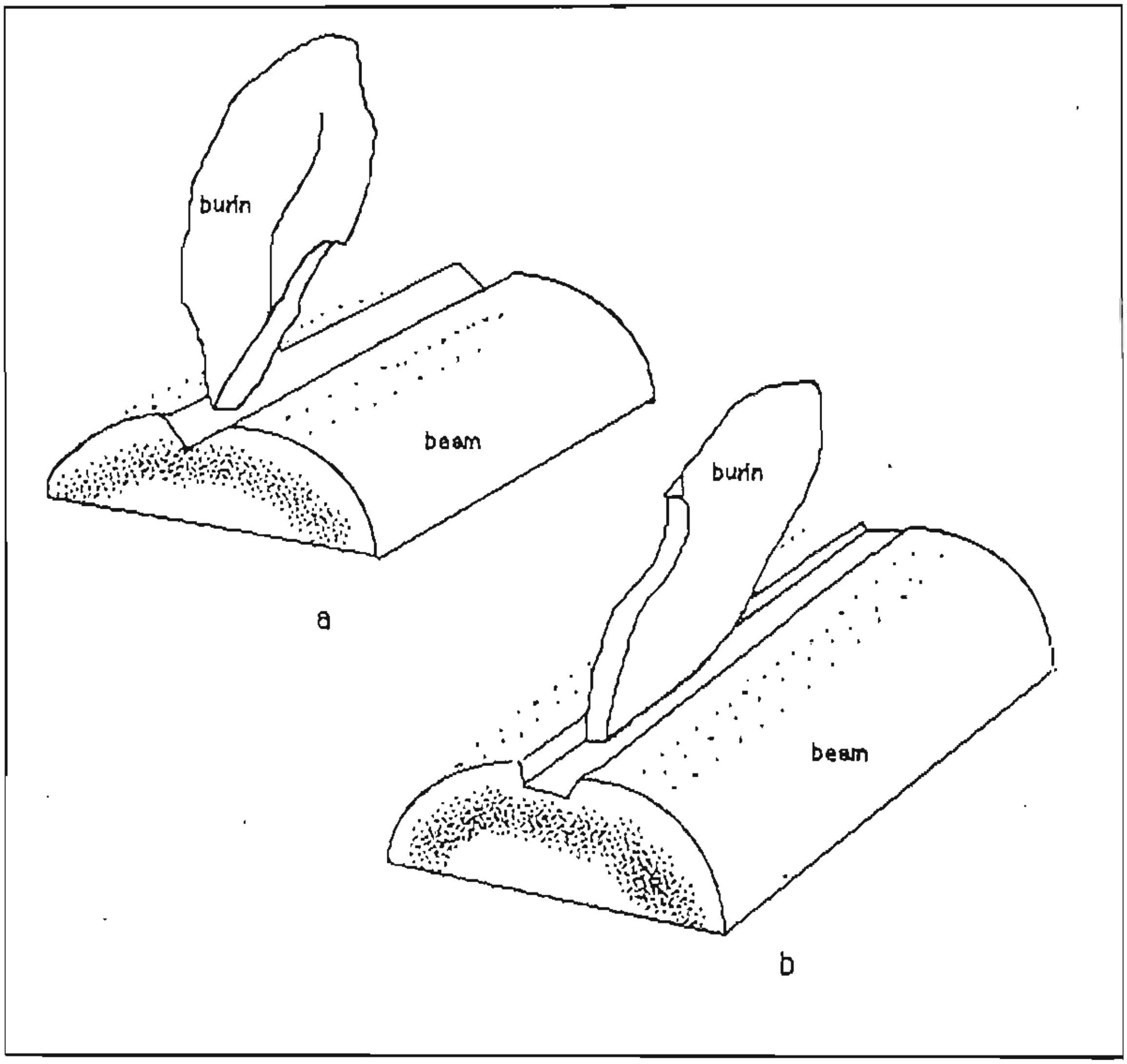

Figure 23. "V" shaped and "U" shaped grooves
a) "V" shaped groove
b) "U" shaped groove

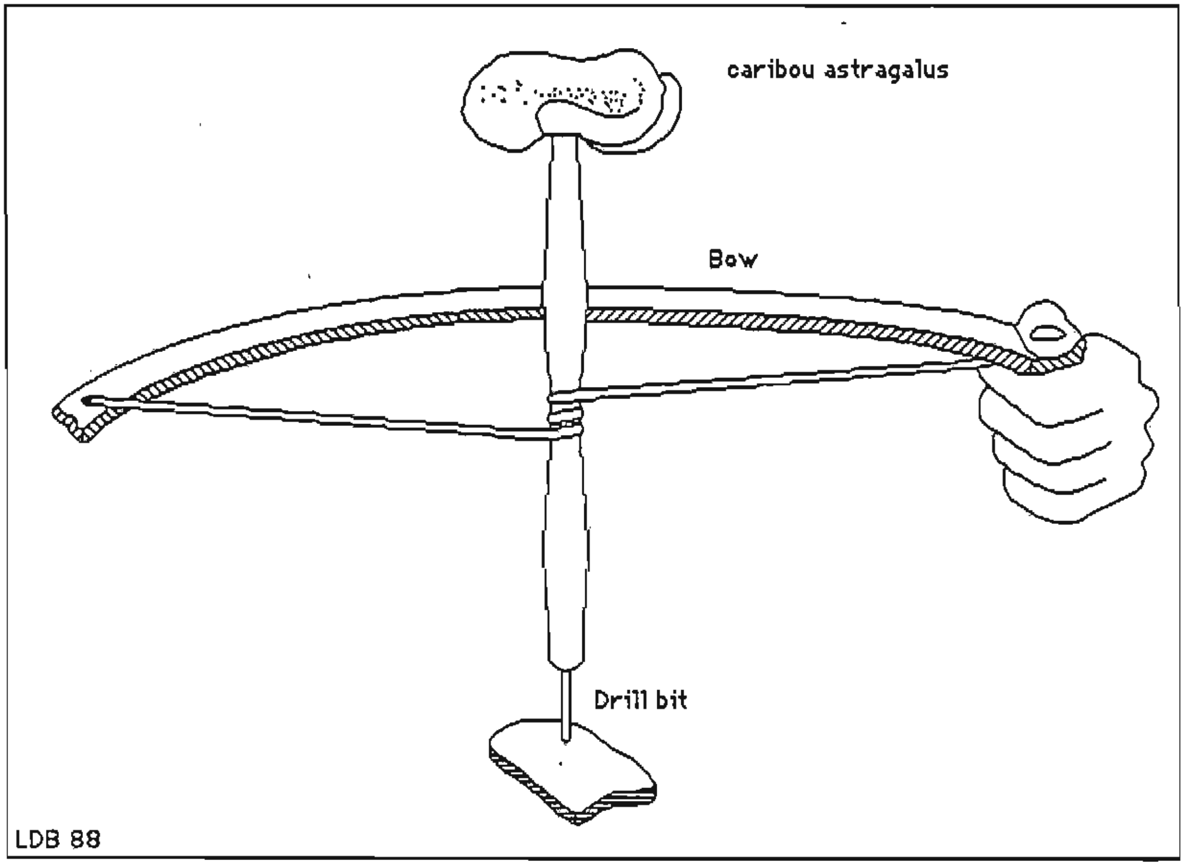

Figure 24. Bow drill

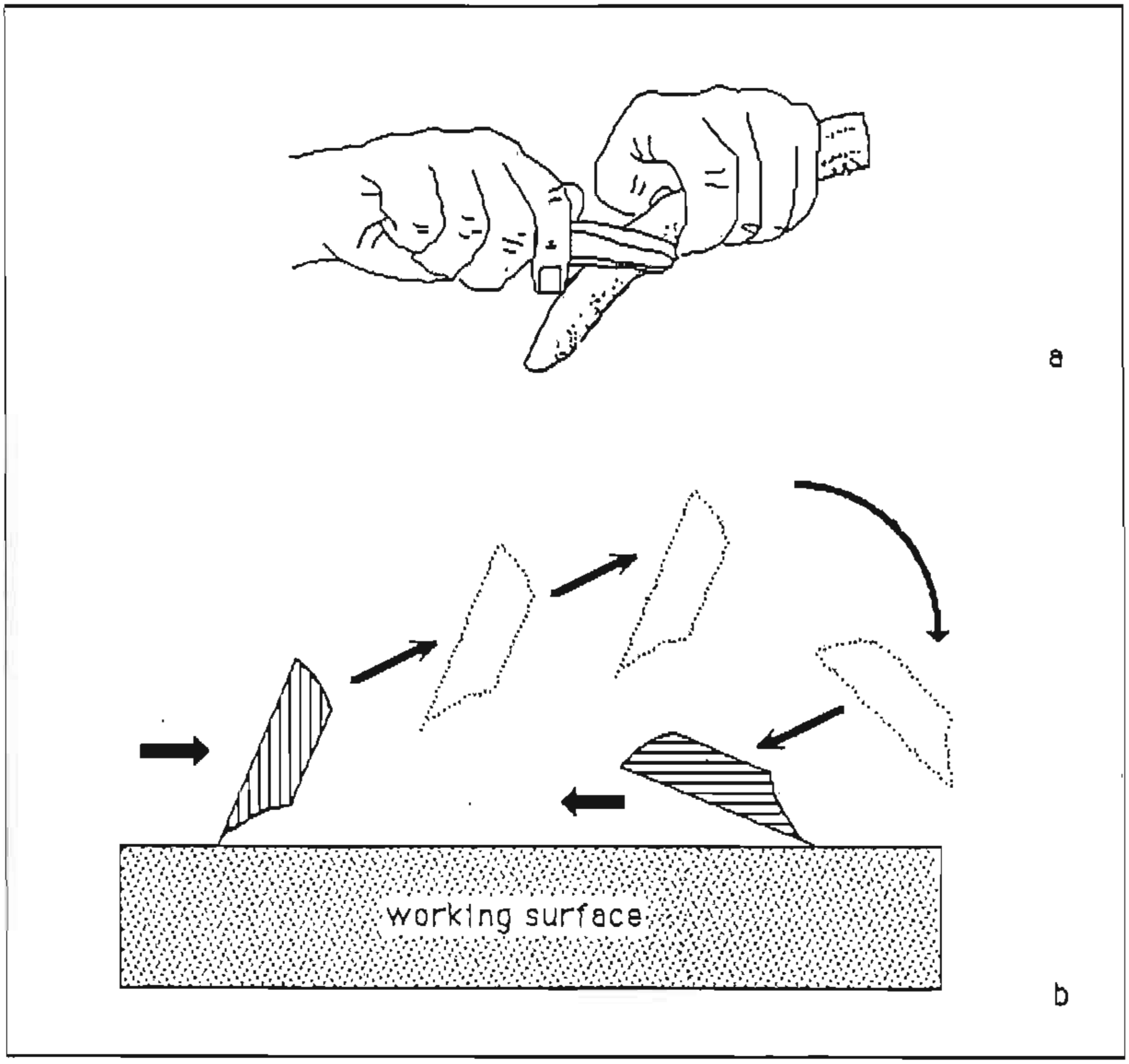

Figure 25 . Scraping action

a) Scraping action

b) The movement of the blade.

Figure 26. Grooving and Scraping Striations

a) Longitudinal striations from grooving (x 15)

b) Longitudinal striations from scraping (x 15)

A

B

Figure 27. Scraping Striations (X 30) and Chattermarks (in background; X 30)

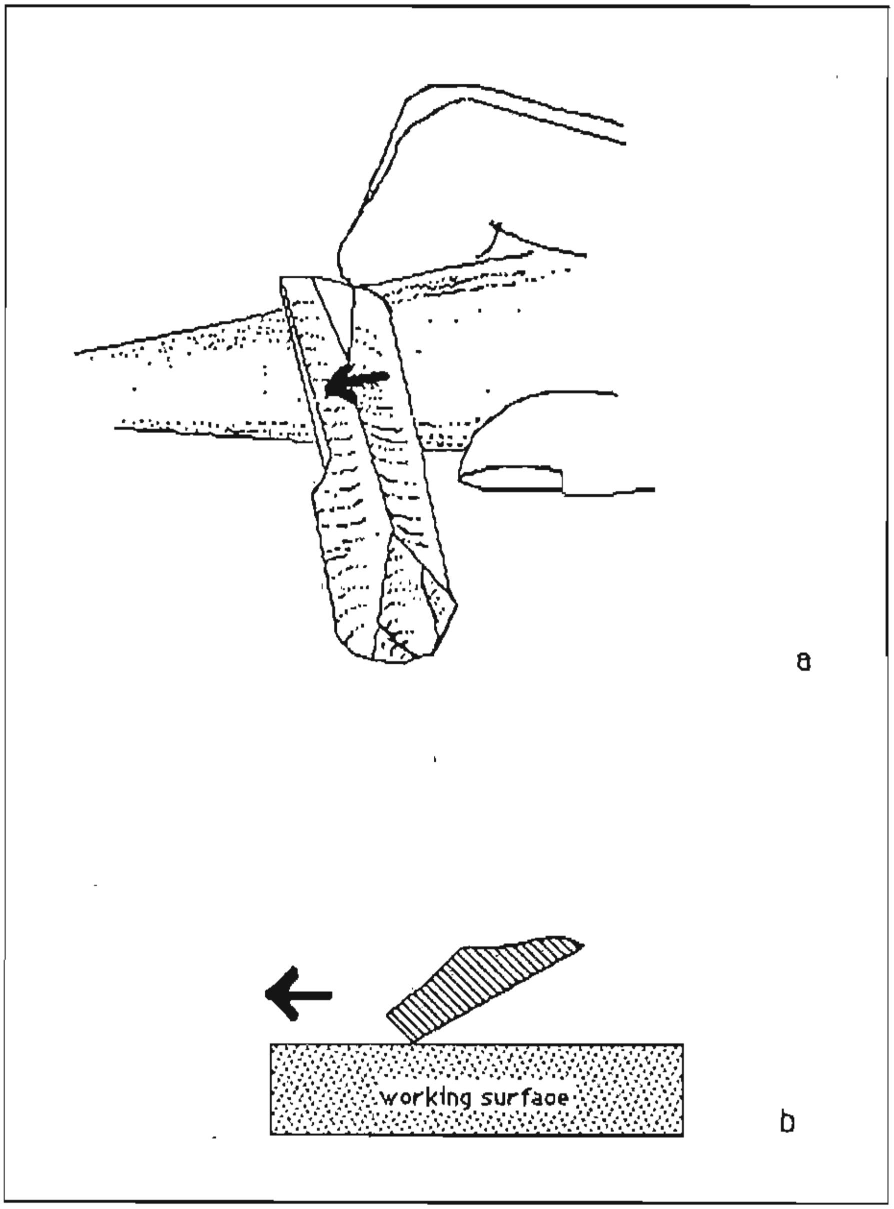

Figure 28. Whittling action

a) Whittling action (after d'Errico *et al*, 1982-84)

b) The movement of the blade.

Figure 29. Whittling Attributes

a) Hinges (x 15)

b) Whittling striations (close-up; x 30)

A

B

8.4 Results of the Analysis

The distribution of modification attributes found in the antler and bone assemblages from NgVh 1 is a reflection of effort expended during tool manufacture. In the antler assemblage, modification traces were concentrated on blanks (29.6%, N=285), debitage (27.8%, N=267) and preforms (23.2%, N=22) (see Figure 30). The fact that antler debitage, which made up 65.3 % of the antler assemblage, contained only 27.8% of all the modification attributes is understandable. This is because antler debitage principally consists of small antler shavings and splinters which are the result of few manufacturing actions.

In the bone assemblage, modification attributes were largely observed on finished products (72.5%, N=240) and debitage (20.3%, N=67); the two major categories of reduction types recovered in the bone assemblage (see Figure 30).

Antler

Antler sections were obtained through the processes of cutting and grooving. Cutting represents 70.6% (N=12) of all modification attributes present on sections and grooving represents 23.6% (N=4) (see Figure 31).

Modifications of antler cores were carried out principally by the actions of cutting (37.5%, N=6), grooving and abrading both at 18.8% (N=3 each) (see Figure 32). Cutting attributes occur during the process of separating the cores from the sections. Grooving attributes correspond mainly to the longitudinal grooves made on the cores to extract blanks. Abrading can be explained by the fact that it is a technique utilized to smooth the working surface to facilitate the cutting or the grooving of the cortex.

Forty percent (N=91) of all modification attributes recorded on antler blanks were attributable to grooving, 25.3% (N=72) were the result of cutting and 14% (N=40) associated with scraping (see Figure 33). The grooving attributes found on blanks are remnants of the longitudinal grooves used on cores to produce blanks. The cutting attributes are associated with transverse cuts originally used to separate the core from the blank. The scraping attributes indicate that work had been started on the blanks to shape a preform, but was later abandoned.

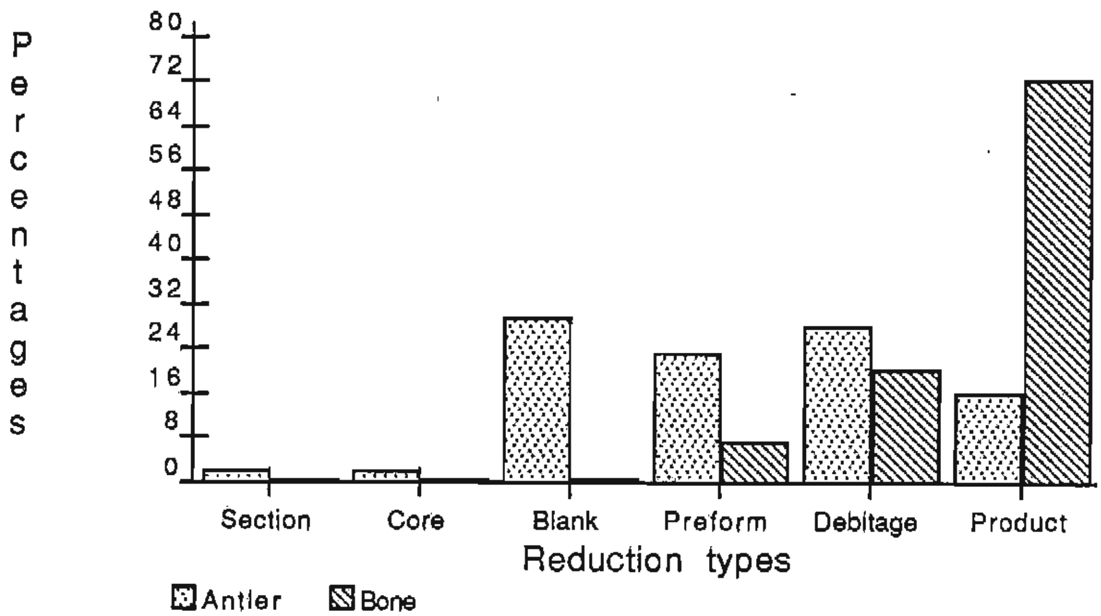

Figure 30. Percentage of all modification attributes per reduction types.

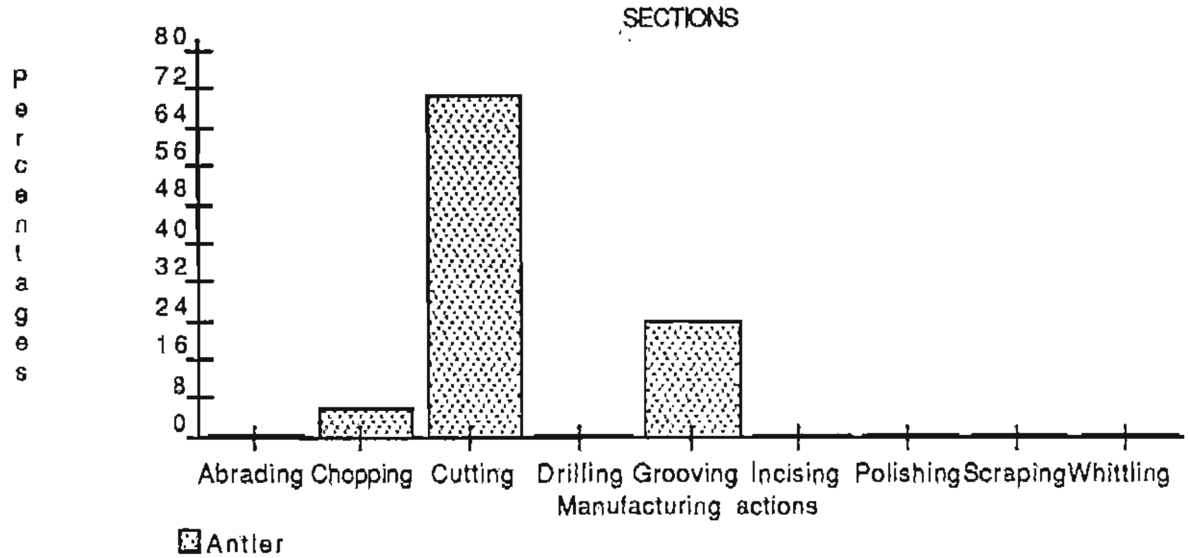

Figure 31. Percentages of all the modification attributes (listed under their respective manufacturing action) for antler sections.

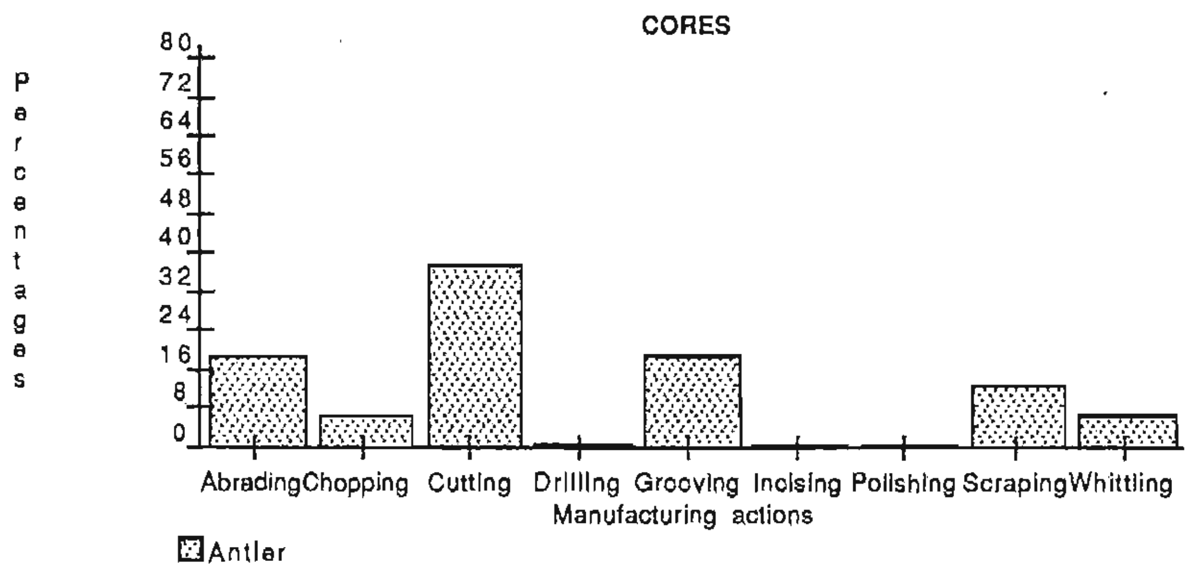

Figure 32. Percentages of all the modification attributes (listed under their respective manufacturing action) for antler cores.

With antler preforms, 26.9% (N=60) of their modification attributes were due to scraping, 25.1% (N=56) to cutting and 23.3% (N=52) to abrading (see Figure 34). Scraping and abrading are techniques utilized in the shaping of a working surface. The cutting attributes again belong to the transverse cuts done originally to separate the cores from the blanks.

The analyses of antler finished products revealed that 21.9% (N=34) of their modifications were the result of abrading, 20% (N=31) of scraping, and 16.1% (N=25) of polishing (see Figure 35). These are all manufacturing techniques utilized in the final stages of tool production.

Finally, 27% (N=72) of the modification attributes occuring on debitage were due to grooving, 20.6% (N=55) to scraping, 15.4% (N=41) to cutting and 13.5% (N=36) to chopping (see Figure 36). Grooving, cutting and chopping are all techniques that sever the antler and produce debitage. Debitage observed with scraping modifications was likely produced during the blank and preform stages of tool manufacture.

Bone

As only one blank and no sections or cores were recovered, these reduction types will not be discussed. At NgVh 1, bone tools were made expediently, by utilizing broken bone and shaping it by abrasion. Awls were manufactured from long bone splinters readily available from the faunal material as described in Chapter 4. Scapulae, made into scrapers, were selected because of their large blades that allowed for easy sharpening. Such tools were opportunistic; made on the spot and discarded after use (see Johnson 1985).

The results of the analysis show that bone preform attributes were due to polishing (39.1%, N=9) and abrading (26.1%, N=6) (see Figure 34). As already mentioned, these are techniques used to shape and reduce bone material. The finished products show these same attributes, with an even higher percentage for each: 40.4% (N=97) associated with polishing and 28.3% (N=68) belong to abrading (see Figure 35). As discussed in Chapter 7, use-wear was identified and accounted for (after Campana 1980; Peltier and Plisson 1986).

Modification attributes found on bone debitage were the result of polishing (31.3%, N=21) and incising (25.4%, N=17) (see Figure 36). Most of the bone debitage are small fragments of scapula blades. This debitage represents the working edges of scraper-like implements that had been re-shaped in order to be reused. Thus, the high percentage of polishing can be explained in part by use-wear. Use-wear was observed only along the working edges of the tool, while general polishing was observed on flat areas, other than the working edge. Incisions were 'hesitation marks' formed on the scapula blade during the attempt to produce a good working edge.

8.5 Summary and Discussion

The results indicate that antler was mainly worked by the processes of grooving, cutting and scraping. Bone was worked by polishing and abrading - techniques that leave no debitage (see Table 18).

These results emphasize the fact that most of the bone tools were made in an expedient manner. This is shown by the abundance of small scapula fragments composing the majority of the bone debitage. Scapulae were easily worked into scraper-like implements with a minimum of investment in time and effort. This small investment in tool manufacture is indicative of the production of situational gear (Binford 1979). Butchering activites, as discussed in Chapter 4, provided a readily available source of bone material. Situational gear, needed for immediate use, was produced from this available bone source. For example, bones could easily be worked into awls or scrapers. The presence of situational gear at NgVh 1 suggests that such expedient gear can be expected in habitation sites and not exclusively in "field" situations as mentioned by Binford (1979).

The antler reduction types all show a high level of modification indicating that they were manufactured "according to quality considerations" (Binford 1979:270). This is expected with the manufacture of personal gear because these types of tools were intended for long term use (ibid.). Thus, personal gear would have been heavily curated by their owners. This included not only finished products, but blanks and preforms as well that "would have been carried by individuals in anticipation of future conditions and/or activities" (Binford 1979:262). This follows Binford's (ibid.) idea that tools were not made all in one place at one time.

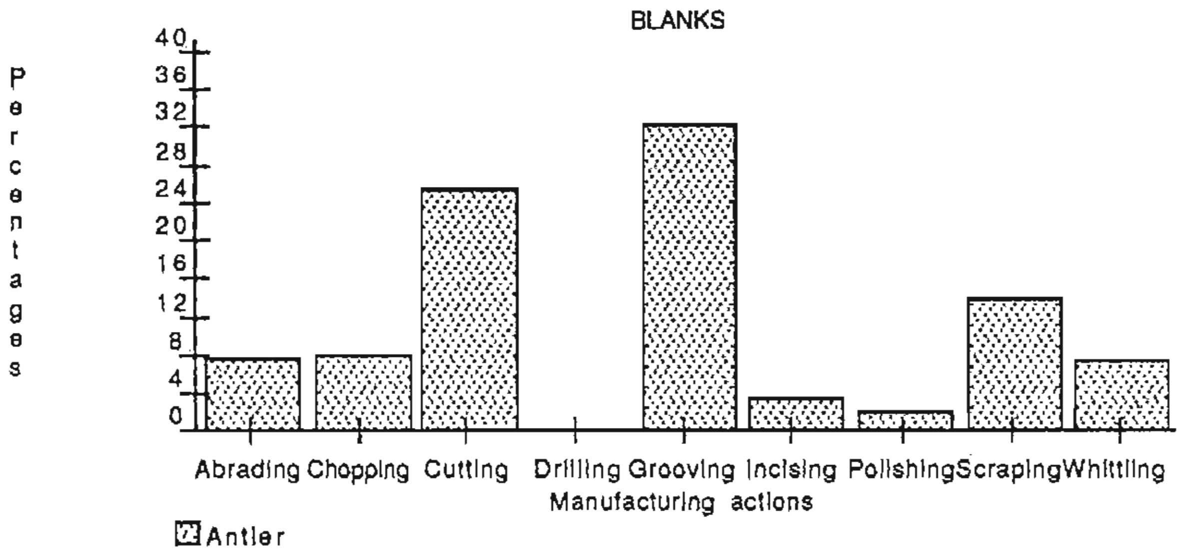

Figure 33. **Percentages of all the modification attributes (listed under their respective action) for antler blanks**

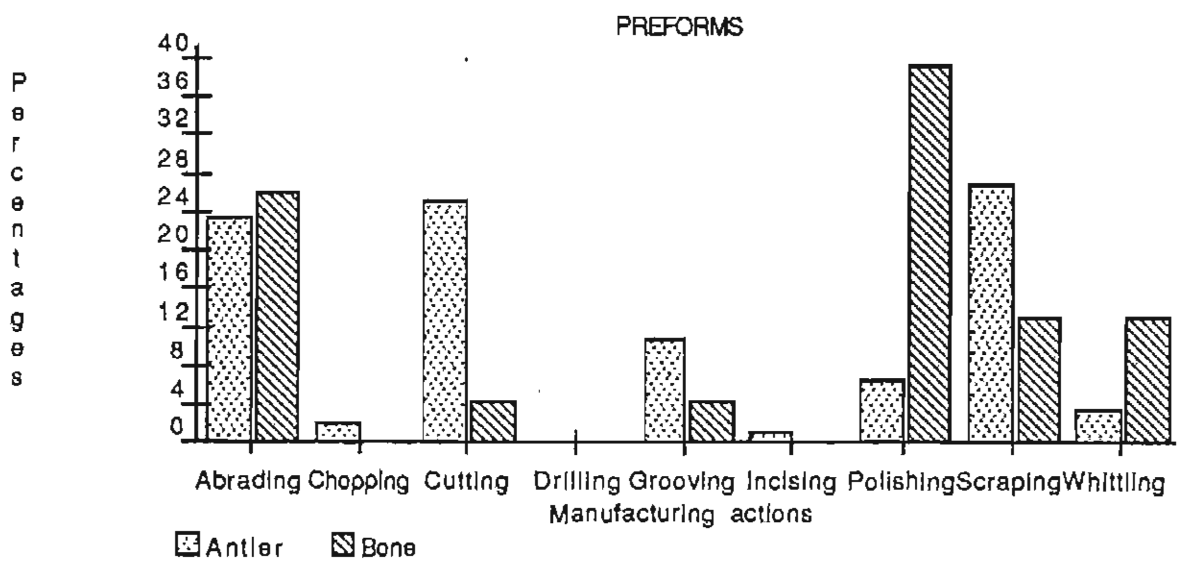

Figure 34. **Percentages of all the modification attributes (listed under their respective manufacturing action) for antler and bone preforms**

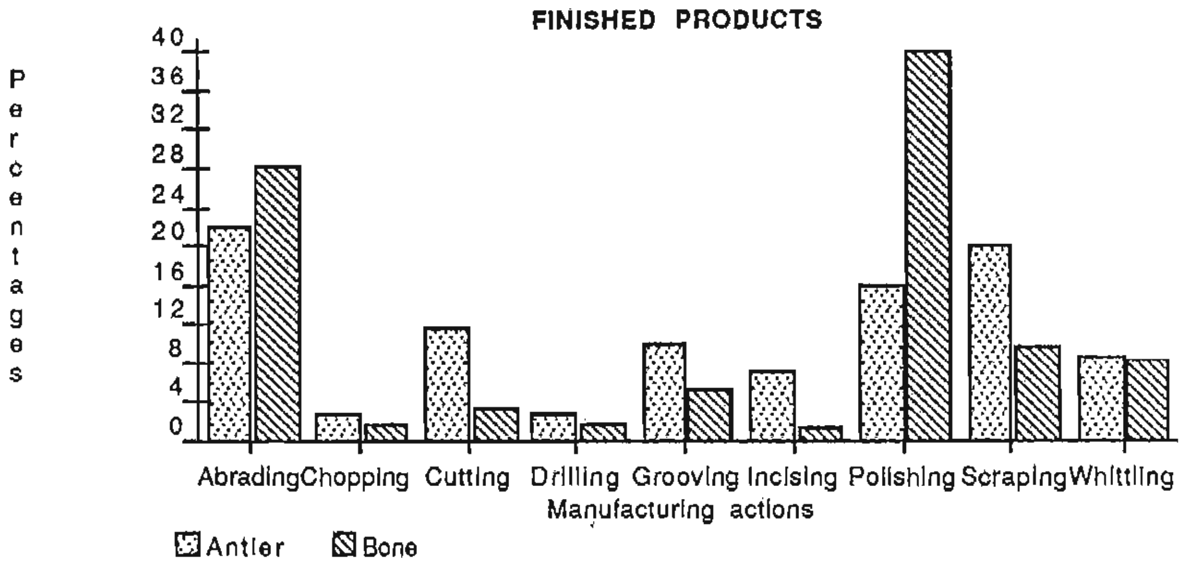

Figure 35. Percentages of all the modification attributes (listed under their respective manufacturing action (for antler and bone finished products)

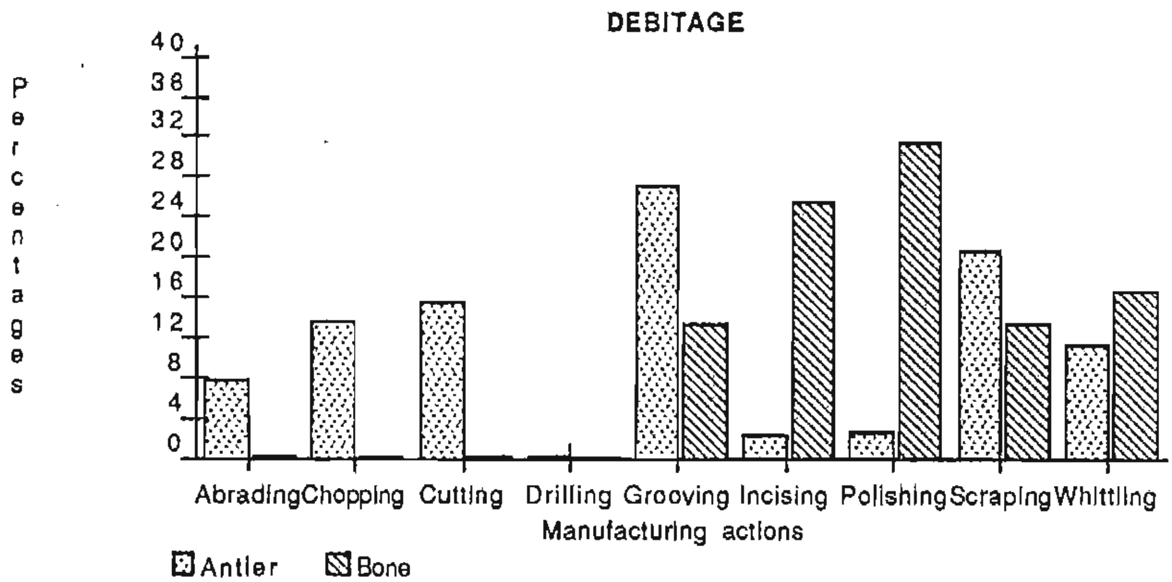

Figure 36. Percentages of all the modification attributes (listed under their respective manufacturing action) for antler and bone debitage

Table 18. Manufacturing actions utilized at NgVh 1

ANTLER

Reduction types	Manufacturing actions	By-products
Sections	cutting grooving	tines, section remnants
Cores	cutting abrading grooving	core remnant, splinters, core "handles"
Blanks	grooving cutting	blank remnants, debitage
Preforms	scraping cutting abrading	shavings
Finished products	abrading scraping polishing	none

BONE

Reduction types	Manufacturing actions	By-products
Preforms and Finished products	polishing abrading	none

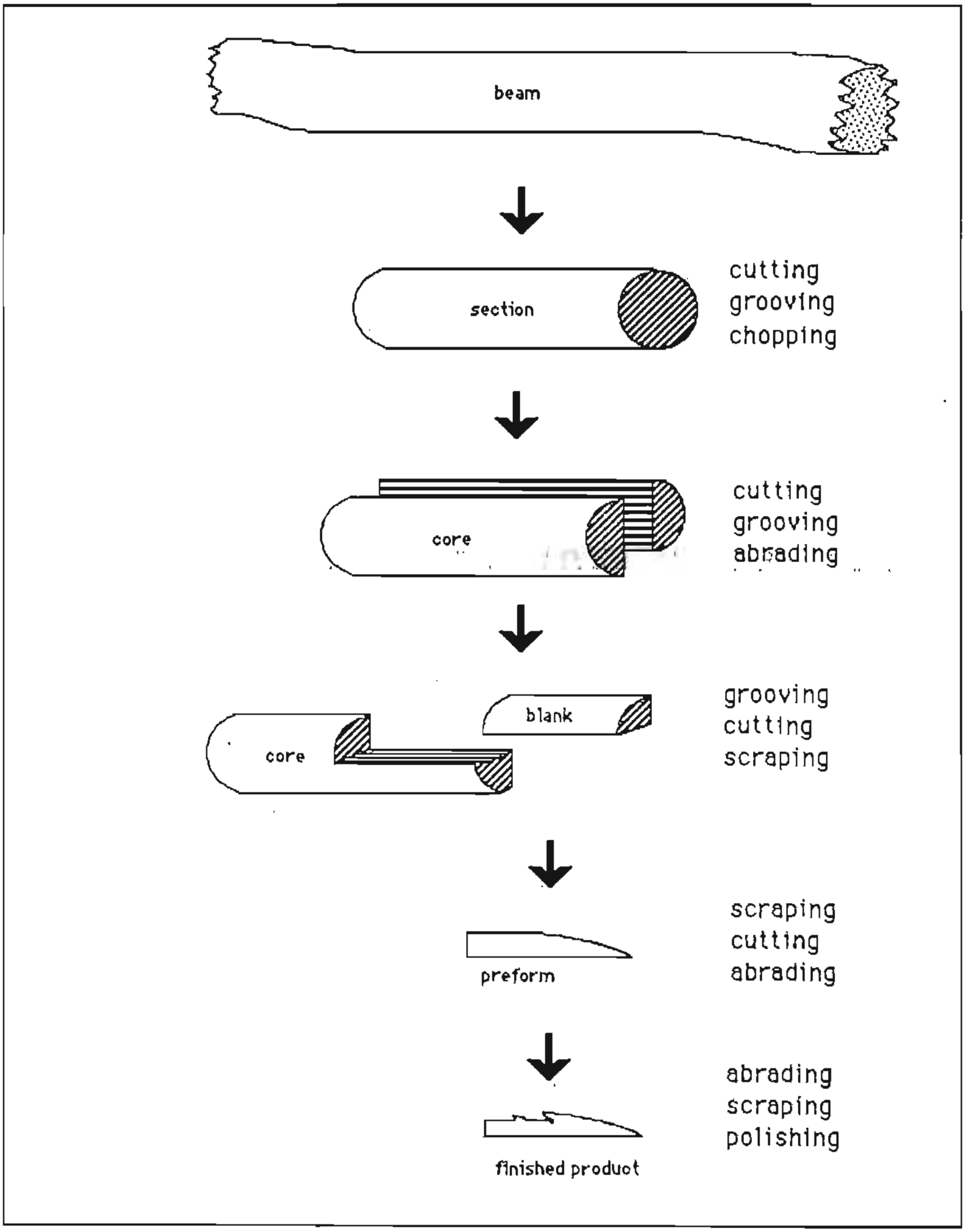

Figure 37. Manufacture techniques performed on antler reduction types from NgVh 1

Chapter 9. Conclusions

9.1 Summary and Discussion

This thesis was undertaken to determine why the Trail River site (NgVh 1) was occupied by prehistoric Mackenzie Inuit. At the outset of this study, it was proposed that subsistence activities and/or raw material procurement were the most probable reasons for site occupation. Analysis of the cultural material from one of the main features (Feature 1) was undertaken to evaluate each hypothesis. The resulting analyses have demonstrated that Feature 1 was a habitation site where activities related to bone processing, tool manufacture, skin preparation and clothes manufacture were carried out. This conclusion is supported by the following data and interpretations:

1) Caribou bones were processed for marrow extraction and grease rendering.
2) There is minimal evidence for fishing.
3) Antler by-products associated with the production of personal gear are abundant at the site.
4) Bone implements were manufactured in an expedient manner and represent situational gear.
5) Implements related to skin preparation (e.g. scrapers) and clothes manufacture (e.g. awls) were well represented.

The site was occupied so that the inhabitants could engage in subsistence activities. Although caribou bones are the most abundant, low caribou MNI (MNI=8), intensive bone smashing for grease rendering and exploitation of other species suggest that caribou hunting was not practiced on a large scale. This is substantiated by the fact that the site was occupied at calving time when caribou are segregated in small sedentary groups. Only individualistic hunting could have been practiced and might not always have been successful. Furthermore, at the end of spring caribou are very low in fat. People would have needed to supplement their diet with other resources such as birds and small mammals.

The analysis of the antler material has demonstrated that a small percentage (1.3%) of preliminary debitage is present, suggesting that antler had not been procured at the site but rather carried to the site in partially processed form. Antler procurement was likely embedded in basic subsistence schedules as Binford (1979) expected with raw material. Antler was also intensively manufactured into tools as hunters were "gearing up" at the site. Recognition of two types of gear was substantiated by the analysis of the manufacturing techniques performed on the associated by-products. Personal gear, made from antler brought to the site or scavenged from the plains surrounding the camp, was manufactured with considerable effort and skill. These tools would have been prepared in anticipation of future caribou hunting. Situational gear, made from bone obtained at the site, was manufactured expediently and intended for immediate use.

The site was probably abandoned in late June. Hunters and their families could have moved to other hunting grounds, near the British Mountains. There, communal hunting utilizing drive lines could have been practised to hunt the huge caribou herds migrating to the east.

9.2 Future Research

More excavations are needed to estimate the density of occupation and the range of activities performed at caribou hunting camps in the northern Yukon. The analysis of faunal material from other sites in the study area should substantiate the fact that caribou hunting in the northern Yukon mainly took place during the summer migration of caribou. If so, this would indicate that caribou exploitation was different from that of the eastern Mackenzie Inuit. Evidence from Kugaluk and Saunatuk indicates that the major season of site occupation for caribou exploitation occured during the fall, a time when caribou hides are at their prime (Balkwill 1987, Morrison 1987).

Although, at Trail River, antler procurement was probably embedded in basic subsistence activites, this needs to be confirmed for other regions of the northern Yukon as well. Can sites that were occupied specifically for antler procurement be identified? One would expect to find preliminary antler debitage highly represented at these sites.

It is hoped that more technological analysis of antler and bone implements will be undertaken in order to better understand the role of by-products in the making of finished products. At the present time it is extremely difficult to associate a finished product with a specific by-product. For example, videos taken of Inuit artisans manufacturing tools would be useful to identify the different by-products produced in the manufacture of various implements.

The comparison of manufacturing techniques utilized by different Arctic groups could also isolate changes of manufacturing techniques through time. Manufacturing techniques could be studied as stylistic attributes. Possibly different ethnic groups could be identified. It would be interesting to verify if different strategies were charactersitic of specific groups or if the efficiency of metal tools utilized by certain groups influenced their techniques of manufacture.

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