SOCIAL LIFE AND TECHNICAL PRACTICE: AN ANALYSIS OF THE OSSEOUS TOOL ASSEMBLAGE AT THE DORSET PALAEOESKIMO SITE OF PHILLIP'S GARDEN, NEWFOUNDLAND

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By

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Abstract

The aim of this thesis is to provide an understanding of the social nature of technological life at Phillip's Garden (EeBi-1), a large Middle Dorset site in northwestern Newfoundland. This is accomplished through the analysis of its osseous (bone, antler and ivory) tool industry. The assemblage is systematically presented providing morphological details for tool types, variation in forms and materials selected for their manufacture. In addition, the frequency of tool forms is recorded over the temporal and spatial extent of the site, and evidence of their manufacture and use is explored. Technological practice is defined in a thoroughly inclusive way, not simply as the material outcome of production, but immersed in social action that reinforces relationships among people, the materials they manipulate and the settings of technological events. The results of this analysis reveal a dynamic and unique community at Phillip's Garden where occupants transformed, over the course of its occupation, some practices of material acquisition, manufacture and use, dwelling occupation, tool making, and hunting.

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Chapter 1

Introduction: Technical Practice and Osseous Material Culture at Phillip's Garden, Northwestern Newfoundland

"One reason why technology is so amenable to the analysis of past social agency is that the material record itself supports an identification of action. The specificity of material used and the technique employed to create particular tool forms provide a range of factors that bring the agency of individuals to life, exposing their decisions and their reflections" Sinclair (2000:196).

1.1 Introduction

Through an examination of the osseous (bone, antler, ivory) tool industry this thesis aims to provide an understanding of technological life at Phillip's Garden (EeBi-1), a large Middle Dorset site in northwestern Newfoundland, over its 800 year occupation. Phillip's Garden was occupied for as long as the Dorset lived on the island of Newfoundland (1990 to 1180 cal BP). Its great size and rich, complex material culture demonstrate its importance as an aggregation site for people from distant settlements (Renouf 2011a, 2011b). It was a place that provided abundant resources mostly in the form of harp seals, but also important raw materials, such as whale bone. The Dorset transformed aspects of their social lives at this site. By intensifying seal harvesting and the processing of associated products, people at the site organized themselves into greater numbers of larger households than is seen at contemporary Dorset sites. Unique tool forms appear among the large assemblage, and together their spatial and temporal distribution reflect dynamic social relationships that people had with each other, animals, their surroundings and the things that they made. Because of its size and unusually good preservation, the osseous tool assemblage at Phillip's Garden offers a rare glimpse into a material culture not well represented in this region of the Dorset world.

Osseous materials were selected for the fabrication of numerous tool types spanning a multitude of practices that functioned in different facets of life. Apart from those that are unique, other types feature designs that are regionally distinct. The primary research aim of understanding how technology shaped social life at the site over time is first addressed through a quantitative and qualitative description and analysis of the tool types represented, their material sources, and their frequency over the geographic extent of the site from dated midden and house features representing all temporal phases of the occupation. Secondly, an analysis of the way osseous tools were constructed and evidence for wear observable through low-powered magnification aids in understanding the nature of material acquisition, reduction, use and re-use. In addition, the spatial and temporal distribution of the tool types offers insights into persistence and change in activities performed at the site with implications for the way the site and other associated locations were occupied. The assemblage is compared to the tool types, their frequencies and material sources from other Dorset contexts. In addition to published sources, much of the comparative information comes from an examination of osseous tools at two contemporary Arctic sites, Alarnerk (NhHd-1) and Nunguvik (PgHb-1) (Appendix A).

The results of this analysis reveal a dynamic and unique community at Phillip's Garden where some traditions of material acquisition, manufacture and use, dwelling occupation, tool making, and hunting practices were altered over the course of its occupation. The analysis offers the first systematic presentation of the osseous collection from Phillip's Garden, including details of manufacture in addition to morphological characteristics. Furthermore, this presentation of tool types reveals a range of activities performed at the site that have not previously been documented. The identification of raw material demonstrates that animal exploitation for tool making was an important pursuit here. In particular whale bone was used extensively, in some cases it was the exclusive material for several tool types. Furthermore, the wide availability and nature of the whale bone influenced the development of unique tool forms. The exploitation of raw materials and the differential reduction sequence for tool making and use at the site placed people in social circumstances that emerge through this analysis. While the seal hunt was an influential and transformative factor in social life at Phillip's Garden, the Dorset approached it in a wider technological context where choices and intentions were expressed through material form.

1.2 Theoretical Approach

The osseous assemblage represents a tangible dimension of technology which through technical practice organizes people in ways that reinforce and sometimes transform their social relationships and worldview. These objects are material markers of events, decisions and compromises, and their use situates people in places that become significant and imbued with meaning, memory and legend. This makes the study of technology particularly fruitful for archaeologists. Consequently, while this is a thesis about artefacts - what they looked like, how they were made and used, and how they changed - the analysis of the tools is nonetheless conducted to uncover aspects of a unique, dynamic social relationship that people would have had with one another, animals and their material surroundings at this large, long-term aggregation site.

Technology as understood in this work, is not simply the material outcome of production, nor exterior to social life (Edmonds 1990; Ingold 2000:313; Pfafferberger

1988:242), but is thoroughly embedded in social action, where practices of acquiring raw materials, manufacturing, using, re-using and discarding are all social events (Dobres and Hoffman 1994, 2000; Dobres 2000; Ingold 2000; Lemonnier 1993; Mauss 1935; McGinn 1978; Schlanger 1998; Sinclair 2000). These technological episodes are repeated, having pre-existing form or structure which reinforces identity, but through the actions of individuals (agents), can be altered. Technological practice is intertwined with how the world is experienced and understood, and lends character to the daily lives of people - where they placed themselves in time and space in social circumstances that ultimately lend form to worldview (Dobres and Hoffman 1994; Dobres 2000; Ingold 2000; Sinclair 2000). For example, awls and animal hides prepared for making clothing are the outcome of technological acts, but they are not simply the sum of technology. These objects also represent social situations that defined their makers' relationships to the material, to each other, and to the animals that provided their material needs. The circumstances of their manufacture and use situated people in places and social configurations that may have reinforced gender or political roles for instance. Bodily movements or gestures would have been performed in regular, recognizable ways that were learned, repeated, and sometimes altered. The actions would have defined a way of doing things, of situating individuals in groupings that would reinforce social identity. Hence, while technology is about the alteration of the material world, it is simultaneously about the creation and transformation of people's social relationships (Dobres 2000:128).

This profoundly inclusive, socialized concept of technology expresses an approach influenced by the work of sociologists, philosophers and others who have partially shaped the course of a post-processual movement in archaeology. It integrates the concepts of agency, practice, habitus, dwelling, landscape construction, and phenomenology - all of which are adopted by archaeologists as a means of interpreting the social lives of individuals and groups through space and time. These concepts grant archaeologists the ability to conceptualize the interactive web of social relationships in the world. Together these ideas emphasize and express the thoroughly cultural response to the external world.

The idea that technology is embedded in social life and gives form to social events and relationships among people is influenced by the works of Giddens and Bourdieu, who in slightly different ways express the important role that individuals play in shaping, maintaining, and altering the ways they conduct their social lives. Through his work in developing a theory of structuration, Giddens argues that while individuals and groups make decisions and act through a set of recognized social rules or structures which are essentially frameworks from which to approach situations, they alter these choices and actions to create alternative structures (Giddens 1984; Johnson 1999:104). The rules or conventions are constructed as a result of action informed by experience and traditional knowledge. These are the constraints that people work within, but through the actions of their daily lives they have the ability (agency) to restructure social conventions (Deal 2011; Dobres 2000: 134; Dobres and Robb 2000:5; Giddens 1984:9; Walker and Lucero 2000; Wobst 2000:40). Giddens emphasizes the active rather than passive role of individuals in consciously reinforcing and also transforming the structural rules in their societies. This is done through social activities which are recursive in that individuals create and recreate them through action-based expressions of themselves (Giddens

1984:2). Furthermore, it is the unintended consequences of day-to-day actions that will condition future acts (ibid:8, 282).

Bourdieu's (1977) ideas similarly express the importance of agents in shaping their social lives through the routine practices of daily living, or *habitus*. He argues that through mundane daily actions individuals create and are likewise structured by institutions and belief systems that are outside their awareness and control (Dobres and Robb 2000:5). The relationship between an individual's actions and the structure of institutions of social relations are dynamic as a result of each influencing the character of the other (Walker and Lucero 2000:131). Consequently institutions or structures are never static because practice both reproduces and transforms them according to different demands (Dieter and Herbich 1998:247).

Also centered on the individual within wider social groupings, Mauss's (2006) writings stress the bodily experience of technology. He sees the body as the first and natural technical object and together with other constructed objects a series of bodily movements are enacted in ways that express ethnicity; indeed are very closely tied to norms of action for identities based on social position, gender and age for instance (Dobres 2000:153). Mauss (1935:98; also Lemonnier 1992) argues that routine bodily habits (*habitus du corps*), even the simple act of digging can be performed in many ways; the form taken is learned through observation, instruction, imitation and experience. While he stresses the physicality of articulated sequential bodily motions, the fact of their being learned and transmitted convinced him of the essential social nature of the movements. Even acts that have a practical efficiency are no less social, as they are enacted in contexts which form the social constitution of the actors (Schlanger 1998:198).

Heidegger too emphasizes the sensory nature of technological practice, stressing the fusion of matter, mind, knowledge and practice. In his discussions of being-in-the-world Heidegger argues that through their physical, embodied experiences with things such as buildings and tools, people gain an awareness of themselves as perceptive agents (Dobres 2000:82; Gosden 1994; Tilley 1994:12). This is an essentially phenomenological approach, meaning one that emphasizes the sensory human experience, where the body is a vantage point from which to understand the world (Brück 2005; Fleming 1999:119; Hamilton et al.2006; Tilley 1994:13, 2008). Heidegger (1977) feels that a way of knowing the world is expressed in how people intimately surround themselves (dwell) in buildings and locations. He gives an example, stating that peasant house designs evolved from a particular relationship that people had with the land, and that these designs likewise provided a kind of experiential life history for their occupants. Both Mauss and Heidegger emphasize the cultural character of embodied experience in relation to objects and places.

Some archaeologists have embraced the works of those who emphasize the thoroughly socialized nature of action existing in a dynamic fabric of worldly experience, not only as it pertains to human technical life, but also to their physical surroundings (Anschuetz et al. 2001; Appadurai 1996:182; Barrett 1994; Cooney 2000; Escobar 2001; Ingold 1993; Whitridge 2004a). Landscapes are no longer seen as discrete, unchanging backdrops for human action, but thoroughly socialized constructs (Basso 1996; Ingold 1993). In this concept of landscape, places take form as a medium of human embodied experience, knowledge and material culture articulated with nonhuman, biophysical features (Whitridge 2004a:243). Ritual and myth are localized or tied to particular places and paths, and thus places take on the role of referential grounds for social action (Basso 1996; Ingold 1993; Tilley 1994;). Clearly as part of any interwoven social fabric, technology would be embedded in how landscapes are understood or constructed (Ingold 1993; Whitridge 2004a; Zedeno and Bowser 2009). Ingold (1993:155) states that places are defined by the kinds of sensory experiences people have with them, which in turn depend on the kinds of activities in which people engage. The association of action, and its residual material remains, with places reflects the repeated phenomenological experiences of groups of people that inhabited those locations (Whitridge 2004a:233).

Archaeologists have furthermore been influenced by those who emphasize the social nature of technical action through the application of the *chaîne opératoire*. This is an interpretive and methodological approach that focuses on an examination of the technical sequence of operations for the reduction of natural resources into material culture, and emphasizes a technological relationship between agents and tools based on decision-making and gestures in the transformation of raw material (Cresswell 1990:46; Dobres 1999:125, 2000:154, 2000b; Edmonds 1990; Lemonnier 1990, 1992; Pelegrin 1990; Schlanger 1990, 1994; Schlanger and Sinclair 1990). Although ideologically influenced by Mauss (1935), particularly the social implications of technical acts, André Leroi-Gourhan first developed the mechanics of the approach, stressing the importance of the organization of techniques around material reduction where the outcomes result from a systematic series of techniques (Schlanger 1994:145). It was Leroi-Gourhan (1943, 1945) who introduced the analytical method to archaeology, and through focus on the stages of techniques brought to bear on material from its conception to its manufacture into a finished tool, he furnished artefacts with a dynamic life history (Dobres 1999:128; Lemonnier 1992).

It is with the understanding that tangible remains of technology can reveal aspects of social organization that the osseous collection is approached in the present thesis. Detailing the material sources of osseous tools reveals practices with implications for the spatial placement and social organization around the tasks of acquisition. Issues of availability, the traditional use of some materials, their mechanical features in relation to function and the need and desire for change are examined through these data. In addition, revealing the stages of manufacture in the creation and reworking of tools at Phillip's Garden provides an understanding of the extent to which various reduction activities are present at the site or imported from elsewhere. This places practices observed at this site in relation to those at other locations. The spatial distribution of tool classes in houses that span the site's occupation has the potential to reveal stability and change in the placement of tasks, and can signal the presence of gender-specific actions.

This theoretical approach acknowledges the most personal and social aspects of technical practice, placing technology within a social fabric where responses, decisions and action are informed by dynamic social structures. These social responses take place within contexts that constrain, but also offer opportunities for creative, mindful approaches. The following section introduces one aspect of this context, the extraordinary site of Phillip's Garden, its location, layout and the history of archaeological research there.

1.3 Phillip's Garden

The Dorset inhabitants of Phillip's Garden have ancestral roots in Siberia, their most ancient predecessors arriving in the New World approximately 4500 years ago (Maxwell 1985). The Dorset emerge as a distinct culture in the eastern Arctic about 2500 years ago, and appear at Phillip's Garden 500 years later. Phillip's Garden is located on the Point Riche Peninsula which extends into the Strait of Belle Isle from northwestern Newfoundland (Figure1.1). The site faces north to the sea and covers an area of over 2 ha, most of it meadow, but some covered by low, dense trees (Figure 1.2). Semi-subterranean house features can be seen as depressions dotting the surface of the meadow at Phillip's Garden. The majority of these have been visually identified, and more have been recorded through a magnetometry survey which located four that had been obscured by subsequent midden deposits (Eastaugh and Taylor 2011; Renouf 2011b). Along with others hidden by trees, Renouf (2011b) proposes a conservative estimate of 68 dwellings on the site. The Dorset occupation of the region was extensive with three identified burial locations (Brown 2011; Harp and Hughes 1968) in addition to a number of residential sites (Figure 1.1). Another important Dorset location in the region is Bass Pond, 500 m to the northeast of Phillip's Garden. The analysis and dating of sedimentary core samples from this pond suggests it was used by Palaeoeskimo groups in seal skin processing (Bambrick 2009; Bell et al. 2005; Renouf and Bell 2008).

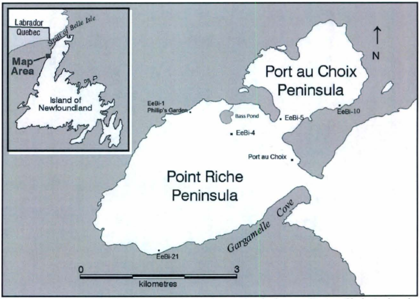


Figure 1.1 Location of Phillip's Garden and other Dorset sites in the area (Port au Choix Archaeology Project image).

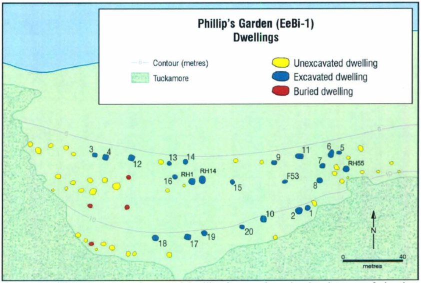


Figure 1.2 Phillip's Garden showing named dwelling features situated on beach terraces facing the ocean (Port au Choix Archaeology Project image).

Radiocarbon dates based on charcoal confirm the occupation of Phillip's Garden spanned 800 years, from 1990 to 1180 BP (Table 1.1) (Renouf 2011b, Renouf and Bell 2009). Renouf and Bell (2009) divide the chronology of the site into three arbitrary phases based on intensity of occupation derived from overlapping calibrated dates among dwelling features. The early phase spans dates from 1990 to 1550 cal BP, the middle from 1550 to 1350 cal BP, and the late phase from 1350 to 1180 cal BP. Dates from house features indicate an initial low population with a dramatic increase through the middle phase, and finally a decline during the late phase leading to abandonment (Figure 1.3) (Renouf 2006). Erwin's (1995, 2011) analysis of architecture and artefacts supports evidence for a population maximum during the middle phase (see also Harp 1976).

Table 1.1 Dates for house and midden features from Phillip's Garden examined in this thesis.

Feature/ House #	1 sigma older	1 sigma younger	Median	C^{14}	±	Lab #
RH 14	1990	1870	1920	1970	60	Beta 23977
F2 mdn	1990	1710	1840	1900	110	Beta 23978
RH1	1920	1630	1780	1850	110	Beta 15379
H2	1710	1570	1650	1736	48	P-692
H10	1690	1560	1620	1712	40	P-695
H18	1690	1530	1590	1683	49	P-736
H18	1680	1530	1590	1680	40	Beta 211266
H2	1690	1450	1560	1659	48	P-693
H2	1610	1420	1540	1640	70	Beta 160975
H6	1600	1420	1530	1632	47	P-679
H18	1570	1420	1520	1630	40	Beta 211267
H10	1570	1420	1520	1630	40	Beta 211260
H17	1520	1420	1470	1610	40	Beta 238476
H10	1540	1420	1480	1602	49	P-694
H2	1530	1420	1480	1600	40	Beta 211272
H2	1530	1420	1480	1593	49	P-683
H4	1520	1410	1470	1580	54	P-727
H18	1520	1410	1460	1570	40	Beta 211268
H2	1510	1390	1450	1550	40	Beta 211270
H12	1520	1370	1440	1538	55	P-729
H2	1480	1340	1390	1510	40	Beta 211271
H11	1510	1340	1400	1509	47	P-696
F73	1400	1330	1370	1480	40	Beta 160976
H17	1400	1330	1370	1480	40	Beta 238481
H17	1400	1310	1360	1465	51	P-734
H17	1370	1310	1340	1450	40	Beta 238479
RH 55	1410	1180	1330	1410	100	Beta 66435
F73 mdn	1350	1180	1280	1360	80	Beta 160977
H20	1300	1180	1250	1321	49	P-737

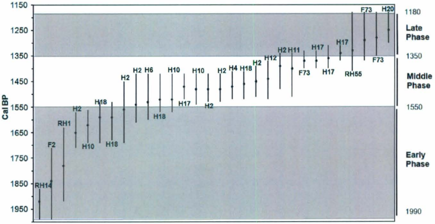


Figure 1.3 Dated dwellings and features examined from Phillip's Garden. The bars represent 1sigma probability range for the calibrated radiocarbon date, and a dot signifies the median probability calendar age.

1.3.1 History of Archaeological Investigations at Phillip's Garden

Phillip's Garden was first recognized for its archaeological riches when William J. Wintemburg of the National Museum of Man tested the site in 1929 (Renouf 2011c, Wintemberg 1939). However, it was the extensive excavations first by Elmer Harp Jr. of Dartmouth College, and later Priscilla Renouf, director of the Port au Choix Archaeology Project, Memorial University that provided the wealth of data that has been gathered from this site. Harp concentrated most of his excavations on larger dwellings, partially excavating 13, and more extensively, seven. His research focused on comparisons of settlement patterns, population size, house architecture and some artefact forms from a number of Dorset sites (Harp 1964, 1969/70, 1976). Renouf's research too, including the excavation of three dwellings, a windbreak and a number of discrete midden features, focused on settlement and subsistence patterns and architecture at the site. In addition, she excavated trenches through two of Harp's middle phase houses and completely re-excavated two more, expanding the area opened and dismantling features to record construction details (Cogswell et al. 2006; Renouf et al. 2005; Renouf 2006, 2007). Renouf's research expanded on Harp's understanding of house architecture in particular, while providing greater and more precise information on subsistence, and the nature of activities on the site and elsewhere in the region (Renouf 1993a, 2006, 2009, 2011a, 2011b; Renouf and Bell 2008; Renouf and Murray 1999; Renouf et al. 2009).

House features have been the focus of most excavations at Phillip's Garden (Harp 1976; Renouf 2006, 2009, 2011b). Harp's description of large houses was based on House 2 which he described as rectangular with beach stones removed from the center and stacked along the walls. At the rear, opposite the entrance, he described a platform of stones, and through the middle of the dwelling, a series of stone-lined pits. The exterior dimensions measured approximately 38.3 m^2 (Harp 1976:133; Renouf 2005:5; Renouf and Murray 1999:121). The small dwelling he excavated, House 5, was an oval, shallow depression with no particularly prominent ring of stones or internal axial feature. Harp believed that the smaller dwellings represented summer houses, and the larger examples were for winter habitation (Harp1976).

Subsequent excavations by Renouf (2006, 2009) expanded on Harp's work by providing greater detail on dwelling construction over the extent of the occupation. She excavated two dwellings dated to the early phase of occupation (Renouf's House 1 and Renouf's House 14), and one to the late phase (Renouf's House 55). Renouf's early phase houses were both oval and surrounded by stones and sand that had been removed from the middle resulting in a central depression. Stones lined both lateral and rear platforms, the latter interpreted as sitting or sleeping platforms. Both features had a pair of stone-lined, bone-filled pits running through the center of the house as part of the axial feature (Renouf 1987, 2003; Renouf and Murray 1999). The interior dimensions of Renouf's House 1 were 42.7 m^2 and the exterior were 64.4m^2. The interior of Renouf's House 14 was 40.4 m^2, and the exterior was 86.3 m^2 (Renouf 1987:6). The late phase dwelling, Renouf's House 55, was circular in shape, outlined by limestone beach cobble and bisected by an axial feature of limestone slabs (Renouf 2003:394). Its interior measured 14 m^2 and the exterior approximately 49 m^2 (Renouf 1993:27). Renouf dismantled this dwelling, exposing a series of post holes that would have accommodated structural supports such as whale ribs or wood (Renouf 1993:30, 2003:394). The discovery of construction features beneath the living floor of Renouf's House 55 encouraged her to revisit some of Harp's middle phase houses to examine their sub-floor features.

Renouf re-examined four of Harp's middle phase dwellings, excavating trenches through houses 2 and 10, and completely excavating houses 17 and 18. In all cases she extended her excavations beyond those areas opened by Harp. Renouf's findings demonstrated that middle phase houses were much larger than Harp had suggested; that their construction was more substantial and included a number of re-building phases over the course of their use-lives (Renouf 2006, 2009, 2011b). She discovered that what Harp had interpreted as walls were in fact platforms which extended 2 - 4 m in width, increasing the overall footprint of dwellings (Renouf 2006:125). The dimensions of House 2 for example, increased from 38.3 m^2 to 94 m^2. Furthermore, Renouf dismantled the central axial features in three houses. In House 2 this axial feature was made up of a stone-paved depression with a large pit at either end. An additional pit was revealed at the southern end of the dwelling in line with the axial feature (Renouf 2005:8). The southern pit and the example at the northern end of the depression were revealed to be large, stone-lined post holes, and the pit between them was thought to function as storage or refuse collection. The central post-holes would have supported load-bearing posts indicative of a dwelling with a peaked roof. Excavation of these post holes revealed that they had been filled in after their initial construction and use, indicating at least one period when the post holes were altered to accommodate new supports. Central post holes or roofing supports were found in houses 10, 17 and 18, and Renouf believes, given the presence of pit depressions in Renouf's houses 1 and 14, that central posts would have existed during the early as well as the middle phase; however this has not been demonstrated (Renouf 2011b:145). Renouf's re-excavations put the footprint for dwellings at Phillip's Garden at 94 m^2 to 103 m^2. Houses of this size are not seen elsewhere in the Dorset range with the exception of Late Dorset long houses.

1.3.2 The Nature of Settlement at Phillip's Garden

The most significant implication of dramatically larger houses at Phillip's Garden is that the number of people occupying these dwellings would have increased. These social units may have represented multiple families practicing a cooperative approach to hunting and processing seals (Renouf 2009, 2011a, 2011b). Furthermore, the interior layout suggests shared occupation of central cooking, eating and storage areas, with the household operating as a single economic unit (Renouf 2011b). Renouf (1994a, 2011b) proposes the hunt necessitated the aggregation of people at Phillip's Garden for its success, and goes on to suggest that this gathering of a large population allowed more intense social activity, reinforcing identity and group cohesion.

Associated with these dwellings is a very rich deposit of material culture including artefacts, animal bone, and a variety of features, further demonstrating the intensity of settlement at Phillip's Garden. For example, the site's artefact assemblage excluding flakes now consists of approximately 36,000 pieces, and faunal specimens which were collected by the Port au Choix Archaeology Project only, number in the many hundreds of thousands. Indeed, the volume of organic deposit over the centuries of occupation in the form of animal and human detritus makes this site stand out as bright green against the otherwise impoverished soils in the region (Figure 1.4).

Figure 1.4 An aerial photograph of Phillip's Garden showing the effects of its rich organic deposit on the relatively barren landscape. (Port au Choix Archaeology Project image).

1.3.3. Harp Seal Ecology and Exploitation at Phillip's Garden

The Phillip's Garden's faunal record demonstrates that the main subsistence activity was centered on the exploitation of migrating harp seals (Harp 1976; Renouf 1991, 2000; Murray 1992; Renouf and Murray 1999; Hodgetts et al. 2003; Hodgetts 2005b). Indeed, seal makes up over 90% of the identifiable fauna in features from the early and middle phases, dropping to just over 70% by the late phase (Hodgetts et al. 2003:111; Hodgetts 2005:66). Harp seals are a migratory species that appeared twice each year around Port au Choix, in the early winter and early spring, bracketing the beginning and end of the long winter season. This resource would have created a temporal frame of reference, constraining approaches to its exploitation and thus strongly influencing economic and social life at Phillip's Garden.

Today harp seal adults and juveniles numbering in the millions migrate south in the autumn just ahead of new Arctic ice formation (Hammill and Stenson 2010). The migration takes them along the coasts of Baffin Island and Labrador; passing through the Strait of Belle Isle and reaching Port au Choix by mid December (Bowen 1989; Sergeant 1991). They travel in open water and are usually somewhat dispersed and not particularly plentiful around Port au Choix (LeBlanc 1996; Renouf 2001b:135). After a winter in the Gulf of St. Lawrence where they give birth, mate and moult, they begin their northward migration, reaching the Port au Choix area around early April (Renouf 2011b). The population in this migration includes those seals that were born during the winter in addition to adults and juveniles. Harp seals in the spring migration are concentrated in open water channels or leads in the ice that remains around Port au Choix. Today local sealers report concentrations of seals in the thousands moving along leads, one of the most productive areas occurring along the coast in front of Phillip's Garden (Renouf 2001b:135). In addition, the underwater topography just off Phillip's Garden is steeply sloped with associated upwelling that attracts a range of species (LeBlanc 1996:32). The migrating harp seal are drawn toward the shore by feeding opportunities as well as ice leads for easy travel (LeBlanc 1996). While both migrations involve harp seal appearances along the coast adjacent to Phillip's Garden, the spring migration brings them in greater concentrations and generally closer to the site (Renouf 2011b).

Despite these differences, there is evidence that harp seals were hunted during both migration periods. Hodgetts (2005a, 2005b) collected measurements on harp seal limb bones that allowed her to determine the age cohort of material from midden samples that spanned the temporal extent of the site. Since harp seals give birth at about the same time each year, a population hunted during the spring would include newborns and 2 to 3 month olds, while a winter hunt would include individuals that had been born the previous spring and were now 11 to 12 months old. Hodgetts refers to work that has generated the range of sizes for limb bones of modern harp seals (Storå 2002), allowing her to demonstrate that her samples included age cohorts representing both winter and spring hunts.

The importance of harp seal and the nature of its ecology in the region is seen as having played a prominent role in shaping aspects of technology and social organization at Phillip's Garden. The abundance of harp seal and the approach to its exploitation led to the site becoming a seasonally re-occupied permanent settlement, not only for the exploitation of rich resources but as a place where large numbers of people gathered to engage in social and ritual activities (Renouf 2011b). Renouf points out that the temporally restricted availability of harp seal despite their great numbers would have required coordinated preparation and execution of the hunt by relatively large numbers of people. She argues that a communal approach to hunting was practiced at the site as a means of increasing efficiency in returns in the event of a short hunting period (Renouf 2011b). The harvest of large numbers of seal is seen in the site's extensive middens and in evidence for seal skin processing in sediment cores from Bass Pond (Renouf and Bell 2008). In addition, the presence of relatively high proportions of slate scraping tools at Phillip's Garden supports the notion that harp seals figured very large in the socio-economic character of the site (Knapp 2008; Renouf 2001b; Renouf and Bell 2008). An examination of the osseous assemblage likewise offers an opportunity to examine this technology in its broader social context.

1.4 The Phillip's Garden Osseous Collection

The Phillip's Garden osseous assemblage consists of 4406 pieces from the full or partial excavation of 24 dwellings, four midden features, and a number of test pits. In this thesis 3253 pieces (73.8% of the total) were selected from 12 dwellings and two discrete midden deposits. The sample was chosen from house and midden features that were radiocarbon dated and yielded greater than 20 osseous tool specimens. Those excavated by Renouf include: Midden Feature 2 (F2mdn) and Midden Feature 73 (F73mdn), Renouf's House 14 (RH14), Renouf's House 55 (RH55), and Renouf's House 1 (RH1). Houses excavated by Harp examined here include; Houses 2, 4, 6, 10, 11, 12, 17, 18 and 20, all abbreviated in figures as H2, H4, H6 and so on.

The sample of features has dates that span the occupation at Phillip's Garden (Figure 1.3). Dates for house features show that most fall within one phase, or occasionally span two. The time scale represented by the dates determines the temporal scale with which it will be possible to discuss trends in tool distribution and frequency. The nature of house construction at the site demonstrates the likelihood of mixed occupation episodes. While many tools from dwelling features are probably associated with the last occupation period, it is likely that tools from earlier occupations are mixed in. As discussed above, house features at Phillip's Garden are substantial in size with well-developed structural features. This indicates a relatively high investment in labour and a commitment to re-occupation (Renouf 2011b). Evidence for re-occupation is seen in renovations to the houses, particularly alterations to central post-holes. Consequently, tool abundance should be seen as signifying tendencies for features within phases, rather than definitively representing single depositional events.

Excluding debitage and unidentifiable tool fragments, 23 recognizable tool types are identified in the assemblage representing technology that encompasses a wide range of activities, social settings and personnel. Table 1.2 presents the numbers and proportions of the tool types examined here. A number of unidentifiable tools are included in this table. They consist of often finished pieces, but are too small to be positively identified. In addition, they may be pieces of unique tools that too fragmented to identify.

Table 1.2 Tool types*, their number and relative proportion in the osseous assemblage.

Name	**#**	**% of Assemblage**	**Name**	**#**	**% of Assemblage**
Adze haft	14	0.5	Needle	89	3.2
Awl	124	4.4	Preform	132	4.7
Barbed point	62	2.2	Pressure flaker	84	3.0
Blank	171	6.1	Polished bead-like piece	74	2.6
Blunt point	52	1.9	Punch	19	0.7
Burin-like tool brace	35	1.2	Representational tool	130	4.6
Core	461	16.4	Refurbishing debris	44	1.6
Foreshaft	32	1.1	Scraper	13	0.5
Harpoon head	92	3.3	Sled shoe	534	19.0
Lance	10	0.4	Wedge	29	1.0
Line fastener	13	0.5	Lance foreshaft- like tool	100	3.6
Metapodial tool	62	2.2	Unidentifiable tools	428	15.2
			***TOTAL**	**2808**	**99.9**

*This table does not include the debitage examined (n=445).

1.4.1 Taphonomic Sources and Assemblage Preservation

While generally well preserved, the osseous assemblage has undergone a number of taphonomic processes which have affected its preservation and recovery (Lyman 1994). The osseous tool assemblage was subject to natural processes including chemical breakdown from exposure to soils, and there is some evidence of rodent gnawing. Similarly, the Dorset would have affected the preservation of these tools. For instance, some tools are broken and show signs of having been burned.

Recovery practices and the archaeological experience of those excavating the assemblage influenced the assemblage and the scale of analysis possible. The relative frequency of some tool types such as harpoon heads may be elevated because they are recognizable even when fragmented compared to more expediently made tools such as awls. While experienced and inexperienced excavators worked on Harp's and Renouf's projects, Harp's recovery practices were not as thorough as Renouf's. Harp did not screen his backdirt which could have resulted in the loss of small osseous tools. Furthermore, he did not collect unmodified faunal material which could have affected the recovery of lightly worked tools such as expedient awls. In addition, the material culture collected by Harp was assigned provenience in 2.5 ft^2 units and he did not recognize stratigraphy differences or discrete deposits such as small internal middens. Consequently a detailed spatial analysis of tool type placement was not included in this study.

Renouf screened all backdirt through 4 mm mesh, and a number of samples were watersifted to recover small remains. In addition, she collected all faunal remains, likely resulting in greater recovery of modified osseous material culture. She excavated material stratigraphically and separated collections from discrete features such as middens and pits.

Some post-excavation alteration to the assemblage has been observed. Most of the tools in the assemblage were excavated by Harp who, in an effort to protect them, applied a coating of shellac. While this does not seem to have adversely affected them, it does make the surface observation of various wear patterns under microscope difficult. In addition, the shiny surface sometimes obscures photographs. Furthermore Harp's collection has suffered some slight damage during shipping and storage since excavation.

While these taphonomic processes affect the relative survival of tools for analysis, this assemblage is considered very well preserved. A number of factors contribute to these unusual preservation conditions. The site is situated on a broad limestone outcrop which helps to neutralize the acid soils common to Newfoundland. Furthermore, the large volume of organic deposit, most of it seal bone remains, would have created localized anaerobic conditions contributing to excellent preservation (Hodgetts et al. 2003:112). Consequently this large osseous assemblage offers a glimpse into an industry that is not often available in the more southern regions of the Dorset range. The following chapter will discuss the methods used in the assemblage's analysis.

1.5 Thesis Organization

At Phillip's Garden a wide range of products were made from osseous materials whose place in daily life spanned a variety of tasks. As a way of organizing the presentation of the collection into chapters, artefacts are discussed in groups based on related tasks. So for instance hunting, hiding working, tool making and tools associated with transportation are discussed in separate chapters. There are tools for which function cannot be established with confidence; these are presented and analyzed together in a chapter of miscellaneous technologies. This arrangement is not entirely satisfying because it implies a distinct separation between tasks that may have been linked, and at the same time links others more closely than they may have been understood. For instance hunting and at least initial hide processing may have been considered closely related tasks, while hide scraping and sewing may have been tasks distinctly separated in time and space and social organization around the tasks. Nevertheless the discussion at the end of the thesis places the events and circumstances of the technologies into a more integrated picture of people in social situations.

Chapter 2 introduces the methods used in the analysis of the collection beginning with an overview of the morphological characteristics of the osseous materials including their mechanical properties and how this can relate to tool function. A presentation of the collection and methods of its analysis will follow. This will comprise a description of the information gathered from the artefacts including their morphology, material, quantity, and spatial and temporal distribution. In addition, methods of determining use and manufacture wear are presented.

Chapters 3 to 9 present the assemblage analysis. Where available, identifiable cores and preforms for each type are described and the methods of reduction presented. Chapter 3 presents an analysis of the tools associated with hunting technology including harpoon heads, their foreshafts, barbed points and daggers. Chapter 4 details the osseous hide working tools including needles, awls, and scrapers. Chapter 5 presents the analysis of sled shoes, the only surviving remnants of sleds at the site. Chapter 6 presents the tools associated with hafting and Chapter 7 introduces the collection of carved representations of animals and objects significant to the Dorset at Phillip's Garden. Chapter 8 examines the debris and tools associated with tool making, and Chapter 9 presents the miscellaneous tools in the assemblage. Chapter 10 pulls the results together with other published data from the site to situate the osseous assemblage within a dynamic social structure. Conclusions in Chapter 11 summarize the research and its contributions.

Chapter 2

Materials and Methods in the Analysis of the Phillip's Garden Osseous Assemblage

> "Studies of material culture can be traditionally understood as oscillating between empirical studies and more theoretical and cultural expressions. The empirical trend is firmly devoted to object analyses- form, materials and manufacture- and does not automatically engage with social relations..... the same object can inhabit both domains, and thus we might do the work of both and interweave between technologies, meanings, practices, and histories" (Meskell 2005:2).

2.1 Introduction

This chapter presents the methods used in the analysis of the Phillip's Garden osseous assemblage. It is preceded by a discussion of osseous material that will introduce the morphological characteristics of the bone, antler and ivory used by the Dorset at this site. The materials will be described with attention to their mechanical properties, which can be relevant to the tool maker's conception of design and function. The methods of analysis will follow, highlighting details of the morphological characteristics recorded, including material type, quantity and distribution both temporally and spatially at the site. A short summary of a program to reproduce manufacture wear on osseous objects made with reproduction Dorset lithic tools will be presented, but the full details are provided in Appendix B. This program informs the interpretation of wear exhibited on the archaeological remains, and will be enhanced by the large body of manufacture and use-wear studies that have been published in recent decades (LeMoine 1994, 1997; Nagy 1990; Semenov 1964).

2.2 The Morphological and Mechanical Properties of Bone, Antler and Ivory

Various osseous materials have evolved characteristics in response to the needs of their animal hosts such as support, locomotion and buoyancy control. As a consequence there is a great deal of variety in the morphology and therefore the mechanics of osseous materials, particularly in characteristics such as strength - the ability to endure stress before beginning to fail; stiffness - the ability to resist being deformed by stress; and resistance to fracture, also referred to as toughness (Currey 2002; Margaris 2006). These characteristics offer opportunities and limitations, thus potentially influencing decisions regarding tool design and function. While issues of availability, traditional knowledge, and the size of the conceived object greatly influence what osseous sources were selected for manufacture in the past, mechanics is an important additional consideration (Scheinsohn and Ferretti 1995; Margaris 2006). For instance the mechanical properties of a tool of unknown function can suggest possible uses. This overview will be based on the limited information available on the morphology and mechanics of osseous materials relevant to the Phillip's Garden assemblage, in particular terrestrial mammal bone, pinniped and cetacean bone, bird bone, ivory and caribou antler.

Bone tissue is a composite material consisting of water and collagen (a fibrous protein) that is made hard by mineral crystals (hydroxyapatite - calcium phosphate minerals) that fill and surround it (Currey 2002:3; Lyman 1994). The combination of mineral components lends strength to bone, and the fibrous portion confers toughness and elasticity. There are two distinct types of bone tissue, compact and cancellous (synonymous with trabecular bone) (Figure 2.1).

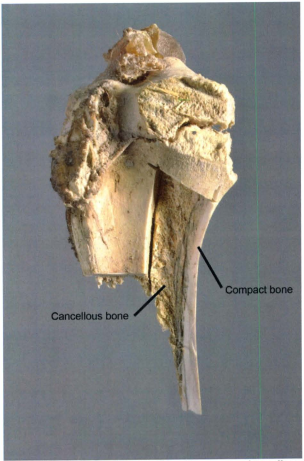


Figure 2.1 Proximal end of a moose tibia with compact and cancellous bone exposed.

There are differing proportions of each kind within individual elements of a species and, more generally, among different species. Compact tissue gives the skeletal element its shape, forming the bone's essentially solid outer portion (Bonnicshen 1979; Currey 2002:21; Johnson 1985; MacGregor 1985). It is made up of structures called osteons which are circular arrangements of layered tissue surrounding canals that house blood vessels (the formation of these structures is referred to as the Haversian system). The layered tissue involves two main types, woven and lamellar. Woven tissue is involved in rapid initial growth and repair and is more randomly arranged compared to lamellar tissue which is arranged in a regular pattern of sheets called lamellae (Lyman 1994:74; Currey 2002).

Mechanically, compact bone is strong, particularly lengthwise along the grain of the bone, having evolved to withstand the loading involved in supporting muscle and locomotion. Furthermore, because of its strength, compact bone is stiff and will resist deformation. Compact bone is denser than cancellous bone which occurs on the interior of bone. Cancellous bone is much more porous and heterogeneous in structure. It is made up of bony plates or struts with numerous empty spaces, resembling a honeycomb pattern. The relative amount of cancellous bone and its distribution is variable for individual bones depending on the bone's particular structure and function. In terrestrial mammals it is concentrated around the articular ends in long bones, while in sea mammals it fills the interior cavity of these elements (Buffrenil and Schoevaert 1988; Currey 2002:208; Pátillon 2008). Relative to compact bone, cancellous bone is not as strong or stiff; however it is tough, meaning that it will bend more easily than compact bone and can absorb energy that would otherwise result in fracture. The bones of different animals have varying proportions of compact and cancellous bone according to evolutionary need.

The limb bones of terrestrial mammals such as ungulates have evolved to bear weight and allow swift movement. This load-bearing capacity makes this type of bone comparatively strong. There is a greater proportion of compact than cancellous bone compared to other animals, and in cervids such as caribou (*Rangifer*), the limb bones have high mineral content and associated stiffness (Biewener and Bartram 1991; Margaris 2006:37). However, with higher mineral content there is an associated relative decrease in toughness (Biewener and Bartram 1991:67). Tests on deer and other artiodactylae support the general character of these varieties of land mammals as possessing limb bones that are strong and stiff, but not particularly resistant to fracture (Currey 2002:130; Margaris 2006; Scheinsohn and Ferretti 1995). Tools made from this kind of material are well designed for jobs that require constant pressure such as awls. In addition, Scheinsohn and Ferretti (1995:714) suggest use as flakers for stone working.

The long bones of birds tend to be thin and hollow, (most are gas-filled); however, gulls and terns of the order Charadriiform have thicker walls with marrow-filled interiors (Margaris 2006:38). Despite their gracile nature these bones are quite strong and tough, having evolved to endure stress coming from numerous directions during flight. Consequently they are well suited for making tiny needles that despite their size are nonetheless capable of the penetrating and twisting involved in sewing hide.

Pinnipeds including seals, walruses and sea lions, and cetaceans including whales, porpoises and dolphins are adapted to aquatic life where there is a need to control buoyancy so that they can, without too much energy expenditure, submerge their bodies (Currey 2002:208; Wall 1983). For many aquatic animals high bone density with its greater overall weight overcomes this; however this is not the case for many cetaceans and pinnipeds (Wall 1983:203). These animals tend to dive to greater depths, and have evolved a physiological response where they expel air during their dive, allowing their lungs to collapse without harm, which is considered better than the mechanism of increased bone density found in other aquatic mammals that do not dive to great depths

(Wall 1983:203). Tests of element strength, stiffness and toughness have been conducted using semi-aquatic pinniped species including California sea lion (*Zalophus californianus*) (Margaris 2006), and South American fur seal (*Arctocephalus australis*) (Scheinsohn and Fettetti 1995). When results are compared to terrestrial mammals these bones are usually tougher than some terrestrial mammals and about as stiff and strong. The pinnipeds tested in these studies are semi-aquatic and have limb elements (used in testing) that are adapted to load-bearing; consequently strength and stiffness are probably elevated compared to species that are fully aquatic.

Tests on cetacean bones are not numerous and there are some contradictions in descriptions of their properties. Some have shown them to be strong and tough, but not particularly stiff, thus while resisting breakage, they are relatively easy to deform. Currey (1988) states that experiments on whale ribs have shown them to lack stiffness, and tests conducted on sperm whale (*Physeter catodon*) by Scheinsohn and Fettetti (1995) demonstrate that elements are relatively strong and tough but not stiff compared to terrestrial mammals. The lack of stiffness is likely due to the lower relative density of these bones. Currey (2002:207) states that there is little or no compact bone, with the elements composed almost entirely of cancellous bone; however others report that there are portions of elements that are made up of almost solid compact bone. Betts (2007:134) states that the proximal ends of bowhead whale ribs are made up almost entirely of compact bone. The contradictions apparent in these works are likely related to a lack of control for the species and elements selected for testing. Nevertheless, all agree that there is a lack of a medullary cavity amongst pinnipeds and cetaceans with cancellous (trabecular) bone filling the limb shafts. This accounts for the bones' ability to absorb the shock of impact, and thereby resist fracture. Consequently pinnipeds' and cetaceans' mechanical features are excellent for the manufacture of tools involved in impact, including barbed points and wedges. Furthermore while the individual trabeculae can crumble somewhat under impact, it is not necessarily a destructive feature as the resulting compressed bone can become very dense and therefore more stiff (Margaris 2006:36). Furthermore, while whale bone is not as strong as terrestrial mammal, it is available in large uniform pieces, convenient for the manufacture of larger objects such as sled shoes.

Antler is an outgrowth of bone that is restricted to the Cervidae family, and with the exception of caribou, is unique to males. Each year antler grows from the ends of small permanent protuberances of the frontal bones called pedicles (MacGregor 1985). During growth, the antler is covered by velvet, a hairy skin rich in blood vessels that protects and feeds it. Gradually blood flow originating from the pedicle wanes and then ceases as the base gradually ossifies; and the velvet is shed. At this point the antler is dead and the cycle is complete. The outer tissue is compact and encloses a trabecular interior that is consistent throughout the core of the antler. Like bone, antler cortex is made up of Haversian system structures, but these are not as well organized, being more porous and having a greater proportion of woven compared to lamellar bone. This structure allows for more rapid growth (Goss 1983; MacGregor 1985). Caribou antler is made up of named parts which will be referred to in this thesis (Figure 2.2).

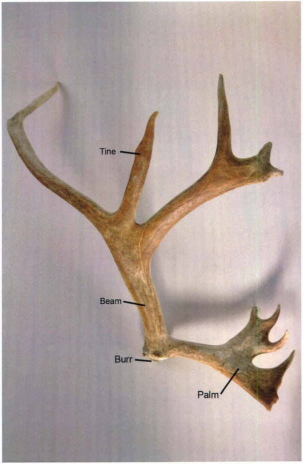


Figure 2.2 Caribou antler with part names.

Antler is generally weaker than bone as a consequence of its low mineral content; nevertheless it is very tough. (Biewener and Bartram 1991:68). The rough surface and interior trabecular material contributes to its ability to absorb the shock of sudden impact. This is consistent with its main function, which is in combat when competing males smash their antlers, fence with them, and push one another during the rutting season

(Currey 2002:124). Good fracture resistance makes antler an excellent choice for the manufacture of tools that require the absorption of impact such as harpoon heads, barbed points, pressure flakers and punches (Blaylock 1980, Nagy 1990). Antler has also been recognized as an important material for making wedges during the Early Aurignacian in Europe (Knecht 1993).

Ivory is composed of dentine, a material like bone in that it is comprised of collagen fibres intermixed with apatite crystals, and found in all mammalian teeth (Krzyszkowska 1990; Lemoine and Darwent 1998; Lyman 1994; MacGregor 1985). It is, upon eruption, capped by enamel which is almost entirely inorganic making it very strong. Below the gum line a modified bone material called cement attaches to the dentine and holds the tooth in the jaw (Currey 2002:177). In some species dentine is over-developed resulting in structures called tusks (Johnson 1985; Lemoine and Darwent 1998; MacGregor 1985). In walrus tusks a thin outer coat of cement overlies two layers of dentine: a thick outer coating that is homogenous in structure, and an internal cavity made up of a secondary deposit of structurally irregular, marbled dentine that is translucent in appearance (Lemoine and Darwent 1998; MacGregor 1985). Narwhal tusk is likewise layered, but the orientation of these are different, creating a twisted appearance. Very little information is available on the specific mechanics of ivory, particularly for walrus and narwhal, but its high mineral content indicates inherent strength and stiffness; however it seems unlikely this material is tough (Margaris 2006:34). This mechanical characteristic suggests use in tools that can endure compression or the constant application of pressure such as awls.

The above review detailed the morphology of osseous materials, focusing on the variety exhibited and the importance of function in the form of the materials. The overall shape and size of materials in their natural state offered opportunities but also limitations on what could be made. Furthermore, while a great number of other factors influenced material use, including availability and tradition, mechanics is a demonstrated aspect of the tool maker's conception of an object. This review will lend significance to the description of the Phillip's Garden osseous collection as a means of understanding the kinds of work that may have been done with some of the tools, and the importance of acquiring particular materials for manufacture.

2.3 Approaches to Osseous Tool Analysis

The analytical study of osseous tool technology has concentrated on two major research objectives: to understand how tools functioned through an examination of their use-wear, and to outline the sequence of reduction operations in the manufacture of tools (Betts 2007; Campana 1989; David 2003, 2007; David and Johnson 1996; Emery 2001; Frison and Craig 1982; Henshilwood et al. 2001, LeMoine and Darwent 1998; Morrison 1986; Nagy 1990; Will 2002). The objectives are related in that they are concerned with understanding the practices of making and using osseous tools, and both approaches are applied to a limited extent in the present work. The following is a brief overview of the chaîne opératoire approach and the study of use and manufacture wear in the analysis of osseous material culture.

2.3.1 The Chaîne Opératoire Approach to the Analysis of Material Culture.

The chaîne opératoire is defined as an approach that seeks to reconstruct the organization of the technological system, and involves the recognition of a succession of mental operations and technical gestures that are enacted in order to satisfy a conceived notion of the outcome (Cresswell 1990:46; Edmonds 1990; Lemonnier 1990, 1992; Pelegrin 1990; Schlanger 1990, 1994; Sellet 1993:106). The succession of operations begins with the acquisition of raw material and ends in the final abandonment of the object. The decisions made throughout are reflections of the technical traditions of various social groups.

In studies of osseous industries, the chaîne opératoire is used to define the physical acts that were performed in the practices of reducing raw materials into tools. Actions such as chopping, sawing, grooving, whittling, abrading and drilling are described by many researchers, along with discussions of the characteristic residual damage caused by a variety of tools used in the production of blanks, cores and finished tools (Betts 2007; Campana 1989; David 2003, 2007; David and Johnson 1996; Emery 2001; Frison and Craig 1982; Henshilwood et al. 2001, LeMoine and Darwent 1998; Morrison 1986; Nagy 1990; Will 2002). A number of studies employing the analytical techniques of the chaîne opératoire have been conducted in northern regions.

Nagy (1990) describes the sequence of antler reduction from the Mackenzie Inuit site of Trail River in the northern Yukon. She determines that all stages of manufacture are represented and that the site functioned as an important location for preparing tool kits for future caribou hunting.

Morrison (1986) conducted a comparative study of bone and antler industries from Inuit and Kutchin (Dene group) contexts in the Mackenzie Delta region. While both groups employed some common techniques in bone reduction, Morrison suggests these reflect the nature of the raw material. However, he notes a number of differences. Cutting techniques were generally similar, but the sequence of action in creating blanks was different. He provides a thorough description of these differences and concludes that they suggest long term boundary maintenance between the Dene and the Inuit in northwestern North America (Morrison 1986:122).

LeMoine and Darwent (1998) describe five reduction stages for walrus tusks from Late Dorset sites on Little Cornwallis Island. The sequence begins with tusk extraction and involves breaking open the skull, first from above where the sagittal area is split downward. The alveolus holding the tusk is cut by incising grooves or chopping across and down both sides to free the tusk (Lemoine and Darwent 1998:76). Once separated from the skull the ivory and enamel are removed from around the base of the pulp cavity using percussion, which results in the production of ivory flake debitage. Blanks are then selected from portions of the tusk depending on the desired tool, usually by reducing portions of the tusk into rectangular pieces by cutting and snapping techniques that are sometimes aided by the use of wedges. Chopping is typically used to make transverse cuts across the tusk, after which it is broken. A variety of tools can then be made from these rectangular or sub-rectangular pieces including sled shoes, harpoon heads and foreshafts (ibid: 79). The tools are finished using carving techniques. Lemoine and Darwent`s (1998) research demonstrates that the central portion of the tusk was specifically selected for the manufacture of tools such as sled shoes and knives.

Betts (2007) describes a reduction sequence for the production of a whale bone tool assemblage from a Mackenzie Inuit context in McKinley Bay, Nunavut. Bowhead whale ribs were selected for tool making, although there is evidence that the mandible was also occasionally used. He divides the preparation of bone for tool making into two stages, primary and secondary reduction; the first stage refers to practices of extracting elements from the animal source for blank preparation, and the second involves shaping and adding design features to finish the tool. The sequence began with initial butchering of the whale and involved the removal of the articular end of the ribs. Betts notes chop marks around the ribs to expose the interior trabeculated area at which point the ribs were snapped. The ribs were cut into three large units, the proximal, central and distal ends. Various parts of the ribs were selected for specific tools (ibid. 136). The central part was isolated for reduction into tools such as sled shoes as this portion is smooth and straight. The proximal portion of the rib was made up of very dense compact bone and was used for smaller tools such as harpoon heads and picks. The distal rib section was not particularly strong but was used for the production of mattocks. The central rib sections were further reduced longitudinally to extract the harder compact bone from the underlying trabecular bone. He suggests wedges were used to accomplish this work as he finds no signs of the removal technique on the blanks. Evidence for secondary reduction at the site included bone shavings from whittling, and a number of preforms displaying polish and drilling.

Betts (2007:137) describes the reduction of bowhead whale bone at the site as an activity associated with seasonal preparations for hunting, noting a focus on the production, maintenance and refurbishing of sea mammal hunting gear and sled shoes.

Furthermore, he examines evidence for the possible trade in whale bone, suggesting it was an important commodity in the broader region.

2.3.2 Use-wear Studies in the Analysis of Osseous Material

Use-wear studies involve the identification of microscopic traces of manufacture and use on osseous material through replicative experiments (LeMoine 1997). Like the chaîne opératoire, use-wear studies of osseous materials have borrowed many of their analytical techniques from studies of lithic technology (Campana 1989; LeMoine 1997; Pawlik 1994; Schiber 2001). As in lithic analysis, this method involves the replication of tools and their use in a number of ways with a variety of materials. From this a comparative collection of tools is generated with known wear patterns that can then be compared to archaeological material. The observation of these patterns is recorded under three general levels of magnification. Low- power magnification allows for the observation of use-wear at 5X-50X magnification. Tringham et al. (1974:175) advocate this method in lithic use-wear focusing on the morphology of micro-chipping to identify wear. High power magnification of between 100X and 400X is said to be more successful and allows for the identification of signature polishes and striations (LeMoine 1997:4). Scanning electron microscopy (SEM) is sometimes used with greater magnifications. LeMoine (1997) uses SEM with magnification of just 125X, but this method is better than high power light magnification because there is greater resolution and depth of field with SEM.

Discovering the function of tools, particularly those that are expediently made, or whose morphology does not lend itself to easy functional identification is the most common research aim for the employment of a use-wear methodology (Campana 1989; Henshilwood et al. 2001; LeMoine 1994, 1997; Semenov 1964; Villa et al. 2001). Use-wear analysis incorporates some of the methods discussed above, particularly the use of experimentation. The results of use-wear studies generate repeatable results. In addition, the examination of edge and surface damage can be very precisely defined with the use of magnification.

LeMoine (1994, 1997) conducts a detailed use-wear study of bone tool technology from the late prehistoric period Mackenzie Delta Inuit. She focuses on a large collection of over 600 tools from the Gupuk site and compares this to other sites from the same region in order to reconstruct the prehistoric design system and describe the spatial and temporal aspects of Mackenzie Inuit bone technology. Her research focuses on understanding the function of finished tools. She conducts experiments where she performs a series of carefully recorded actions on osseous material using modern and reproduced Inuit tools to develop a catalogue of wear. The results are described with the aid of high-power scanning electron microscopy and compared to a collection of archaeological tools for which there is well documented functional information. In 90-100% of cases the wear patterns was similar to the similarly worked experimental specimens.

LeMoine's (1997) replication of tools and examination of archaeological material allow her to characterize a design system with four general patterns of working: simple grooving, grooving, scraping and drilling. The results of this analysis demonstrate that Mackenzie Inuit design systems remained constant over a period of at least 500 years, followed by rapid change in the historic period (LeMoine 1997:93).

Alternatively Campana (1989) employs a mainly low-power magnification approach in the use-wear analysis of Natufian and Protoneolithic bone tools in the Zagros and Levant regions. This research was primarily concerned with methods of identifying the wear traces, in particular, whether methods and techniques could allow the observation, comparison, and functional interpretation of use-wear and manufacture traces on bone objects and, given the above, whether the manufacture traces and use-wear on bone implements may be used to assess, characterize, and compare specific archaeological assemblages.

Campana fashioned a number of bone tools using reproductions of ancient lithics to create comparative data on the surface shape and fine-scale marks left in bone tool manufacture. Like many others he uses fresh, dry, heated and soaked bone material and observes their characteristic properties. He made 30 bone points initially using the groove-and-splinter technique to produce blanks, followed by shaving which left distinct wavy edges on the bone. Examination under a stereoscopic microscope showed distinct patterns that were compared to the archaeological assemblages.

The great contribution of use-wear studies is their potential to identify the source of damage on the surface of tools. The results of use-wear studies published in recent years provide a valuable comparative data set which others can access in the analysis of their own materials.

2.4 Analysis of the Phillip's Garden Osseous Assemblage

The Phillip's Garden osseous tool assemblage is classified according to commonly used names for artefacts in other Palaeoeskimo collections which are based on morphological traits, particularly shape, and by function which has been inferred largely from ethnographic analogy. While making the assumption of function on this basis can be a problematic issue with typologies in general, it is essential to put a collection into recognizable and manageable order for analysis (Tomášková 2005). Part of the reason for retaining commonly used names is to allow easy comparison with other Palaeoeskimo collections. Furthermore it seems rather a waste of effort to quibble about using terms such as needle and harpoon head for instance when these functional titles are widely held to be accurate. Nevertheless, there are a number of unique forms in the Phillip's Garden collection that are given names based on their distinct morphological features. Furthermore, some tool types are broken down into sub-types and treated separately in the analysis. For instance this collection has a number of harpoon head sub-types, and carved representations of objects will be broken into the subjects (bear, seal or walrus for example).

2.4.1 Assemblage Description

An illustrated, quantitative and qualitative morphological description of the tool forms is presented for each type in this thesis. Rather than concentrating solely on the presentation of standard forms for each, variations are presented to provide the scope of morphological characteristics for each form. The shape and size of tools is recorded, including where possible, the average length, width and thickness, as well as the median and standard deviation of each tool type. In addition, these measurements of each type will be presented in box and whisker diagrams to show the range, the median, and midspread or central half of measurements (Drennan 1996). This will allow an assessment of the degree to which outliers may be influencing the overall impression of tool size. Occasionally size ranges in some forms may be assessed graphically to determine if a distribution in size is continuous or represents discrete clusters. It should be noted that the measurements of complete tools may not reflect their original dimensions. Through use and breakage followed by resharpening and reshaping into useable implements, many complete tools may not be as large as they were originally. The shape and position of design features such as line holes, notches, bevels and decoration are described and quantified. Written descriptions will be accompanied by numerous photographs, including photographs taken under magnification to illustrate microscopic details.

2.4.2 Descriptive Terminology

Descriptions of tool forms in this thesis use a number of terms relating to their orientation that need to be made explicit. When the function of the tool is known, and therefore its orientation is understood, the distal end denotes the end of the tool that is farthest away from the person holding it, while the proximal end, or base, is the closest. The area between the ends is called the body or shaft, and has dorsal, ventral and lateral surfaces (Figure 2.3). The dorsal and ventral surfaces denote the upper and lower surfaces respectively, and the lateral surfaces are adjacent to these. When the lateral surface is thin it will often be referred to as the edge or margin. A few forms such as sled shoes are not actually held during use. Their orientation is described using the terms anterior for the front end of the sled shoe and posterior for the rear (Figure 2.4). When the tool function, and consequently its orientation is unknown, the long and narrow sides will be used to distinguish surfaces.

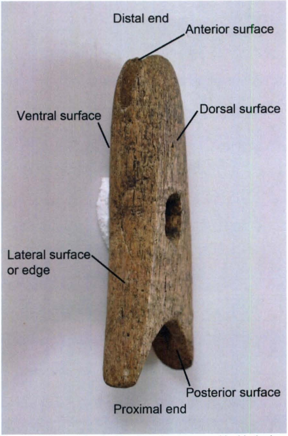


Figure 2.3 Harpoon head with orientation terms used in this thesis.

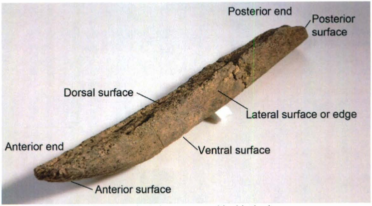


Figure 2.4 Sled shoe showing orientation terms used in this thesis.

2.4.3 Assemblage Quantification

Quantifying the frequency of individual tool types begins at the most basic level in a manner common in zooarchaeology, with a tally of each specimen of a complete or incomplete tool (Lyman 1994:100; Reitz and Wing 1999:10). A major problem with using a simple tally of pieces as an indication of the frequency of forms is that fragmentation can lead to counting the same tool twice or more (Ringrose 1993). However, the presentation of the number of pieces is important as it represents the raw, un-manipulated data with which others can work. One method to overcome the problem of fragmentation is to count the most frequently occurring recognizable portion such as a point, or the eye of a needle, thus providing a minimum number for the tool form. However this can result in a very conservative estimate when diagnostic areas are few, or can over-estimate poorly represented tool forms (Grayson 1978:55). For this reason, the discussion and distribution of all tool forms is based largely on the number of whole and fragmented specimens. Nevertheless, when sample sizes permit, the minimum number of each tool type will be presented as an additional level of information to assess observed patterns. The minimum number of individual tools (MNIT) will not be given to highly fragmented pieces such as blanks and cores which retain few diagnostic zones such as complete and identifiable ends. In many cases tools are defined by working portions or are very distinct such as carvings of walrus, and so the number of specimens is the same as the MNIT.

Results of quantification are presented graphically in histograms for each house and midden feature arranged from oldest to youngest, thus allowing a quick visual impression of the frequency of tools in features over time. As is standard practice in archaeology these histograms displaying differences in the numbers of tools of each type in features are supplemented by a chi square test (Drennan 1996). This statistical test determines the theoretical likelihood that the observed differences are real and not accidental reflections of their frequencies.

Since the total assemblage of tools from features varies in size based on factors such as feature size and the extent of their excavation, comparisons of the frequency of tool types in features will be presented as a proportion (%) of the total osseous assemblage for each feature. Again these proportions data will be presented in histograms for features and their total assemblage size arranged from oldest to youngest.

2.4.4 Raw Material Identification

Each specimen will be examined to identify the type of osseous raw material. The first level of identification involves distinguishing bone, antler and ivory. Where possible, a more precise classification of the sources will be offered. For instance it may be possible to classify bone as whale, but more often only broad taxonomic terms such as bird, terrestrial mammal or sea mammal are achievable.

Distinguishing bone, antler and ivory is usually straightforward with fresh or even dry examples. However, taphonomic processes (Lyman 1994; Vercoutère et al. 2007) and manufacture, including cutting, grinding and polishing into sometimes very small tools, can make the identification of artefact examples more difficult. Ivory is characterized by a layered appearance, but some bone tools exhibit a flaking of the surface compact bone which can give the appearance of ivory. Furthermore, both the compact and cancellous portions of antler are rather more porous than terrestrial mammal long bones commonly used for making tools, and are quite simple to distinguish. However, antler can closely resemble the porous sea mammal bone used to make many of the tools at Phillip's Garden; this is a relatively common problem in the collection. Finally, many of the distinguishing characteristics of osseous materials are best seen in transverse and longitudinal section which is usually impossible when examining unbroken and often well-polished tools (Krzyszkowska 1990:5).

2.4.5 Manufacture and Use-wear Identification and Terminology

While this thesis is not specifically focused solely on the manufacture and use-wear on the artefacts, it is part of the overall description. Tools will be examined for wear under a Nikon SMZ1000 stereomicroscope with the capacity to magnify from 8-80 times, and photographs will further aid the descriptions. Low-powered magnification allows a quick and inexpensive means to view possible use and manufacture wear in a large sample of tools. The identification will be based on limited experimental work conducted in this thesis and the published literature available which provides excellent comparative information (Semenov 1964; Olsen 1979; Campana 1989; LeMoine 1994, 1997; Griffitts and Bonsall 2001; Buc and Loponte 2007; Gates St. Pierre 2007; van Gijn 2005, 2007; Legrand and Sidéra 2007; Christidou 2008). These works provide a catalogue of written and illustrated descriptions of manufacture and use-wear on osseous tools based on a widening variety of experiments that can be accessed by others.

A number of common terms are used to describe action and residual wear by researchers in this field (Clark and Thompson 1953; David 2007; LeMoine 1994, 1997; Morrison 1986; Nagy 1990). The present work uses most of these terms to maintain consistency and is largely adapted from Nagy (1990). Abrading is the reduction of the surface material using a grinding implement such as a sandstone abrader. Abrasion used in the manufacture of tools results in striations, a series of thin, parallel lines. Chopping is a percussive action where a relatively heavy tool cuts into the raw material resulting in a series of notches in the chopped surface. Cutting is produced with sharp tools which are pushed and or pulled over the surface leaving incisions in the form of small channels. Grooves are generally larger, deeper versions of incisions. Incising and grooving are two actions that are performed during the cutting of raw material. In the Dorset context grooving is associated with burin-like tools and involves downward pressure coupled with pulling or pushing. Debris is removed leaving a flat-bottomed channel or groove. Sometimes when grooves are concentrated in a small area and penetration is particularly deep the action will be referred to as gouging. Likewise, incising penetrates the surface with downward pressure but results in v-shaped incisions. A common technique described for cutting involves the penetration of most or all of the compact bone and antler, and simply breaking the remaining thin skim of compact bone, and where present, the cancellous bone. This is referred to as the groove and splinter or cut and snap technique (Betts 2007; Clark and Thompson 1953; Morrison 1986). Scraping is an action for reducing and shaping the surface of raw material by pulling and pushing a scraping tool over the surface while applying pressure. The resulting debris is often dust-like pieces of material. Finally, polishing is an action which adds lustre to the surface of osseous tools, achieved through abrasion with a very fine stone and often soft materials such as hide.

2.4.6 Osseous Tool Reproduction

Conducting independent, highly detailed manufacture and wear experiments is beyond the scope of this research project; nonetheless some manufacture experiments coupled with the use of low-powered magnification contributes to an understanding of the human actions associated with Dorset osseous tool making at Phillip's Garden. Appendix B presents a series of experiments involving the manufacture of four osseous tools like those from Phillip's Garden using exact replicas of Dorset lithic tools. The tools include a bird bone needle, an antler harpoon head, a whale bone foreshaft-like tool and a bone barbed point. A variety of replica Dorset tools were used to perform the many tasks of reducing the raw materials into finished tools including microblades, retouched flakes, scrapers and burin-like tools. The relative efficiency of different lithic tools was assessed and the resulting wear was compared microscopically to some of the archaeological samples. In addition, an estimate of the time it took to manufacture tools offered some insights into the work required by the Dorset tool maker. The experiments were performed by Tim Rast, an archaeologist and professional reproduction tool maker who is familiar with manufacturing both lithic and osseous Dorset artefacts (http://elfshotgallery.blogspot.com/).

2.5 Summary

Osseous materials have heterogeneous structures with particular characteristics that make them excellent for manufacturing tools. They are soft enough to work into complex shapes with holes and sockets and easy to carve into realistic representations of things. The mechanics of osseous materials show variety in strength, stiffness and the ability to withstand impact (toughness). Along with availability, these characteristics would have influenced decisions regarding the planned function of tools. For the first time the osseous assemblage from Phillip`s Garden will be described in detail. The variety of tools present, their size and shape will be described, and their spatial and temporal distribution will be presented to assess change and endurance at the site. The description will include a presentation of the materials selected for the manufacture of tools. The cores, blanks and preforms for tool types will be examined to determine the sequence of their reduction (chaîne opératoire), and a microscopic assessment will offer insights into the ways in which the material was worked. These results are informed by experimental work to reproduce some Dorset osseous tools. The ultimate goal of the methodology laid out in this chapter is to answer research questions that focus on the social practices surrounding the osseous industry at Phillip`s Garden. The following seven chapters present the results of putting this methodology into practice.

Chapter 3

Osseous Hunting Technology at Phillip's Garden

"The harpoon head emerges as a kind of grammatical
operator in the conversation between hunter and prey, an obligatory
passage point" Whitridge (2004b:464).

3.1 Introduction

At Phillip's Garden, bone, antler and ivory hunting implements are represented by harpoon heads, their foreshafts, barbed points, and a small number of bone lances. These tools demonstrate the importance of coastal hunting practises which is further supported by site location and the faunal remains (Murray 1992; Renouf 1993a; Hodgetts et al. 2003). The barbed points, harpoon heads and foreshafts are parts of composite tools used to capture marine animals. While some aspects of tool morphology are different from that of modern Arctic coastal hunters, the general technology is remarkably similar. Therefore, ethnographic literature can suggest details of their use and offer insights into how hunters would have organized themselves to hunt their chosen prey. This chapter provides a detailed description of the Phillip's Garden hunting tools, the materials used in their manufacture and their relative frequency throughout the site and over time. The recovery of some harpoon head preforms allows a more detailed description of the manufacturing techniques employed.

3.2 Analogous Hunting Technology

Ethnographies offer insights into how barbed points of very similar design to those from Phillip's Garden are hafted as part of composite tools, and in what fashion they are used. Nelson (1899) describes how barbed points are hafted to shafts for seal hunting spears among the coastal hunters of Bering Strait. Points are most commonly attached to ivory or bone foreshafts which are tightly bound to wooden shafts. The barbed points have holes through which lines run to the spear shaft. After the seal is struck, the barbed point becomes detached from the foreshaft but remains connected by way of the line to the shaft. The shaft usually turns sideways and acts as a drag in the water thus slowing the seal. Spears for larger animals are assembled in a similar way, but have longer, more substantial lines and dragging implements, either inflated seal skins or wooden float boards (Nelson 1899:137). Balikci (1970:28) describes similar barbed points used by the Netsilik of the central Canadian Arctic as fishing harpoons, again hafted to bone foreshafts and then wooden shafts (see also Birket-Smith 1945:71). The point detaches and is retrieved by simply pulling in an attached line. In this case the barbed points are used to harpoon trout swimming near the shore in shallow water.

Harpoon heads are part of a composite harpoon, a tool well-designed for hunting sea mammals (Maxwell 1985; Park and Stenton 1998). The harpoon head is attached at its proximal end to a foreshaft which in turn is fastened to the long handle or shaft of the harpoon. At its distal end a harpoon head may be self-pointed or accommodate a stone endblade. When a harpoon is thrust into an animal the endblade or point of the harpoon head pierces the flesh and the entire harpoon head is driven into the wound. Flared barbs at the proximal end of the harpoon head help keep the tool embedded. In addition, a line attached in the center of the harpoon head is pulled causing the harpoon head to toggle in the wound, thus preventing it from being pulled out. In this way it is possible to hold fast to the sea mammal and eventually capture and kill it.

3.3 Phillip's Garden Barbed Points

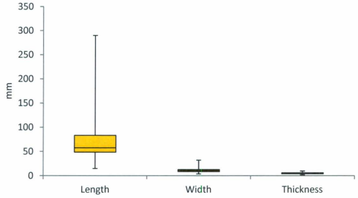
Barbed points are pointed tools with a series of barbs running down one or both lateral edges (Figure 3.1). There are 65 barbed points in the Phillip's Garden assemblage of which 62 were selected from dated features for examination in the thesis (MNIT of 21 based on distal ends). However, no barbed point preforms were identified. The examples display some variation in both size and form. The measurements presented are those for which the information is available. For instance, length measurements will be presented from tools which are unbroken transversely. Table 3.1 shows the average length, width and thickness measurements as well as the median and standard deviation and Figure 3.2 illustrates the size variation. While there are some outliers, most of the lengths and widths cluster and the thickness show little variation.

Figure 3.1 Barbed points from Phillip's Garden showing size and design variation. The top row shows some of the slender examples and the bottom row some more robust specimens. The example on the bottom right has barbs on one side only.

Table 3.1 Length, width and thickness variation in barbed points from Phillip's Garden.

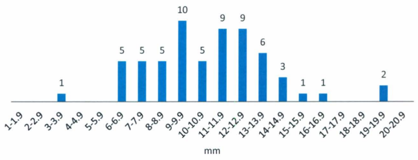
	Length mm	Width mm	Thickness mm
Average	94.6	10.8	5
Median	81.7	10.8	4.7
Standard Deviation	62.1	3.1	1.5

Figure 3.2 Variation in length, width and thickness for barbed points.



These tools show greatest variation in length; nevertheless most measurements are clustered. The overall form of barbed points includes examples that are more slender than others, possibly reflecting differences in the intended targets. To see if the barbed points separated into size groups or if the variation is continuous the frequency of width measurements is presented in Figure 3.3. There were too few complete examples to graph length measurements. There are a range of widths, but they are generally continuous and do not separate into size clusters.

Figure 3.3 Range in width measurements for Phillip's Garden barbed points.



The range in sizes suggests that the barbed points were intended for hunting animals of different sizes. As harp seals are the most frequently represented species here and barbed points from ethnographies demonstrate their use in sealing, it is likely that some functioned specifically in seal hunting (Losey and Yang 2007). Alternatively, or in conjunction with this, is the possibility that they were used in fishing. Maxwell suggests they were fishing spears for Arctic char (*Salvelinus alpines*), but notes they may not have been efficient for the job. He states, "Spearing fish with this implement, probably thrown rather than thrusted, would require extreme accuracy, not only to stab the fish, but also to avoid breaking the fragile tip on rocks (Maxwell 1985:141)." All of the very few fish species represented in the collection at Phillip's Garden are those that inhabit the zone near the ocean bottom (Murray 1992:58). These include cunner (*Tautogolabrus adspersus*), Atlantic cod (*Gadus morhua*), and species from the flounder family (Pleuronectidae) such as halibut (*Hippoglossus hippoglossus*) and smooth flounder (Liopsetta putnami). The cunner and smooth flounder could have been captured with barbed points as they inhabit shallow waters near shore, and there are periods when it may have been possible to take cod. Cod inhabit the area just above the sea floor, staying offshore throughout the winter to avoid the extreme cold, and moving inshore and to shallow shoals in spring and summer (Templeman 1966). Despite their availability during the warmer seasons, they are generally under at least 5 m of water and would be impossible to spear under normal conditions. It is only during the annual early summer spawning season of the caplin (*Mallotus villosus*) that cod will come very close to both the shore and surface. They feed on these small smelt-like fish when they congregate in huge numbers to spawn along the beaches around Newfoundland and elsewhere. Local people in Port au Choix have always collected caplin using nets, and often tossed hooks into the masses of tiny fish to capture cod found feeding in the schools. One fisherman who was shown our barbed points suggested that they would work very well to spear cod during this period.

Of the specimens where it could be recorded, most barbed points have barbs on both lateral edges of the tool (91%, n=41) as opposed to on one (9%, n=4). On barbed points with barbs on both lateral edges, these occur alternately down the length of the implement, but there is no pattern in their numbers. As some of the few complete tools have only two or three barbs, it is likely that when a point was broken it was repaired for reuse by grinding the distal break to a point.

In the Phillip's Garden collection barbed points have proximal ends with line holes, and are either tapered to a flattened point or have an open socket offering clues to how they would have been hafted (Figure 3.4). These ends indicate two methods of hafting. The open socket variety of barbed point was placed against the foreshaft or shaft and bound with material such as sinew. The tapered barbed points fit into a socketed shaft or foreshaft. Line holes in the proximal ends of the barbed points allowed retrieval of prey once it was captured. Unfortunately no traces of any kind of shaft have been recovered at Phillip's Garden, suggesting they may have been made of wood as in the ethnographic descriptions above, and did not preserve. Furthermore the foreshafts found in the collection do not have sockets into which the tapered barbed points would have fit (see foreshafts this chapter).

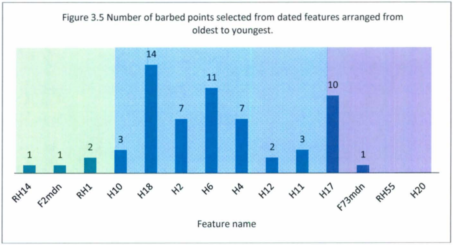
Figure 3.4 Barbed Points. Top row shows examples with open sockets at the base, and the bottom row shows tapered bases.

Most of the barbed points are made of bone and antler with just a few examples of ivory and some which were either bone or antler (Table 3.2).

Table 3.2 Number and percentage of materials used in the manufacture of barbed points.

Material	Bone	Antler	Bone/Antler	Ivory	Total
Number	37	18	5	2	62
%	59.7	29.0	8.1	3.2	100.0

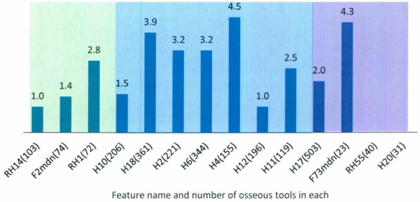
Figure 3.5 shows the distribution of barbed points throughout the site over time. It is clear they are present during all phases of the occupation. Some of the house features including houses 18, 6, and 17 appear to have a relatively high frequency compared to the others. To overcome the problem of counting individual tools numerous times as a result of fragmentation, the minimum number of barbed points was calculated to compare their frequency. In this case the distal ends were the most frequent part, and House 17 and 18 have greater numbers compared to other features (Figure 3.6).



Chi square = 40.800, p < 0.0001

To account for the differences in the total osseous assemblage sizes for each feature, the frequency of barbed points is expressed as a percentage of the total osseous assemblage. When this is presented (Figure 3.6) the frequency shows that House 18 and House 4 from the middle phase have the greatest proportion. Midden feature 73 also has a high proportion, but this may be due to the small sample size of this assemblage.

Figure 3.6 Percentage (%) of barbed points in the osseous assembage from selected features at Phillip's Garden arranged from oldest to youngest.



These results demonstrate that while barbed points do not make up a large portion of the osseous assemblage in any of the features, their distribution shows that the activities associated with their use are widespread in houses and middens and span the temporal occupation of the site. Nevertheless, they are not evenly distributed.

3.4 Phillip's Garden Harpoon Heads

Harpoon heads at Phillip's Garden are generally long and narrow with slightly wider proximal ends giving them a generally triangular shape. They have a proximal socket, proximal barbs, at least one line hole and a distal end with a socket to hold a chipped stone endblade, or less commonly, a carved point for piercing prey. There are 120 harpoon heads in the Phillip's Garden assemblage of which 92 were selected from dated features for examination in this thesis. Five forms are represented; Kingait closed (MNIT of 44 based on proximal end), Dorset parallel, self-pointed Dorset parallel, self-pointed barbed (MNIT of 8 based on distal end) and self-pointed non-barbed (Table 3.3).

Table 3.3 Number and percent total of harpoon head types from selected features at Phillip's Garden.

Harpoon head forms	Number	% of Total
Kingait closed	60	65.2
Dorset parallel	2	2.2
Dorset parallel self-pointed	1	1.1
Self-pointed barbed	12	13.0
Self-pointed non-barbed	3	3.3
Unknown	14	15.2
Total	92	100.0

3.4.1 Kingait Closed Harpoon Head Form

The Kingait closed form is rectangular to triangular in shape with a rounded distal end and a wider proximal end with flared barbs (Park and Stenton 1998:33) (Figure 3.7). The distal end of the tool holds a stone endblade in a socket carved transversely into the anterior surface (Figure 3.8a). At the proximal end, a foreshaft is held in a rectangular socket carved out of the posterior surface (Figure 3.8b).

Figure 3.7 Phillip's Garden Kingait closed harpoon heads showing some of the slight variation in size. A small piece of foreshaft remains in the example fourth from the left.

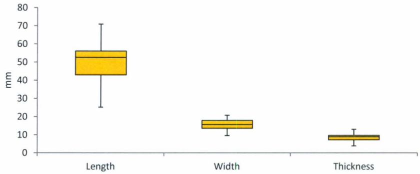
Figure 3.8 Kingait closed harpoon head showing (a), proximal socket, and (b), distal socket.

Length, width and thickness measurements are presented in Table 3.4 and Figure 3.9 illustrates the size range of variation. The range of variation seen is similar to those seen in other contemporary contexts (Park and Mousseau 2003: 266).

Table 3.4 Variation in size of Kingait closed form harpoon heads from Phillip's Garden.

	Length mm	Width mm	Thickness mm
Average	50.5	15.8	8.6
Median	52.6	15.7	9.0
Standard Deviation	11.5	2.8	2.0

Figure 3.9 Variation in length, width and thickness for Kingait closed harpoon heads.



One line hole is most commonly carved through the middle of the harpoon head from the dorsal to ventral surface, but occasionally two holes are carved lengthwise on the dorsal/ventral surface. The lateral surfaces of these tools are ground to a rounded, bevelled, or flat surface (Figure 3.10). Occasionally the dorsal and or ventral surfaces are thinned behind the line hole at the proximal end. This thinning is usually unifacial, or absent, and less commonly bifacial (Figure 3.11). The frequency of these characteristics is presented in Table 3.5.

Figure 3.10 Kingait closed harpoon head showing a bevelled lateral surface.

Figure 3.11Lateral view of a Kingait closed harpoon head showing thinning on one surface proximal to the line hole.

Table 3.5 Frequency of various morphological characteristics on Kingait closed harpoon heads from Phillip's Garden.

	Line Hole Number		Lateral Sides			Dorsal/Ventral Thinning		
	One	Two	Bevelled	Round	Flat	Unifacial	Bifacial	Absent
Number	54	4	37	20	11	30	4	11
%	93.0	7.0	54.4	29.4	16.2	66.7	8.9	24.4

Other design features on the dorsal and ventral surfaces of the Kingait closed harpoon heads include a number of incisions and grooves, often around the line hole (Figure 3.12). The grooves are broad, shallow and smooth indentations usually on the proximal end of the line holes, while incisions are thin lines. These features occur in combination or singly on the harpoon heads.

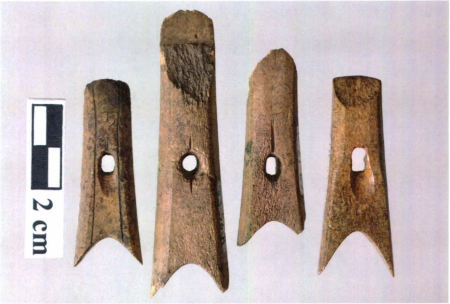


Figure 3.12 Kingait closed harpoon heads showing grooves and incisions around the line hole. From left; the first example shows a wide shallow groove at the proximal edge of the line hole. The second has two lines incised at both the proximal and distal edges, and the third has a single short incision on the distal edge of the line hole. The forth has a broad groove on the proximal edge of the line hole.

Where the surfaces of harpoon heads were very well preserved it was possible to record these features. The results presented in Table 3.6 show there is a range of variation in the incidence of grooves and incisions. These grooves and incisions could be interpreted as the remains of gouging the harpoon head surface to make the line hole; however their frequency and appearance suggests they were more intentionally rather than incidentally placed features. Firstly these marks are absent from many harpoon heads which would suggest that they are not a necessary outcome of the line hole production process. Furthermore the grooves have smooth surfaces and are symmetric in shape indicating some attention was devoted to their final form. The incisions are likewise carefully formed, tend to be uniform in size and shape, and there is usually only one tiny line projecting from the line hole. The uniformity seen in this pattern of incision would be unlikely if the tool maker was simply extending the area to place the line hole.

Table 3.6 Location and frequency of grooves and incisions around Kingait closed harpoon head line holes from selected features at Phillip's Garden.

Groove and Incision	#	%
Groove: unifacial	13	28.3
Incision: bifacial	2	4.3
Incision: unifacial	1	2.2
Incision :bifacial, groove: unifacial	6	13.0
Incision one surface, groove alternate surfaces	7	15.2
Incision and groove same surface	2	4.3
Absent	15	32.6
Total	46	99.0

Table 3.7 presents the number of tools with these various design details in features that span the occupation of the site. No design is confined to any particular feature and unless the design is rare they occur throughout much of the site's occupation. This suggests that design features do not represent the characteristics adopted by one individual or a household exclusively, but represent enduring motifs.

Table 3.7 Number of Kingait closed harpoon heads from selected features at Phillip's Garden with various design characteristics for features arranged from oldest to youngest and including undated features*.

Feature Name	Lateral edge shape			Dorsal/ventral thinning			Grooves and incisions around the line hole						
	Rnd*	Bev	Strt	Abst	Bif	Uni	Abst	Bi incised	Bi Groove	Bi incised Uni groove	Grooved Incised Altnt	Uni Grooved Incised	Uni grooved
RH14			1			1							1
F 2mdn													
RH 1													
H 10	8		1	3	1	3	4				1		2
H 18	9	4		5		6	5	1	1		1		3
H 2	2	1	2	1		2							2
H 6	4	1	1	1	1	3	1		1	1		2	
H 4	3	1		1		1					1		1
H 12	4	2	1	1	2	2		1		2	1		2
H 11	1	1									1		1
H 17	7	7	3			7	3			2	1		1
F 73mdn			1			1							
RH 55													
H 20			1										1

*Rnd: round, Bev: bevelled, Strt: straight, Abst: absent, Bi: bifacially, Uni: unifacially, Altnt: alternating

Some additional design features are noted as incision lines elsewhere on the Kingait closed harpoon head dorsal and/or ventral surfaces. Usually these are thin single (n=4) or double parallel lines (n=8) running the length of the tools (Figure 3.13), and occasionally a series of short (approximately 8-10 mm), thin lines on the dorsal or ventral surfaces on the distal edge (n=6) (Figure 3.14).

Figure 3.13 Incisions carved into the surfaces of Kingait closed harpoon heads. From left note single line followed by an example with three short incisions around the line hole, double parallel line on the third, and the example on the right has two lines each meeting at the proximal and distal ends of the line hole.

Figure 3.14 Short, parallel incisions on the distal ends of Kingait closed harpoon heads.

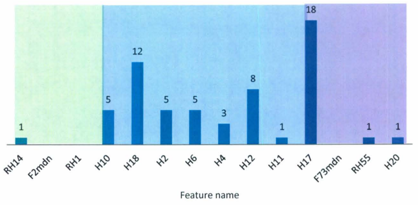
The majority of Kingait closed harpoon heads are made of antler, followed by bone and ivory. I was unable to identify confidently the material source of four examples (Table 3.8).

Table 3.8 Number and percentage of materials used in the manufacture of Kingait closed harpoon heads.

Material	Bone	Antler	Bone/Antler	Ivory	Total
Number	6	48	4	2	60
%	10.0	80.0	6.7	3.3	100.0

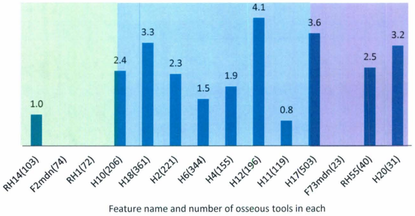
Kingait closed harpoon heads are present during all phases at the site, but are more frequent during the middle phase (Figure 3.15). House 18, 12 and 17 have higher numbers than most other dwelling and midden features. However, when the frequency of these harpoon heads is represented as a percentage of each feature's osseous assemblage, only House 12 has a high proportion of this tool type (Figure 3.16).

Figure 3.15 Number of Kingait closed harpoon heads from selected features at Phillip's Garden arranged from oldest to youngest.



Chi square = 46.000, p < 0.0001

Figure 3.16 Percentage (%) of Kingait closed harpoon heads from selected features at Phillip's Garden arranged from oldest to youngest.



3.4.2 Dorset Parallel and Self-pointed Dorset Parallel Harpoon Head Form

There are only two examples of Dorset parallel harpoon heads in this collection, both made of antler. The overall shape is rectangular, with parallel lateral edges and only a slight flaring at the proximal end. There is a distal socket to hold an endblade and a barbed proximal end with a closed foreshaft socket. The tool is triangular in cross-section with a line hole that runs transverse to its length (Figure 3.17). The line hole is flat on the ventral side and rounded elsewhere. These specimens average 41.4 mm in length, 11.1 mm in width, and 8.6 mm in thickness. One was found in House 10 with dates spanning the early and middle phase, and the other in House 17 at the end of the middle phase.

Figure 3.17 Dorset parallel harpoon heads.

One Dorset parallel harpoon head has all the features of the typical form, but this specimen is self-pointed with a pair of parallel barbs near the distal end (Figure 3.18). This example is made of antler and measures 11 mm in width and 8 mm in thickness. It was found in House 2 which dates from the early and middle phases of occupation.

Figure 3.18Self-pointed Dorset parallel harpoon head. Note the lines incised near the distal end that would have met close to the point.

3.4.3 Self-pointed Barbed and Unbarbed Harpoon Head Forms

These forms do not accommodate a stone endblade but are instead self-pointed at the distal end. There are 12 self-pointed barbed harpoon heads in the Phillip's Garden collection, three of which are unbarbed.

The self-pointed barbed examples have one set of parallel barbs at the distal end, a central line hole, and are slightly flared s with closed sockets at the proximal ends, typical of other harpoon head forms (Figure 3.19). There were no ivory examples of these harpoon heads, most are made of antler or bone, and one of either bone or antler (Table 3.9).

Table 3.9 Number and percentage of materials used in the manufacture of self-pointed barbed harpoon heads.

Material	Bone	Antler	Bone/Antler	Ivory	Total
Number	4	7	1	0	12
%	33.3	58.3	8.3	0	99.9

Figure 3.19 Self-pointed barbed harpoon heads.

Table 3.10 shows the average, mean and standard deviation in length, width and thickness of the self-pointed barbed harpoon heads. Since there were only two examples for which length measurements could be taken, just the variation in width and thickness are presented in Figure 3.20.

Table 3.10 Variation in size of self-pointed barbed form of harpoon heads from Phillip's Garden.

	Length mm	Width mm	Thickness mm
Average	51.9	16	6.6
Median	57.6	16.3	7.3
Standard Deviation	11.6	2.4	2.4

Figure 3.20 Variation in width and thickness for self-pointed barbed harpoon heads.

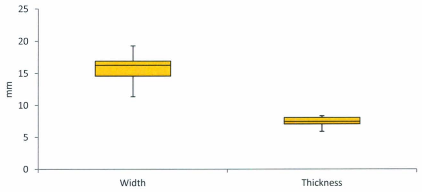
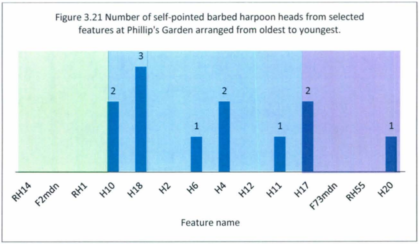
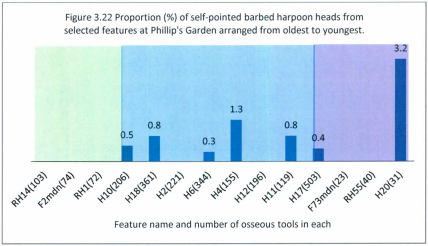


Figure 3.21 shows the frequency of self-pointed barbed harpoon heads. It is clear that this form is present in small numbers throughout the occupation of the site, and the difference in the frequency is not significant. This is supported when the frequencies are presented as a proportion of each assemblage (Figure 3.22). The higher numbers in House 20 are likely a result of its very small assemblage size.



Chi square = 2.000, p = 0.9197



Three self-pointed non-barbed harpoon heads have been recovered from the site, two made from antler and the other from bone (Figure 3.23). There is one large example (length: 98.6 mm, width: 19.2 mm, thickness: 8.6 mm) made of large sea mammal bone, probably whale. It is oval in cross-section and its distal end is tapered to a point. There are two line holes, one off center in the midsection of the tool, and slightly flared barbs at the proximal end, but with no proximal socket. The tool must have rested against another segment and been lashed into place, or else it is incomplete. The two other specimens of this form are made of antler. Both are long and narrow with tapered distal points, oval cross-sections, and single central line holes. They both have concave proximal ends with barbs that do not flare, but one example has a more typical closed foreshaft socket while the other has an open socket. These tools were recovered from House 4, House 6, and House 10, all dating to the middle phase of site occupation.

Figure 3.23 Self-pointed non-barbed harpoon heads. The largest is made from sea mammal bone and has no proximal socket. The others were constructed from antler. The middle example has an open socket and the one to its right a closed socket.

3.4.4 Harpoon Head Manufacture and the Description of Their Preforms

Only three harpoon head preforms have been recovered in this collection (Figure 3.24). This is certainly too small a sample to discuss any patterns pertaining to the order of operations in the manufacture of harpoon heads; nevertheless these examples offer some insights into harpoon head fabrication. In each case the overall shape has been carved and the object has been finely ground on all surfaces. I will describe the three preforms separately. Example A has a triangular section of antler removed to create the concave base and proximal tangs. The foreshaft socket has not been carved, nor has the line hole; however, the distal endblade socket has been formed. The distal portion of the second preform, B, is broken. It too has a segment removed from the proximal portion to create the tangs and likewise the foreshaft socket has not been formed; however in this case the line hole has been carved. Specimen C is also a proximal fragment. The line hole has not been placed; however the proximal portion has been removed and the foreshaft socket has been carved. In addition, a decorative line has been incised lengthwise through the midsection on one surface of the tool. From this small sample I can tentatively suggest that there may not be any standard order for the placement of sockets and line holes in the manufacture of harpoon heads. In each case the base has been cut out, but otherwise the line hole and proximal socket may be carved one before the other. The samples from Alernerk and Nunguvik did not include harpoon head preforms, so it is not possible to evaluate differences and similarities in broader manufacture practices at this stage.

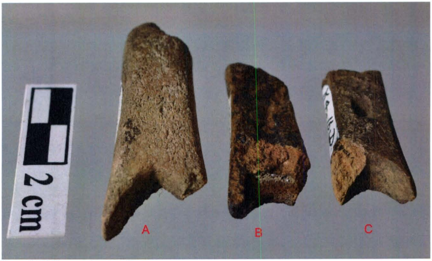


Figure 3.24 Harpoon head preforms.

Ten small pieces of triangular antler debitage removed from harpoon head preforms have been identified in the collection (Figure 3.25). Six of these debitage pieces were recovered from House 18 and one each from Renouf's house features 55 and 1, and House 6. This distribution is possibly a product of sampling since they resemble small seal tarsal bones and because he did not collect faunal material, Harp may not have collected all those excavated.

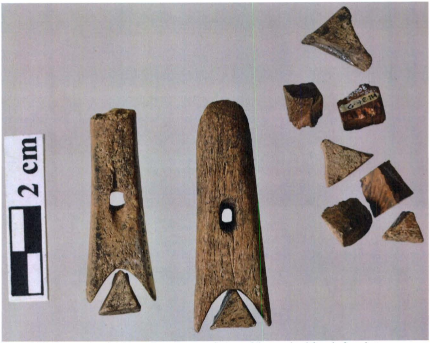


Figure 3.25 Harpoon head debitage from the manufacture of the proximal foreshaft socket.

While finished harpoon heads are thoroughly ground and polished, leaving few remains of the steps taken to manufacture them, these tiny wedges retain traces of the work done to remove them from the harpoon head preforms. The lateral surfaces show striations from the cutting action on the dorsal and ventral surface of the preform (Figure 3.26). A slight ridge often remains on the lateral surface where the toolmaker worked from both dorsal and ventral surfaces and then broke the thin bone that remained between them in the groove and snap technique (Figure 3.27).

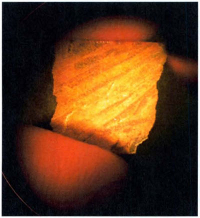


Figure 3.26 Striations on the lateral surface of harpoon head debitage (8x, 7A259A812).

Figure 3.27 Central ridge on the lateral surface of harpoon head debitage (8x, EeBi-1:15505).

These wedges also exhibit the removal of tiny fragments of bone from the posterior surface of the harpoon head preform. This suggests that the toolmaker established a line between the dorsal and ventral surfaces by pecking out a series of bony bits. The traces are later ground in the finished tool but are retained on the debitage (Figures 3.28 and 3.29).

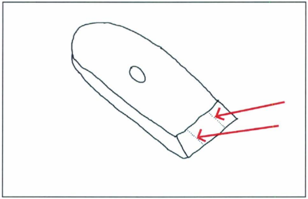


Figure 3.28 Arrow points to the location on the wedge debitage where pecking is observed.

Figure 3.29 Traces of bone removal from the edge where the posterior and lateral surfaces of the harpoon head debitage meet. Note striations on the lateral surface (8x, 7A259A843).

Elsewhere, an examination of the foreshaft sockets showed no traces of manufacture at the lower magnification used in this research. It is possible that the repeated insertion of foreshafts would obscure any early stages of fabrication, but these traces too were not seen.

A notable feature of the Phillip's Garden harpoon heads is how remarkably straight the sides of the line holes appear. McGhee (1996:142) points out that drilling technology was absent from Dorset culture. He states that holes were formed by gouging deep, elongated incisions on the surface of an object until a hole is formed. The residual gouges on either side of the hole are obvious in tools such as needles, awls and those with suspension holes; however they are usually absent from the line holes on harpoon heads at Phillip's Garden. In his experimental reproduction of a harpoon head Tim Rast (Appendix B) used a flake to scratch the initial incision and gently twisted the flake to remove material from the sides and give the hole its characteristic round shape. The edges of the reproduction harpoon head clearly show the striations caused by Tim's twisting of the flake (Figure 3.30).

However under a stereoscopic microscope it becomes apparent that the Dorset made their line holes in a different fashion. The Dorset examples show some possible striations or polish near the entrance to the hole, but for the most part there are chisel-like channels running through the holes from the dorsal to ventral surfaces (Figure 3.31). Each channel is deeper toward the center of the hole and retains ridges left by the chiselling tool. This pattern is most apparent on the antler harpoon heads; it is more difficult to see the technique employed on the bone examples. These chisel-like marks are more apparent on the interior walls of the line hole since this area is more deeply gouged and would not have become polished by contact with lines. It is possible this was accomplished using the very small, hafted quartz crystal or chert microblades found in the Phillip's Garden collection.

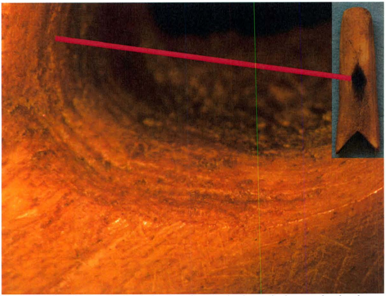


Figure 3.30 Striations on the line hole edge of a reproduction antler harpoon head under 20x magnification.

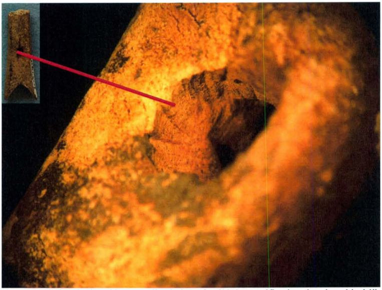


Figure 3.31 Kingait closed harpoon line hole under (10x) magnification showing chisel-like gouges (EeBi-1:16450).

These features of harpoon head line hole manufacture are seen on almost all the Kingait closed and self-pointed barbed forms, but is unclear for the self-pointed non-barbed form. However, there are differences noted for the Dorset parallel harpoon heads. The Dorset parallel line hole is flat on the surface along the ventral surface of the body of the tool, and rounded dorsally. The flat edge shows striations running lengthwise that represent multiple incisions. However, the corners of the straight edge have been squared by pushing a sharp, probably pointed, object into the hole (Figure 3.32). By contrast, the rounded surface is very smooth with little evidence of striations, possibly resulting from friction with hide during use. There are no chisel-like gouges cut through the holes as is seen in the Kingait closed form; however this may be a result of the small sample size.

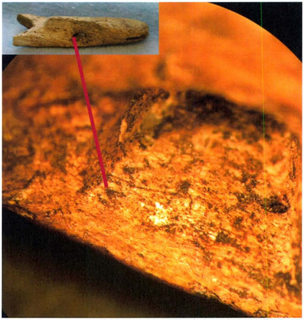


Figure 3.32 Dorset parallel harpoon head line hole 7A270B29 (20x).

3.5 Phillip's Garden Harpoon Head Foreshafts

From a total of 35 foreshafts in the Phillip's Garden collection, 32 from dated features were selected for examination here (Figure 3.33). There is little variation in form; all have tapered distal ends that form a rectangular cross-section where the tool would have fit into a harpoon head, and proximal ends that are either slightly pointed and tapered on the opposite plane to the distal end (Figure 3.34A), or tapered to a flat surface on the same plane as the distal end (Figure 3.34B). In complete examples, two examples have squared proximal ends with line holes and one tool exhibits a narrowing or pinching at the proximal end, presumably to hold a binding material in place (Figure 3.35).

Figure 3.33 Harpoon foreshafts. The top row shows variation in size. Note tapering on the distal and proximal ends is on opposing planes. The first foreshaft on the bottom left has a narrow proximal neck for line fastening and the two examples to the right have proximal line holes.

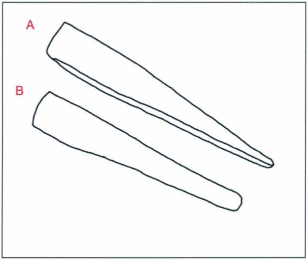
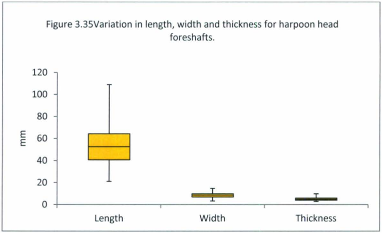


Figure 3.34 Foreshaft shapes. Example A has a proximal end that tapers to a slight point, while example B is tapered flat on both ends.

The variation in size is greatest for lengths, while width and thickness measurements are more consistent (Table 3.11). This is illustrated in Figure 3.38

Table 3.11 Variation in the size of harpoon head foreshafts from selected features at Phillip's Garden.

	Length mm	Width mm	Thickness mm
Average	56.1	8.7	5.2
Median	56.4	8.6	4.9
Standard Deviation	18.0	2.3	1.6



The distal ends of foreshafts would have been jammed into the proximal ends of harpoon heads. Indeed this collection has some examples where portions of broken foreshafts are still embedded in harpoon heads (Figure 3.7 above). The proximal ends of foreshafts would have been attached to harpoon shafts by either inserting them into sockets or, less likely, binding them to the shaft.

Most foreshafts are made of bone or antler, and less commonly of ivory. It was impossible to determine whether five of the foreshafts were made of bone or antler (Table 3.12)

Table 3.12 Number and percentage of materials used in the manufacture of harpoon head foreshafts.

Material	Bone	Antler	Bone/Antler	Ivory	Total
Number	15	10	5	2	32
%	46.9	31.3	15.6	6.3	100.1

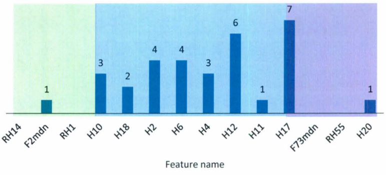
Design features such as incisions are rare on foreshafts in this collection; however two examples display parallel lines running along the length of the tool (top left Figure 3.33).

Two harpoon head foreshaft preforms were recovered from Houses 10 and 11, dated to the middle phase (Figure 3.36). The overall shape of the foreshaft has been accomplished, but there remains some additional abrading to thin the distal end to the more standard thickness. Both are constructed from sea mammal bone.

Figure 3.36 Harpoon head foreshaft preforms.

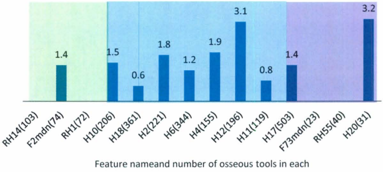
Harpoon head foreshafts are distributed throughout the site, spanning the extent of its occupation in numbers that do not differ significantly (Figure 3.37). When the foreshafts are represented as a percentage of each feature's osseous assemblage they make up a small portion of the assemblage and are fairly evenly distributed (Figure 3.38).

Figure 3.37 Number of foreshaft harpoon head from selected features at Phillip's Garden arranged from oldest to youngest.



Chi square = 10.6670, p = 0.2993

Figure 3.38Percentage (%) of harpoon head foreshafts in the osseous assemblage from selected features at Phillip's Garden arranged from oldest to youngest.



3.6 Phillip's Garden Lances

Lances are defined as sharply pointed, relatively broad knife-like implements used to kill animals. All ten lances from the Phillip's Garden assemblage are examined here (Figure 3.39). They are all made of bone; five of sea mammal, four of terrestrial mammal and one unknown. Six are distal fragments, two are represented by a proximal end, and two medial portions make up the collection. There is some variation in the appearance of lances. There are three examples which have thin, flat distal ends and tapered stems that may have functioned as small handles. The remaining specimens are simply long narrow bones that have been ground to a somewhat flattened and very sharp point.

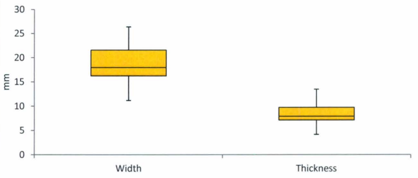
Figure 3.39 Bone lances from Phillip's Garden. The example on the far left is a flattened stemmed form with incised lines decorating the dorsal and ventral surfaces. The two other examples are made from cut and sharpened terrestrial mammal bone.

Because none are complete no length measurements are recorded. There is some variation in width and thickness (Table 3.13). Figure 3.40 illustrates the range and variation of width and thickness measurements.

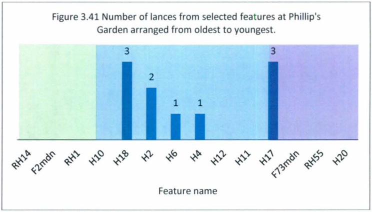
Table 3.13 Variation in size of lances from selected features at Phillip's Garden.

	Width mm	Thickness mm
Average	18.7	8.5
Median	18.0	7.9
Standard Deviation	4.3	2.5

Figure 3.40 Variation in width and thickness for lances.



Lances were recovered from house features spanning the middle phase of occupation to the beginning of the late phase, but are nonetheless relatively uncommon in the assemblage (Figure 3.41). Their numbers are too few to suggest that any differences are significant.



Chi square = 2.000, p = 0.7358

There is decoration on three of the flattened stemmed forms (Figure 3.42). In two examples there are lines running lengthwise through the middle of the blade area, a single line in one example and double parallel lines on both surfaces in the other. The proximal stemmed end of one tool has four incised lines running lengthwise on both surfaces. The lateral two incisions on both surfaces are shorter than the medial lines. The final example has two parallel lines running lengthwise on the blade portion of the tool.

The lances have two distinct forms, one quite utilitarian with little embellishment beyond the creation of a sufficiently strong, sharp edge. The other form is often stemmed and decorated, and generally appears to have been manufactured with greater attention to form. The sample is too small to make conclusive interpretations of their role in technical life at the site, but it is possible they functioned differently, and that the more highly refined examples were ornamental.

Figure 3.42 Three lance fragments showing decoration.

There was one lance preform recovered from House 18 (Figure 3.43). It is a piece of terrestrial mammal long bone, probably caribou that is broken just behind the distal tip. The lateral edges were cut all the way to the cancellous bone to remove it from the element and shape the tip. Some additional cuts were made to thin the area just proximal to the tip, but no abrading is apparent.

Figure 3.43 Lance preform.

3.7 Summary

As a large seal hunting community it is no surprise that hunting tools are found throughout Phillip's Garden for the extent of its occupation. While there are very few lances, the predominance of barbed points and harpoon heads reflects the maritime economy here. Bone, antler and only occasionally ivory, were used to make these tools and there is some evidence of the methods employed in their manufacture.

Barbed points show variation in size that suggests they were used to hunt a variety of animals, possibly cod fish in addition to sea mammal. Most harpoon heads are the Kingait closed form but within this there are design differences such as the shape of the lateral edges and the grooves and incisions around the line holes. A few preforms and some debitage demonstrate that harpoon heads were manufactured at the site, but their numbers are too few to discuss possible spatial patterns. Nevertheless, details of their manufacture are apparent. The method of line hole construction and preform preparation is displayed on preforms and debitage allowing a greater understanding of the methods used in their construction. Holes are made by pushing narrow stone tools into the dorsal and ventral surfaces, rather than incising and twisting. Harpoon head debitage shows cutting action and surface preparation that are all obscured by later grinding and polishing on the harpoon heads.

Chapter 4

Osseous Hide Working Technology at Phillip's Garden

"The technology of skin clothing is one of a large number of subjects that form part of a body of superlative traditional ecological knowledge...This knowledge concerns the environment, including seasons, winds, stars, animal behaviour, movements and biology, and innumerable other factors" (King et al. 2005:14).

4.1 Introduction

The range of hide working tools in the Phillip's Garden collection reflects the importance of this activity at the site and demonstrates that all stages are represented here from the initial preparation of hides to the manufacture of finished products. In the osseous collection, there are bone and antler scrapers, awls of varying sizes, and needles. This supports the growing body of evidence that seal skin working was an important activity at Phillip's Garden (Renouf and Bell 2008, Knapp 2008). Older and more recent ethnographic accounts provide insightful information on how seal skins have been processed traditionally by groups in the northern circumpolar region (Boaz 1888; Murdoch 1892; Turner 1894; Jenness 1922; Mathiassen 1928; Oakes 1987; Hall et al. 1994; Oakes and Riewe 2007; Renouf and Bell 2008). This chapter provides some of these details which places the Phillip's Garden skin working tools into a context of tasks that would have shaped the daily lives of people inhabiting the site.

4.2 Hide Working

Most Arctic ethnographies that describe seal skin working refer to the use of smaller species, in particular ringed seals (Balikci 1970, Birket-Smith 1929; Boas 1888). These are the most commonly hunted species in recent centuries and their skins are thinner and considered more appropriate for clothing. While there are a few references to harp seal skins being used to make clothing, the skins are considered relatively thick and well suited for making boats and associated clothing, boot soles and tents (Turner 1894:62; Oakes 1987:19; Issenman 1997:35; Pauksztat 2005). Nevertheless their abundance at Phillip's Garden and the relative rarity of ringed seal here would have made them invaluable for making most clothing as well as larger products.

The characteristics of seal skin make it an excellent material for manufacturing waterproof coverings. Seal skins are made up of hair, skin and blubber. The hair is oval in cross section with a relatively smooth exterior and dense interior that does not offer much heat-retaining insulation. However, because it lies flat and the surface of the hairs are made up of tiny overlapping scales, it is quite water resistant and consequently considered excellent for making boots, mitts and stockings (Hall et al. 1994; Issenman 1997; Meeks and Cartwright 2005; Petrussen 2005).

Processing seal skins involves a relatively lengthy procedure and the use of a number of osseous and lithic tools. After the animal has been killed and flensed (skinned), blubber is removed using a sharp knife, or more typically in the Arctic, a convex-bladed ulu. The skin is then washed several times over a number of days, often in fresh water, or sometimes initially with a mixture of salt and fresh water (Boas 1888:112; Pedersen 2005). Each time the skin is soaked for a period of several hours to a day and is scraped very carefully and evenly to remove any blubber and tissue. This soaking and scraping softens the skin and removes grease which would otherwise stain the hide (Hall et al. 1994; Pedersen 2005). The outer edges of the hide are then perforated and the skin is laced to a wooden frame, or alternatively pegged out on the ground and allowed to dry outside for a number of days (Birket-Smith 1929:245). The Inuit from the northern Baffin Island region make slits in the skins almost an inch in width and spaced about four inches apart and approximately one quarter of an inch from the edge around the perimeter of the hide (Oakes 1987:15). If the skin is to be cut and sewn immediately it is simply remoistened once more before cutting. Otherwise, occasionally the skin is stored for later processing, and when taken out for sewing, it is moistened, scraped lightly, and softened by rubbing, chewing or walking on it (Boas 1888; Hall et al. 1994).

Some seal skin products including boots will have the hair removed. It can be shaved off using a sharp tool, or dampened and rolled with the hair on the inside and stored for a period, then scraped to remove the loosened hair. Rolling the hide, and in some cases adding fish offal or blubber to encourage putrification accomplishes hair removal (Birket-Smith 1929:247; Murdoch 1892; Oakes 1987; Renouf and Bell 2008). Today as in the past, people sometimes sink the framed hide into a brook or pond where the warm waters and bacteria can accelerate the depilation (Renouf and Bell 2008). Tanning involves treating the skins with a wide range of products such as bark, urine, animal brains, fat or smoke (Murdoch 1892; Oakes and Riewe 2007; Renouf and Bell 2008).

Cutting and scraping tools are of primary importance in the initial preparation of hides for further manufacture into products (Mathiassen 1928; Oakes 1987; Renouf and Bell 2008:38). Cutting tools were traditionally made of stone such as ground slate or more recently, metal. Scrapers described in ethnographies are usually made of ground or chipped stone and bone (Boas 1888; Murdoch 1892; Jenness 1946; Balikci 1970; Oakes and Riewe 2007; Otak 2005). Bone scrapers are often expediently made using the scapula or split long bones of animals. They are most often described for use after the initial blubber is removed and the skin has been cleaned and dried. A blunt scraper is used to soften the dried skin by breaking down the connective tissue and removing any remaining oils (Birket-Smith 1929; Mathiassen 1928:111; Oakes and Reiewe 2007:30, 1998:14). In addition, bone scrapers are described for use in pressing water or grease out of the hides (Birket-Smith 1929:244; Oakes 1987).

4.3 Phillip's Garden Osseous Scrapers

Sixteen osseous scrapers have been identified in the sample from Phillip's Garden of which 13 are analyzed here. Like some in the ethnographic literature they are all expediently made. They are constructed from split beam portions of caribou antler or sea mammal bone with distal portions that are tapered to a broad, flattened or slightly pointed end (Figure 4.1). The small number in this collection suggests that most scraping was accomplished using some other tool. The relatively high number of slate tools (n=304) at Phillip's Garden may have substituted for bone scrapers (Knapp 2008; Renouf and Bell 2008:37).

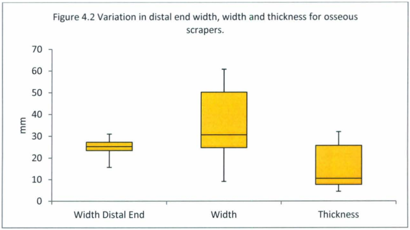
Birket-Smith (1929:244) describes a scraper form similar to those from Phillip's Garden made of split and slightly ground pieces of caribou antler beam. These were used to scrape water from the hides of animals killed in rivers or lakes by Inuit of western Hudson Bay (formerly Caribou Eskimo).

Eleven of the osseous scrapers have working edges that are ground and polished on one edge, while two are bifacially ground. The remaining scrapers are too degraded to establish the number of worked surfaces. While it is difficult to get an accurate sense of tool lengths since all but two are broken, the overall width and thickness of the tools is quite variable, probably reflecting a lack of consideration for creating a standard form (Table 4.1, Figure 4.2). By measuring only the width of the working edge, there is much more consistency.

Figure 4.1 Osseous scrapers. Note the similar form and size of the distal ends.

Table 4.1 Variation in the size of osseous scrapers from selected features at Phillip's Garden.

	Width distal end mm	Overall width mm	Thickness mm
Average	24.7	31.4	11.2
Median	23.3	28.2	8.5
Standard Deviation	4.8	14.5	9.0



Most scrapers are made of antler, five of the larger examples from the beam of a caribou antler; the others are too fragmented to identify the portion of antler, but they too appear to be beam sections. The remaining scrapers are made of bone (Table 4.2). One of the bone scrapers was made of whale bone and four others from either whale or other large sea mammal. These are made on bone slivers that have been ground.

Table 4.2 Number and percentage of materials used in the manufacture of osseous scrapers from selected features at Phillip's Garden.

Material	Bone	Antler	Total
Number	5	8	13
%	38.5	61.5	100.0

Examination of these scrapers under low power magnification showed polish and some striations on three of the tools (Figure 4.3). While grinding is a feature of the manufacturing process and evident on much of the tools' surfaces as striations, the distal ends show polish which is interpreted as use wear. In an experimental study of use and manufacture wear found on bone tools from the Mackenzie Delta, LeMoine (1997:35) found the most common form of wear from rubbing bone tools against hides was a dull polish, and striations appeared to indicate grooving motion as in creasing activities. The wear exhibited on the Phillip's Garden scrapers suggests that these tools could have been used primarily in scraping soft material in the processing of hide.

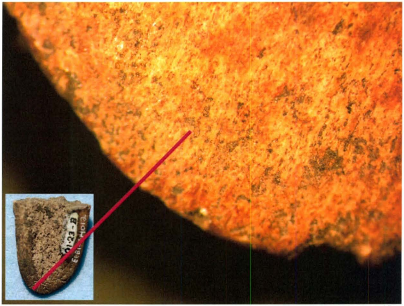
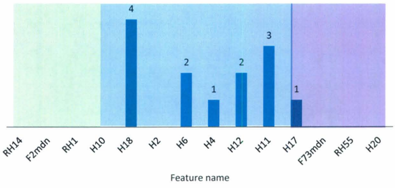


Figure 4.3 Polish and striations on the edge of an osseous scraper EeBi-1:14012 (20x magnification).

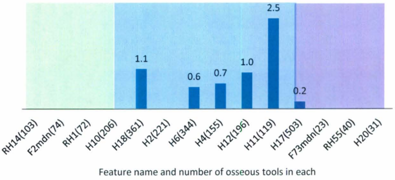
Osseous scrapers at Phillip's Garden are found throughout the middle to the beginning of the late phase of occupation (Figure 4.4). The differences in their numbers, however, are not considered significant. When the distribution of scrapers is expressed as a percentage of the total osseous assemblage there is a generally even distribution with the exception of House 11 where the frequency of scrapers is relatively high compared to other features (Figure 4.5).

Figure 4.4 Number of osseous scrapers from selected features at Phillip's Garden arranged from oldest to youngest.



Chi square = 2.000, p = 0.8491

Figure 4.5 Percentage (%) of osseous scrapers in the osseous assemblage from selected feature at Phillip's Garden arranged from oldest to youngest.



4.4 Phillip's Garden Awls

Awls are sharply pointed implements used to puncture hides. There are 124 awls (all distal ends) in dated features selected from a total of 158 at Phillip's Garden. They are represented by two forms. The first, called the standard, is the most common, numbering 111. Its shape and size is less consistent than the other, more formally constructed variety referred to as the conical awl with 14 examples in this sample (Table 4.3).

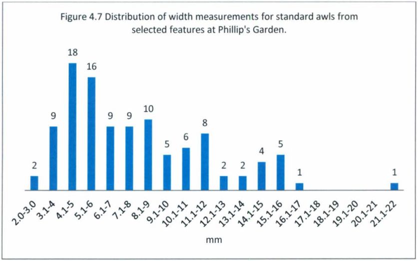
Table 4.3 Number and proportion of awl forms from selected features at Phillip's Garden.

Awl forms	Number	% of Awls
Standard	111	89.5
Conical	13	10.5
Total	124	100.0

4.4.1 Standard awl Form

The standard awls are long and narrow with sharpened working ends, and some light grinding and polishing to make the tool comfortable to handle (Figure 4.6). While most examples are extremely slender and light in weight, often made of bird bone, there are some that are more robust. These latter examples are still sharp in most cases, and may have been used to make and/or stretch larger holes around the perimeter of hides for lashing to frames for stretching and drying, or possibly for pegging out on the ground (Issenman 1997:64). In order to determine if the variation seen in the standard awls separated them into size groups, their width measurements were plotted (Figure 4.7). The results show that there is a wide range of variation in width, but no separation.

Figure 4.6 Standard awls. The top row includes lighter examples and the bottom, the more robust variety.

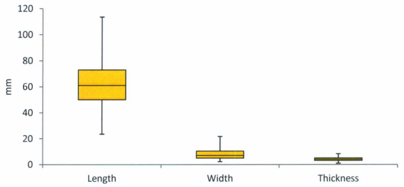


The standard awl measurements show some variation in length, width and thickness, which may reflect the relatively expedient nature of the tool (Table 4.4, Figure 4.8).

Table 4.4 Variation in the size of standard awls from selected features at Phillip's Garden.

	Length mm	Width mm	Thickness mm
Average	62.5	8.1	4.1
Median	61.1	7.1	4.1
Standard Deviation	22.0	3.9	1.6

Figure 4.8 Variation in length, width and thickness of standard awls.



The standard awl points are usually round or more rarely oval in cross-section, and the surface of the working end is highly polished. This is the case regardless of any size differences (Figures 4.9 and 4.10). Occasionally there are irregularities such as one or two tiny pits on the working surface, but the margins around the pits are very polished confirming that the predominant function involved contact with soft materials.

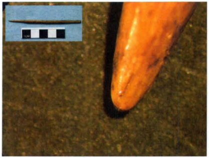


Figure 4.9 Lighter example of standard awl (EeBi-1:12089) at 40x magnification.

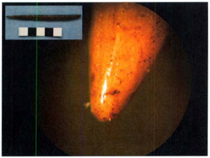


Figure 4.10 Robust example of standard awl (EeBi-1:12087) at 40x magnification.

Most standard awls are made of bone, but there are some of antler and very few of ivory. It was difficult to distinguish bone from antler in 23 cases (Table 4.5). An examination of the bone awls allowed for the determination of the animal sources of this material in some cases. Terrestrial mammal and bird were the most common sources for bone, followed by sea mammal (Table 4.6).

Table 4.5 Number and percentage of materials used in the manufacture of standard awls from selected features at Phillip's Garden.

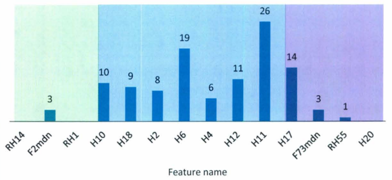
Material	Bone	Antler	Bone/Antler	Ivory	Total
Number	71	14	23	2	110
%	64.6	12.7	20.9	1.8	100.0

Table 4.6 Source of bone used in the manufacture of standard awls from selected features at Phillip's Garden.

Material	Bird	Terrestrial Mammal	Sea Mammal	Total
Number	9	30	13	52
%	17.3	57.7	25.0	100.0

Figure 4.11 shows the distribution of standard awls in midden and houses features from oldest to youngest. It is clear that this form is widely distributed in middens and dwellings spanning all phases of occupation. There are some significant differences in the frequency of awls in features. Houses 6, 11, and 17 have the greatest frequency of these tools in their osseous assemblages. Since awls are recognized by their distal ends this frequency also represents a minimum number for the tool type.

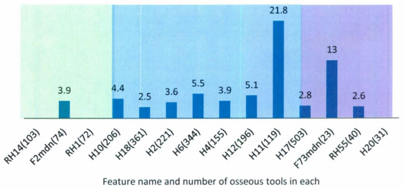
Figure 4.11 Number of standard awls from selected features at Phillip's Garden arranged from oldest to youngest.



Chi square = 55.4, p< 0.0001

To account for the differential size of the feature samples the frequency of standard awls are expressed as a proportion of the total osseous assemblage for each. When this is done only Houses 6 and 17 have similar frequencies of this form to other features, while House 11 shows a much higher frequency of standard awls. The high frequency seen in midden Feature 73 is probably a result of its small sample size (Figure 4.12).

Figure 4.12 Percentage (%) of standard awls in the osseous assemblage from selected features at Phillip's Garden arranged from oldest to youngest.



4.4.2 Conical Awl Form

The conical awls, including 14 specimens (all distal ends), are small, conical-shaped pointed tools that are uniform in their size and shape (Figure 4.13). They are round to almost square in cross-section with no evidence of hafting. The proximal end is flat and unpolished, while the distal end is highly polished and identical to other awls (Figures 4.14 and 4.15). Their small size suggests they may have been held between the first and second fingers and pressed with the thumb in the creation of small needle holes.

Figure 4.13 Conical awls from Phillip's Garden.


Figure 4.14 Conical Awl EeBi-1:11888 10x magnification (distal).

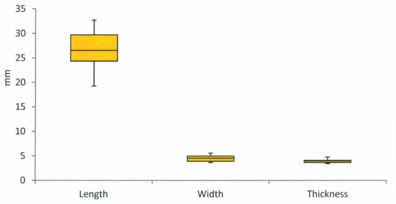

Figure 4.15 Conical Awl EeBi-1:11888 10x magnification (proximal).

Table 4.7 shows the variation in length, width and thickness and Figure 4.16 illustrates the relative metric uniformity of this form.

Table 4.7 Variation in the size of conical awls from selected features at Phillip's Garden.

	Length mm	Width mm	Thickness mm
Average	27	4.5	4.0
Median	26.6	4.5	4.0
Standard Deviation	4.0	0.6	0.4

Figure 4.16 Variation in length, width and thickness of conical awls.

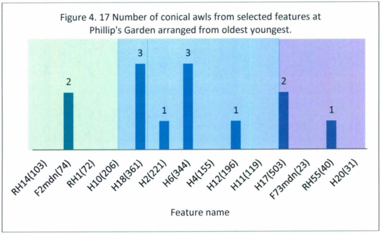


Because of their small size and surface grinding it is fairly difficult to distinguish bone from antler conical awls. Table 4.8 shows the frequency of material types for these tools. Bone is the most frequent choice of material, but there is at least one antler specimen in the assemblage.

Table 4.8 Number and percentage of materials used in the manufacture of conical awls from selected features at Phillip's Garden.

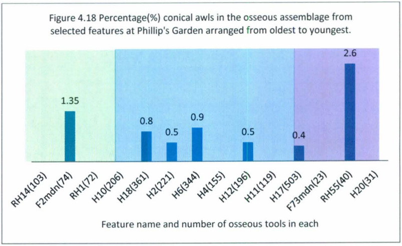
Material	Bone	Antler	Bone/Antler	Total
Number	6	1	6	13
%	46.2	7.7	46.2	100.1

Figure 4.17 shows that despite the small sample size these awls are distributed throughout the temporal span of the occupation in both houses and midden features; however the differences in their frequency are not significant. As all 13 specimens are represented by the distal end there is no difference in their distribution when fragmentation is taken into account.



Chi square = 2.000, p = 0.9197

When the conical awls are presented as a proportion of each feature's osseous assemblage, they represent a fairly even distribution within house features during the middle phase; however they are frequent in midden Feature 2 from the early phase and in late phase Renouf's House Feature 55 (Figure 4.18).



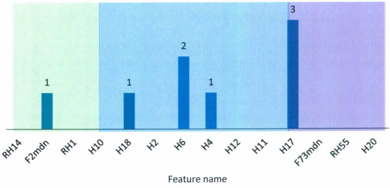
4.5 Awl Preforms

There are eight awl preforms in the sample selected from Phillip's Garden and all of them appear to be intended as standard forms (Figure 4.19). They are made of bone, three of bird bone, and five of unknown source. Traces of the incisions made to cut the bone indicate the method of manufacture. The traces of working on the awl preforms show multiple parallel incisions from use of a thin cutting tool such as a sharp retouched flake. The sides of the incision are not smooth and straight, but display thin incisions from cutting slightly off center in the groove, suggesting that a burin-like tool was not used to prepare awl blanks. Cutting continued until the bone was almost cut through. At this point the blank was snapped off. Awl preforms display this jagged, snapped portion as well as the smoothly gouged edge.

The sample of awl preforms is small; nonetheless, evidence demonstrates that they are present throughout the site from the early phase to the beginning of the late phase in similar numbers. This distribution demonstrates that like the use of finished awls, their manufacture was fairly widespread (Figure 4.20).

Figure 4.19 Awl preforms. Note the jagged edges of the bottom two examples. The inset shows a close-up (EeBi-1:10945 at 8 x) of the bottom tool's edge.

Figure 4.20 Number of awl preforms from selected features at Phillip's Garden arranged from oldest to youngest.



4.6 Phillip's Garden Needles

Of the 103 needles in the collection, 89 are selected from dated features at Phillip's Garden, most of them fragmented (Figure 4.21) (MNIT of 45 based on distal ends). The cross-section of needles is rectangular, becoming more rounded and sharply pointed at both ends. Eye holes are formed by incising into the dorsal and ventral surfaces until the hole is formed. The remnants of these incisions remain visible around the eye margins. All are made of bone, much of it likely to have come from bird, but usually this is difficult to confirm with confidence.

Figure 4.21 Needles from Phillip's Garden.

There is almost no variation in the width and thickness measurements of needles (Table 4.9). However, there is some variation in the length measurements; although these are based on only six unbroken specimens (Figure 4.22).

Figure 4.22 Variation in length, width and thickness for needles.

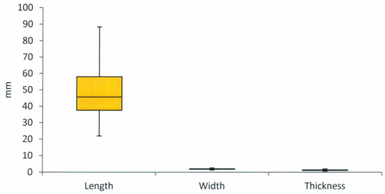
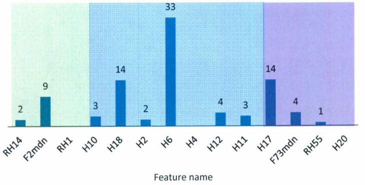


Table 4.9 Variation in the size of needles from selected features at Phillip's Garden.

	Length mm	Width mm	Thickness mm
Average	49.8	1.9	1.3
Median	45.6	1.9	1.3
Standard Deviation	23.0	0.3	0.3

The distribution of needles is throughout house and midden features over the span of the occupation, suggesting the early and sustained practice of sewing at Phillip's Garden. Nevertheless, there are some significant differences among features. There is a cluster of needles in houses 18 and 6 (Figure 4.23). Indeed, 20 of the 45 distal fragments of needles came from House 6.

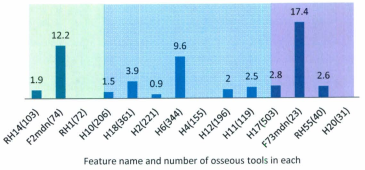
Figure 4.23 Number of needles from selected features at Phillip's Garden arranged from oldest to youngest.



Chi square = 106.500, p < 0.0001

When the frequency of needles is expressed as a proportion of the total osseous assemblage in each feature, House 6 still appears to have a higher relative frequency of needles (Figure 4.24). Likewise midden features in the early and late phases have relatively high frequencies of needles.

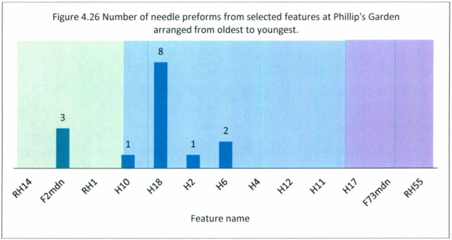
Figure 4.24 Percentage (%) of needles in the osseous assemblage from selected features at Phillip's Garden arranged from oldest to youngest.



4.7 Needle Preforms

Needle preforms are similar to, but narrower than awl preforms. They have edges that show incising with small jagged portions where blanks were snapped from cores (Figure 4.25). Fifteen needle preforms were found in house and midden features in the sample selected for this research (Figure 4.26). While their numbers are few, and difference in frequency insignificant, their distribution includes features dating to the early and middle phases.

Figure 4.25 Needle preforms. The third example from the top clearly shows the jagged portion remaining when the blank was snapped from the core.



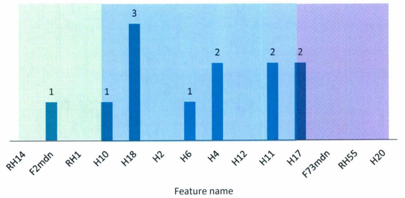
Chi square = 11.333, p = 0.0231

4.8 Needle/awl Cores

Twelve cores for the manufacture of needles or thinner standard awls have been identified in the Phillip's Garden sample. All are made of bird long bone with the articular ends removed. The specimens show where blanks had been removed, and some still retain partially formed blanks (Figure 4.27). The articular ends appear to have been broken off rather than cut as no cut marks could be seen. However some of the examples are slightly damaged. The blanks appear to have been formed by placing a series of incisions along the length of the bone around the diaphysis, but not completely cutting through. This appears to have been accomplished using a retouched flake tool as the grooves are lined with thin incision marks. The distribution of the needle/awl cores is spread from the early to beginning of the late phase, but differences in their frequency are not significant (Figure 4.28).

Figure 4.27 Needle or awl cores. Note the incisions have not entirely penetrated the bone. There are two incisions visible on the lower example.

Figure 4.28 Number of needle cores from selected features at Phillip's Garden arranged from oldest to youngest.



Chi square = 4.000, p = 0.6767

4.9 Summary

The Phillip's Garden osseous assemblage has a range of tools associated with hide working that demonstrates the breadth of this pursuit at the site, both as an activity represented by multiple stages, and as one that was carried on for all of the site's occupation. The presence of osseous scrapers and awls indicates some early stages of hide preparation including the scraping of hide, perhaps to remove grease or soften the material, the puncture of hides for lashing to frames and for placing needle holes. Later stages such as the manufacture of skin products are indicated by the presence of needles in features throughout the site. Furthermore, the manufacture of these tools indicated by the presence of awl and needle preforms made from a variety of bone sources demonstrates another activity associated with skin product fabrication.

The measurements of length, width and thickness show relatively little variation in the hide working tools with the exception of the scrapers. The scrapers show a great deal of variation in width and thickness and appear to have been made with the single aim of achieving an appropriate working edge. These edges, and those of awls, display polish consistent with their hide working functions. Awls, in particular the conical form, are consistent in width and thickness. Needles are very consistent in width, thickness and the shape of both distal and proximal ends.

Hide working tools were present at Phillip's Garden through all phases of the occupation and would have been an important adjunct activity associated with the seal hunt. While they are well represented during the middle phase, their relative frequency among features is not evenly spread even when they are presented as a proportion of their total osseous assemblages. House 11 has a consistently higher proportion of awls and osseous scrapers, and House 6 has more needles than other houses at the site. This suggests that while activities may have been generally widespread, there are some dwellings that had a more intensive focus on this particular activity.

Hide working is made up of a sequential series of time-consuming tasks from the point when the skin is removed from an animal to a finished sewn product. The osseous collection at Phillip's Garden represents the remains of these activities and their spatial and temporal distribution shows they are widespread. The higher relative frequency of these tools in some middle phase dwellings suggests a spatial concentration of people collaborating on these tasks during that period, and as these tasks may be attributed to woman for the most part, these results could indicate a gender-based character to the social group.

Chapter 5

Sled Shoe Design, Manufacture and Distribution

"To a nation living such a roving life as that of the Iglulik Eskimos, means of conveyance naturally are of great importance. As a consequence of the lack of permanent habitations, these people are practically always travelling.... Thus travelling is looked upon as a very natural form of existence; it is not regarded as being unusual or troublesome, as a necessary evil to be brought to an end as quickly as possible" (Mathiassen 1928:73).

5.1 Introduction

In the often frozen environments of the Arctic and subarctic sleds are an efficient means of conveyance over snow and ice for people and goods. This technology is well represented at Phillip's Garden where sled shoes are the most frequently represented tool type in the osseous collection, and remain the only parts that offer information on the manufacture and use of sleds at the site. Furthermore, their abundance, including numerous preforms and cores, demonstrates the importance of sled making and use in the daily lives of inhabitants. The large predictable supply of harp seal meat, blubber, hides and bone would have provided valuable products at Phillip's Garden. There is little doubt that a means of transporting the hunted animals and their products around the local area and elsewhere was an important aspect of life here.

This chapter describes the morphology of sled shoes at the site, the materials used, stages of manufacture and the distribution of the tools spatially and temporally. A morphological description of the sled shoes, their cores and preforms, will allow an exploration of Dorset sled shoe manufacture and use. A circumpolar ethnographic review of how sleds were constructed and the materials selected offers insights into how the pieces found at Phillip's Garden were part of a large composite piece of equipment. Nevertheless, the Phillip's Garden sled shoes exhibit design features unique in the Dorset world, and have no ethnographic equivalent.

5.2 Sleds in Ethnography

Sleds described in ethnographies were constructed of various materials such as wood, bone and ivory and designed in most cases to be hauled by either dogs or reindeer (Balikci 1970; Birket-Smith 1929; Bogoras 1909; Boas 1888; Mathiassen 1928; Murdoch 1892; Nelson 1899; Turner 1894). Occasionally when the need arose, sled parts were made from frozen hide and ice (Balikci 1970:12). The sleds were often simple, consisting of two parallel runners with upturned front ends. The runners were braced by a series of crossbars lashed to their dorsal surfaces and harder sled shoes fixed to the ventral surfaces. The shoes were commonly of the hardest material available, such as ivory, and often coated on their ventral surfaces with ice, or a frozen sludge made up of water and moss or mud. This coating protected the shoes from abrasion against the ground ensuring a longer use life. As spring approached and temperatures rose, the shoes became more vulnerable to abrasion as the protective coating melted away quickly.

Boas describes long sleds made by groups in the Hudson and Davis Straits (See map Appendix C). These were constructed of driftwood and measured between 1.5 m and 4.6 m in length, and 51cm to 76 cm in width. The top of the runners at the front end were straight, but curved upward from their underside. Shoes of whale bone or ivory were lashed or riveted to the runners (Boas 1888:122). When lashed, a line was passed through holes that had been counter-sunk into the shoe to maintain its smooth surface, and then a coating of ice was applied to this surface. Whale bone shoes were left as one long piece in shorter sleds, while ivory shoes were usually made up of numerous pieces lined up and riveted to the runner using wooden pegs. Crossbars of wood, bone or antler were positioned over the runners, and lashed with line passed through the crossbars from the dorsal to ventral surface and run through holes in the lateral surfaces of the sled runner.

Mathiassen (1928:73) describes a number of sleds from the eastern Canadian Arctic that were very similar to those recorded elsewhere. Runners were made of wood with the underside of the front end curved upward. They ranged in length from approximately 3-6 m and were all around 40-50 cm wide. The crossbars overhung the runners and measured as much as 70 cm in length. The front end of the runners was curved upward and each was shod with old whale bone. Fresh whale bone, saturated with fat was thought to be more difficult to fasten. The shoes were covered with a protective coating, in this instance, of a frozen peat and water mash (ibid. 75).

Murdoch (1892:353) describes sleds constructed by people in the Point Barrow region of northwestern Alaska. They were approximately 2.5 m in length and 75 cm wide. The runners were made of driftwood curved upward toward the front of the sled, and shod with whale mandible bone. However the upper portion of the sled was equipped with rails to contain the load, usually consisting of various smaller items such as camp supplies and clothing. Like those described above, holes through the lateral surfaces of the runners attached them to crossbars and rails. These sleds were sometimes shod with single blocks of river ice running the length of the sled, approximately 30 cm thick and 15 cm wide.

Grooves were cut into the ice shoe, the runner was inserted and the space filled with water and allowed to freeze.

Siberian sled runners exhibited some differences from those described for the North American Arctic (Bogoras 1909; Nelson 1899). Nelson described a sled type from Plover Bay in far northeastern Siberia which was used throughout the coastal area and on St. Lawrence Island. The runners were made from narrow pieces of driftwood approximately 5 cm wide and 3 cm thick. The length is not reported. From the illustration it is clear that the crossbars fit into depressions in the dorsal surface of the runners (Nelson 1899:208). Flat, thin pieces of wood were used as shoes lashed to the ventral surface of the runners through countersunk dorsal/ventral holes. Near the front of the sled the runner was attached to another overlapping piece of wood of the same width that was bent up and over the top of the sled (Figure 5.1). This sled form was hauled with dogs and in the case of some Chukchi in the region, reindeer.

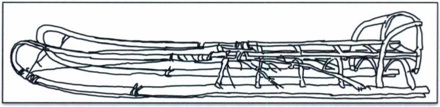


Figure 5.1 Wooden sled from Plover Bay northeastern Siberia (adapted from Nelson 1899:208). Note articulated pieces of wood added to the front end of the sled and bent up over the top. The crossbars fit into sockets carved into the dorsal surface of the runners.

Bogoras (1909:89) described a number of additional Chukchi sled designs, all fairly similar to the one mentioned by Nelson with reference to how runners were constructed and attached to other parts. These sleds measured approximately 2 m in length and were lightly constructed of antler and wood, with runners that had additional pieces added to the front which were bent over the top of the sled. The crossbars fit into shallow sockets carved into the dorsal surface of runners. Small holes on the dorsal surface of the runner were drilled adjacent to these sockets and lines were run through these and fastened to the crossbars to hold them in place (Bogoras 1909:90). The upper part of the Chukchi sled had rails or occasionally boxed in areas that were attached to the crossbars and run parallel to the runners. These held passengers and various supplies.

A number of ethnographers describe small sleds, usually hauled by people, that were used for short hunting and fishing trips and for transporting specific items such as kayaks (Bogoras 1909; Fitzhugh and Kaplan 1982; Mathiassen 1928; Murdoch 1892; Nelson 1899; Oakes and Riewe 2007; Rousselot et al. 1988:162; Van Stone 1988:180). Nelson (1899:208) describes a very small sled used to transport meat from kill locations to villages on St. Lawrence Island. It was only about 40 cm in length and consisted of two short walrus tusk runners on which sat three crossbars attached with lashing that was fed through the sides of the runners (Figure 5.2). Additional holes in the front and rear were used for lashing loads to the sled. These sleds appear not to have been shod or covered in a frozen coating.

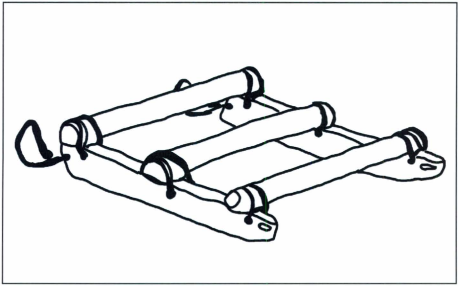


Figure 5.2 Sketch of a small sled described by Nelson (adapted from Fitzhugh and Kaplan 1982:229).

Similar sleds were used to transport skin boats, dead seals or tubs of water by Siberian and Alaskan groups, but specific measurements are not provided (Bogoras 1909:107; Oakes and Riewe 2007:9). These had stout wooden runners, turned up at the front, with ivory sled shoes and crossbars that were inserted into holes through the lateral surfaces of the runners. Sleds 1 m long and 36 cm in width from Southampton Island are briefly mentioned by Mathiassen (1928:74). The front of the runners was not curved up and the materials used in their construction are not reported. However the shoes were made of whale bone. Murdoch (1892:355) describes a sled measuring just over 50 cm with ivory runners and lashing holes drilled through the lateral surfaces to attach crossbars and wooden railings. The underside on the front end of the runners was carved to angle upwards.

A number of generalizations can be made about sleds in this ethnographic survey that will aid in the interpretation of the Phillip's Garden variety. There was variety in the size and design of sleds, but they shared some features. While they could be simply made, or elaborate, the shoes of most examples discussed were covered in a protective layer of ice, or some other material such as moss or mud mixed with ice and allowed to freeze. In addition, larger sleds were more likely to be pulled by animals, and smaller ones by people. The sled pieces from Phillip's Garden appear to be for relatively small sleds and have design features that share similarities and differences with those described in ethnographies. The following section provides a detailed description of the sled shoes from this site.

5.3 Phillip's Garden Sled Shoes

Sled shoe fragments make up the largest osseous tool category at Phillip's Garden with 624 examples. The sample in the assemblage examined here consists of 534 speciemens, all made of whale bone (Figure 5.3). There are two sled shoe forms in the collection, a beveled form (n=4) and a standard form (n=530). While there are many similarities the beveled examples are shorter, and some of the features of the dorsal surface are different (Figure 5.3).

Figure 5.3 Standard sled shoes. The top two are posterior (rear) fragments. Note the position of the line holes, one in front of the other. The third example down is the lateral view of an anterior fragment. Note that the ventral surface tapers upward at the anterior end to form the curve for the sled shoe. The right hand examples in both fourth and fifth rows are the dorsal view of the anterior end. Note the line holes positioned next to one another. The left hand examples on the bottom two rows are dorsal views of the dorsal surfaces.

a.

b.

Figure 5.4 a and b. Photo a., is a dorsal veiw. Note the number and orientation of line holes. The ridges on the lateral edges of the dorsal surface end at the point where the dorsal surface tapers toward the posterior (Photo b).

Both sled shoes forms are long and narrow with square cross-sections and smooth, flat to slightly rounded ventral surfaces. The dorsal surfaces usually have a wide flat channel running lengthwise down the center of the piece with two raised ridges along the sides (Figure 5.5).

Figure 5.5 Posterior end of a sled shoe showing the channel carved into the dorsal surface. Note that line holes are oriented longitudinally and the lateral surfaces are reduced to form a pointed posterior end.

Since this edge is relatively thin, it is more suseptible to destructive taphonomic processes and is, consequently, absent from some specimens. Nevertheless, 86.6% of the sample had a channel carved into the dorsal surface. The ridges along the dorsal surface of the shoes suggest a runner oriented in the same direction fit into the channel created. It is unlikely that channels were carved into these tools if crossbars were intended to sit on them. The ridges would crumble under the weight of any load put on the sled, and there is no evidence of notching on them for positioning crossbars. It is much more likely that another piece fit into the length of the shoe, and that perhaps it was made of wood since nothing that would fit the outline of the channel has been found at the site.

5.3.1 Standard Variety of Sled Shoe

The standard form is long and narrow with parallel sides. It is generally square in cross section, rising on the lateral edges of the dorsal surface. The dorsal ridges end toward the anterior end where the two anterior line holes are positioned. The ventral surface at the anterior end is angled upward by grinding the ventral/lateral corners creating a central keel and two beveled sides similar to the bow of a boat (Figure 5.6).

Figure 5.6 Standard sled shoe showing the ventral and one lateral face of the anterior end. Note that at the anterior end the ventral surface is slightly angled upward toward the lateral surfaces. The single, biforcated line hole is sunk into the ventral surface to maintain a smooth surface and protect lashing lines.

The posterior end of the standard sled shoe is ground on the lateral surfaces straight toward the central axis of the shoe leaving a tapered end (dorsal to ventral) (Figure 5.7). Line holes are carved from the dorsal to ventral surfaces at the two ends, and periodically along the midsection of the tool.

Figure 5.7 Posterior end of standard sled shoe.

Line holes in the shoes offer clues to how the sled was used. At the front of the sled shoe there are two holes about 10 mm apart (Figure 5.8). They meet a single hole counter-sunk into the ventral surface allowing a lashing line to pass up from the ventral to the two dorsal holes while maintaining a smooth ventral surface (Figure 5.9). The holes located along the midsection and rear of the sled shoe are positioned longitudinally, or one in front of the other and again the lashing lines are counter-sunk on the ventral surface.

Figure 5.8 Standard sled shoe showing the dorsal surface of the anterior end and the transversely oriented pair of line holes. The red lines suggest the orientation of lashing.

Figure 5.9 Ventral surface of standard sled shoe showing single ventral line hole at the anterior end. The red lines show how lashing would be counter sunk in the ventral hole.

The difference in the orientation of the lashing suggests that these lines were used for different purposes. At the rear and along the midsection of the shoe the lines could have passed from the shoe, through the runner and be well positioned to bind pieces sitting perpendicular on the runner such as crossbars. The line in the front of the shoe is oriented differently and may have been used to pull the sled (Figure 5.10).

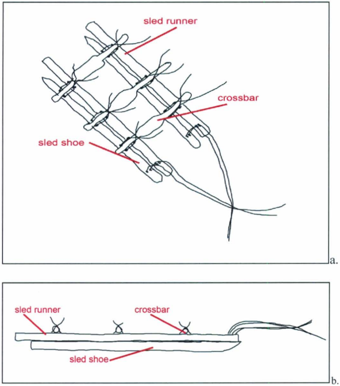


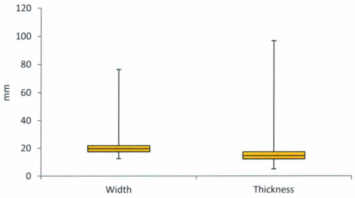
Figure 5.10 Diagram showing the parts for Phillip's Garden sled. The upper drawing shows how the runner would fit into the dorsal slot along the sled shoe and cross bars would fit over the runner. Pairs of lines counter sunk in the shoe would extend up through the runner and bind the cross bar. Lines at the front may have been oriented forward for pulling the sled. The lower drawing shows the lateral view or parts in their articulated form.

Most specimens of standard sled shoes in the collection are segments from the midsection. The minimum number of sled shoes that could account for the pieces in the collection is 46 based on the frequency of posterior pieces. Because there are no complete sled shoes, the most meaningful way to express the size range is width and thickness (Table 5.1). Figure 5.11 shows that while there are outliers in the sample most of the sled shoes are very uniform in width and thickness.

Table 5.1 Variation in the size of standard sled shoes from Phillip's Garden.

	Width mm	Thickness mm
Average	19.9	15.1
Median	19.6	14.5
Standard Deviation	4.0	6.0

Figure 5.11 Variation in width and thickness for sled shoe fragments



Length estimates for the whole standard sled are difficult to determine with confidence; nevertheless, a review of the position of line holes and the length of cores may offer some suggestions. Maxwell (1985:153) estimates the length of Dorset sleds to be between 1.85 and 2.4 m based on proportional comparisons to toy wooden models. There is only one complete example of a miniature sled runner in the Phillip's Garden collection (see Chapter 7) with a width of 4.3 mm and a length of 86.5 mm, the length being 20.3 times the width. If the average width of the standard form is 19.6, the average length could be approximately 4 m. This method is unsatisfying since there is unlikely to be any proportional relationship between the representations and full-size sled shoes. Indeed, design features of the toys are different in a number of ways. Line holes, for instance are placed through the lateral sides of tools (Figure 5.12).

Figure 5.12 Miniature representation sled shoe. Note that line holes pass transversely through the lateral surface.

The two largest sled shoe cores in the collection measure 1.7 m and 1.30 m. Since standard sled shoes do not appear to be made up of articulating parts and since no medial segments are unbroken, this could indicate the approximate length. Nevertheless, this is a small sample of cores from which to suggest a total length. The distance between line holes may offer some clues to the length of the finished tool. Because of fragmentation, there are only a few sled shoe examples where more than one set of line holes is present.

In one long posterior specimen, the distance between the posterior line holes and the next set of medial line holes is 47 cm. On another anterior fragment there is a distance of 45 cm from the front line holes to the next set along the medial section of the tool. If there were only three sets of line holes, the total length would be approximately 1 m. However there are two medial fragments with two sets of line holes, one 16 cm apart and the other 26 cm apart. If there were two medial line holes, then the length would range from approximately 1.1 m to 1.2 m in length. It is impossible to determine how many sets of medial line holes there are, but given the length of cores, a tentative estimate of length for standard sled shoes is between 1.0 m and 1.5 m.

5.4 Bevelled Variety of Sled Shoe

There is only one complete example of the beveled form measuring 200.0 mm in length, 18.7 mm in width, and 18.0 mm in thickness. The three other pieces include an anterior portion, a midsection and a posterior portion, giving a minimum number for this sled shoe form of three (Figure 5.13).

Figure 5.13 Bevelled sled shoe forms.

All were made from whale bone. The ridges created on the lateral edges of the dorsal surface of these shoes run only about half way along its length from the anterior end. From about the midpoint of the tool the dorsal surface is carved downward diagonally toward the ventral surface of the posterior end (see Figure 5.4b above). Line holes on the anterior half of the tool are positioned side by side and lead from the dorsal surface to a single counter-sunk line hole on the ventral surface. Along the midsection and at the posterior end there are three pairs of line holes that run down the center of the dorsal surface, usually one in front of the other, but in one example they are somewhat overlapping. They too meet a single counter-sunk line hole on the ventral surface.

The position of line holes and the presence of a carved channel on the dorsal surface suggests that these shoes operated in a similar fashion to the standard form; however they were likely attached to other sled shoe segments. The extensions would have lacked an anterior end and would have been carved to bevel upward and slide on to the posterior end of the beveled form. While no examples have been recovered, the often broken and damaged condition of the sled shoes makes it difficult to positively identify any extension pieces, and the rarity of the beveled form suggests they too may have been infrequent. The beveled form may have been used to build longer sleds when whole pieces of available whale bone raw material were not sufficiently long or when whale bone of sufficient length was scarce requiring reworking of broken pieces. Alternatively these shoes may have been used as extensions for the standard length sled, or perhaps as the front piece of a mostly wooden sled shoe. All four beveled forms were found in middle phase houses, two in House 17, one in House 4 and the last in House 6.

5.5 Nomenclature: Sled Runners Versus Sled Shoes

The Phillip's Garden sled shoes have features which could suggest they functioned as sled runners rather than shoes; however most morphological evidence strongly supports their being the latter. While inconclusive, two characteristics of the tools could indicate they were runners. The underside of the front end is curved upward like many of the runners described in ethnographies, and there are six examples with decoration on the ventral surface which would seem unlikly if the tool was expected to occasionally come in contact with the ground. However, as seen in many of the ethnographic examples shoes are usually also coated in a protective layer of ice or frozen sludge to facilitate easy gliding over ice and snow, so any decorations would have been protected. In addition, ethnographies describe sled shoes that curve upward over runners.

The strongest piece of evidence that these are sled shoes is the presence of a wide, flat groove carved the length of the dorsal surface. It would have been a great investment in time and effort to carefully remove the bone from this portion of the tool. There is no doubt it was done in order to accomodate another piece positioned in the same orientation. It seems likely that runners made of a material such as wood fit into the shoes and held the crossbars. Furthermore the holes in the ventral surface are counter-sunk to maintain a smooth surface and striations on the ventral surface are not uniform in size and orientation suggesting occasional abrasive contact with hard objects such as stones rather than the result of tool manufacture (Figure 5.14).

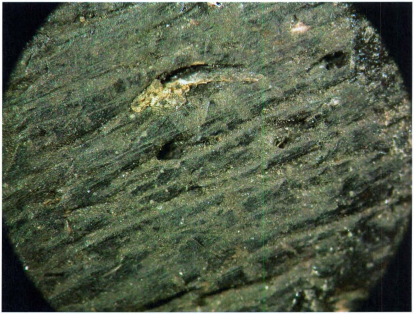


Figure 5.14 Striations on the ventral surface of a sled shoe at 10x magnification (EeBi-1:32338).

Harp (1976), who first described these tools from Phillip's Garden, was inconsistent in naming them. He refers to them as sled runners and not sled shoes; nevertheless his description of their characteristics confirms his notion that they functioned as shoes fitting beneath the runner. He (Harp 1976:76) states:

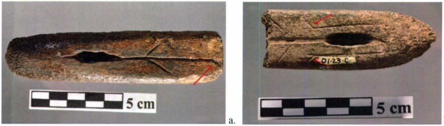
> "On the bottom (*of the shoe*), the connecting rib between these two holes is cut away so that a lashing would be countersunk beneath the running surface. A final significant characteristic of this and all other fragments in the group is the presence of deep, longitudinal scratches along the convex bottom surface. One would expect a bare sled runner to be scarred in just this manner, and the scratches suggest that the runners were used without the application of an artificial surface of sludge or ice." (insertion added).

Following Harp's nomenclature, Renouf (2009) continues to use the term runner to describe these tools.

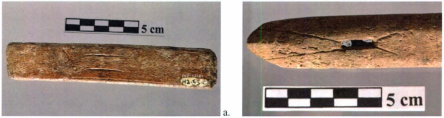
Harp states that shoes were likely left with no coating of ice or frozen sludge because of the striations he observed; however the relatively small amount of damage seen in this analysis of the entire collection contradicts this generalization. It is expected that even light contact with ice, snow and occasionally the ground would result in significant surface damage, but this is not the case. In fact, there are only a few striations on some sled shoe fragments, and these are not particularly deep. Consequently, it would appear that efforts were made to minimize this by adding a protective layer. Furthermore, the occasional addition of decoration on the ventral surface indicates the likely intention to protect this surface.

5.6 Decoration on Phillip's Garden Sled Shoes

Decorative designs are carved on six sled shoes, three standard forms, and three for which the form cannot be determined. Decoration appears on the ventral surface only, close to the anterior end on five examples, and on the midsection of one shoe. Two examples consist of single incised lines running down the center of the shoe toward the posterior from the anterior line hole on the ventral surface (Figure 5.15 a and b). At two locations on one of the tools, and one on the other, there are two diagonal lines radiating out from the central line to make an arrow shape. In addition, one example shows two single parallel lines on either side of the anterior line holes each with a single short incision radiating out from the lateral side of the line. One midsection of a sled shoe has two short parallel lines running lengthwise along the shoe (Figure 5.16a). Two examples have two incised lines radiating out diagonally toward the lateral edges from the posterior end of the anterior line hole to form an X-shape, and another has two additional lines radiating diagonally out from the anterior end of the anterior line hole (Figure 5.17b). Finally one fragmented example has two parallel incised lines on either side of the anterior line hole, running toward the tip of the shoe. While the frequency of decoration appears low, there are only 34 anterior ends in the collection, and as this is the most frequently decorated portion of the shoe, the five specimens represented suggests that close to 15% of the shoes could have been decorated.



a. b.
Figure 5.15 Anterior portions of sled shoes with decorations involving incised lines running from the line hole toward the posterior of the shoe. Note that diagonal lines radiate laterally to form an arrow shape. In Photo a there are two arrows, the red arrow indicating the second, posterior set. In Photo b there is one arrow shape and the addition of two parallel lines each with one projection diagonally toward the side of the tool (indicated by red arrows).



a. b.
Figure 5.16 Photo a., shows two short parallel incised lines on the ventral surface of a sled shoe and Photo b., shows four lines radiating diagonally from an anterior line hole. Together they form a X-shape.

5.7 Sled Shoe Distribution

There are some significant differences in the frequency of of standard sled shoe specimens in features across the site (Figure 5.17). While sled shoes are present in all features, House 17 in particular has significantly more than other features. Because the results could be influenced by differential fragmentation among the features, all total lengths of fragments for each feature are summed, not to demonstrate any real indication of sled shoe numbers, but to assess relative differences (Figure 5.18). Again House 17 appears to have a greater frequency of this type while all other features remain relatively even.

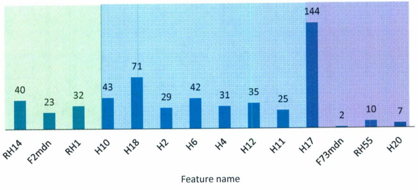


Figure 5.18 Number of sled shoe fragments from selected features at Phillip's Garden arranged from oldest to youngest.

Chi square = 409.475, p <0.0001

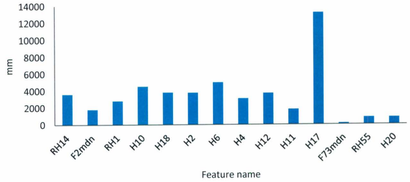
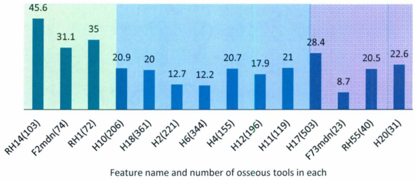


Figure 5.19 Total length measurements for sled shoes from selected features at Phillip's Garden arranged from oldest to youngest.

However, when the number of fragments in each feature is expressed as a percentage of their total osseous tool assemblage, it is clear that Renouf's Houses 1 and 14 from the early phase have high frequencies of sled shoes in addition to House 17 (Figure 5.19). The distribution of sled shoes demonstrates that the inhabitants of Phillip's Garden relied on sleds for the transport of goods throughout the occupation of the site. Nevertheless, they tend to be frequent during the early phase, becoming less so during the middle phase with a slight increase again in the late phase.

Figure 5.19 Percentage (%) of sled shoes in the osseous assemblage from selected features at Phillip's Garden arranged from oldest to youngest.



5.8 Sled Shoe Construction, Cores and Preforms

It is impossible to differentiate whether bevelled or standard sled shoe forms were intended from the sled shoe cores and preforms; consequently they are discussed as a whole. Sled shoe cores are large pieces of whale bone that have scars from the removal of long, rectangular segments (Figure 5.20). There are 20 examples from dated features at

Phillip's Garden. No articular ends of cut whale bone have been recovered from the site suggesting that the cores were partially prepared elsewhere, possibly quite close to the water's edge. Without a comparative faunal collection it was not possible to identify with confidence the elements selected for making sled shoes; however since they are large, thick and relatively straight they appear to be made from mandibles. Whale bone is heterogeneous in density with some elements or parts of elements having thick dense outer layers and more porous, spongy inner layers (Figure 5.21). The denser outer layer makes up the ventral surface of the sled shoe, with some remaining spongy bone for the dorsal surface.

Figure 5.20 Whale bone sled shoe cores.

Figure 5.21 Cross-section of whale bone sled shoe core. Note that the dense outer portion of the bone is sought for the construction of sled shoe's ventral surface.

Sled shoe preforms were removed by gouging and cutting a straight groove along the length of the core and snapping the blank off when the compact bone had been severed and only the more porous cancellous material remained. The groove was achieved using burin-like tools and retouched flakes or bifaces. Bone wedges were inserted into the cut groove to pry the blank from the core. The bone appears to have been cut through the entire outer layer. The ragged nature of the spongy bone area on the preforms suggests this portion was simply broken from the core (Figure 5.22). The preform was then laid on its side and some of the spongy material cut off (Figure 5.23). Initial cuts along the margins between bone types appear slightly uneven or wavering. They are narrow, shallow grooves that were likely accomplished using a burin-like tool. Microscopic examination of the groove surface shows them to be smooth and relatively flat with no apparent individual slices characteristic of chert bifaces or retouched flakes. Nevertheless, it is likely that burin-like tools were used alternately with bifacially worked lithic tools, with any traces of the jagged edged chert tools obliterated by subsequent burin-like tool use.

Figure 5.22 Sled shoe preform showing the finely cut compact bone and the ragged appearance of the broken cancellous bone.

Figure 5.23 Initial incisions on the lateral side of the sled shoe preform to remove the more porous cancellous bone.

Preforms with the posterior and anterior ends partially constructed are rare with only three examples in this collection. This results in a somewhat tentative discussion of their manufacture. In most cases the preforms are probably well along in construction before features such as the end beveling are created. Nevertheless, one posterior preform fragment did not have the spongy portion cut off, yet the end had been beveled. Scars on the side of the preform near the bevels are relatively short and wide resembling scraper working (Figure 5.24). The bevels themselves show fainter scars as this area was subsequently abraded. One incomplete anterior portion shows the development of the bevels before line holes were constructed (Figure 5.25). In this case it appears the intention to create a sled shoe from this preform was abandoned and this worked portion was cut off to ready the remaining piece for manufacture into a new tool.

Figure 5.24 Posterior fragment of a sled shoe preform showing the shaping of the end prior to the removal of the cancellous bone.

Figure 5.25 Sled shoe preform with some preparation of the underside of the anterior end.

The channel on the ventral surface of the sled shoe was created by incising two parallel lines down the length of the tool, and then removing the bone from the center. Figure 5.26 shows the only preform that displays this stage. A microscopic examination of the groove's surface is made up of thin incisions suggesting that they were cut with a flaked chert tool rather than a burin-like tool. The bone in the center was likely removed with a scraper and then abraded to create a smooth finished surface.

Figure 5.26 Parallel incisions to make the ventral channel in a sled shoe preform.

The morphology of the line holes is similar for both the standard and beveled forms. Bone was removed to make holes by incising into an ever deepening groove using a slicing action, probably with the sharp unretouched edge of a lithic blade or flake (Figure 5.27). In some instances there are scars that show the downward motion of a slightly pointed tool. This may have been to straighten the sides of the holes (Figure 5.28).

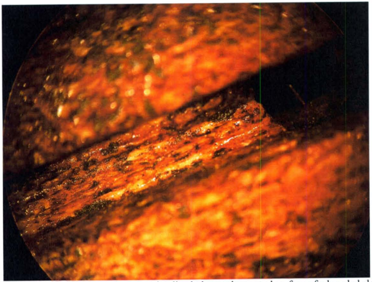


Figure 5.27 Incision scars from creating line holes on the ventral surface of a beveled sled shoe EeBi-1:27605 (10x magnification).

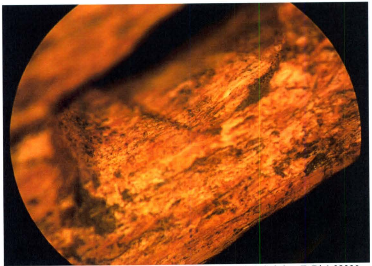


Figure 5.28 Channels cut through the line holes on a beveled sled shoe EeBi-1:32330 (20x magnification).

Based on limited specimens it is possible to offer a general summary of sled shoes manufacture (Figure 5.29). Long, straight whale bones, probably taken from mandibles, were selected for sled shoes. Ends were removed and the remaining sections were split. Smaller implements, including burin-like tools used in conjunction with bifacially worked tools, were used to cut the shape of the sled shoe from the whale bone core with the additional aid of wedges. The preform was then further reduced to the approximate size and shape of the finished tool by incising a groove along the margin of the bone between the dense outer, and porous inner bone. In some cases the posterior end of the sled shoe was beveled by scraping and abrading before the porous bone was removed. The anterior end of the sled shoe preform was beveled, probably with a combination of scraping and abrading. A channel was created on the dorsal surface by incising two parallel grooves to outline the area, and then scraping bone from the proposed location of the channel. Finally line holes were created for lashing the shoes to other parts of the sled.

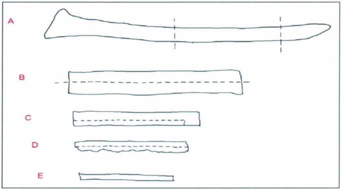
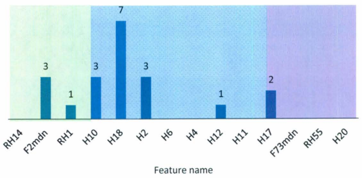


Figure 5.29 Diagram of core reduction into a sled shoe preform. A straight section of whale bone is selected and cut through (A). It is split (B), and then a section including compact and cancellous bone is cut out (C). The cancellous portion is removed (D) and the remaining preform is ready to be finished with line holes, the formation of dorsal channels and end shaping (E).

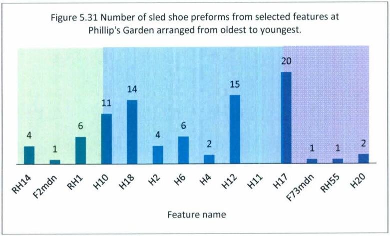
Twenty sled shoe cores and 87 sled shoe preforms have been identified at Phillip's Garden, distributed throughout the site and in all phases. These manufacturing objects are distributed in featurs that span the occupation attesting to the importance of sled making at the site. While sled shoe cores are relatively rare at the site and differences in their relative frequency are insignificant, they are most common from the early to middle phases and fairly rare after the start of the late phase (Figure 5.30).

Figure 5.30 Number of sled shoe cores from selected features of Phillip's Garden arranged from oldest to youngest.

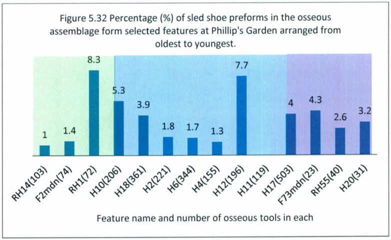


Chi square = 7.333, p = 0.2911

Sled shoe preforms are more common and are found in all phases, in significantly different frequencies (Figure 5.31). When represented as a proportion of the total osseous assemblage for each feature Renouf's House 1 and House 12 show slightly higher frequencies of preforms (Figure 5.32).



Chi square = 62.000, $p < 0.0001$



5.9 Summary

As the most frequently represented tool in the osseous assemblage sled shoes demonstrate the importance of transportation within Phillip's Garden and for the broader region. The presence of sled shoe cores and preforms shows that their manufacture was widespread over time and in features at the site. Along with finished tools it is possible to suggest how sled shoes were constructed. They were all made from long segments of whale bone and reduced mainly using a technique of grooving and snapping the material from its core. Cutting, scraping and abrasion were used to finish the tool. There was consistency in this methodology over time, and almost all finished specimens had a standard morphology with the exception of shorter bevelled specimens. These may have been composite pieces only occasionally used. Otherwise it is likely that the sled shoes consisted of one piece running the length of the sled. Sleds were probably relatively short compared to many ethnographic examples hauled by animals. The examples from Phillip's Garden would have been used to transport goods, and perhaps children or elderly passengers. Their presence at the site is an indication of the importance of transport and mobility, and the relative differences in their frequency suggest that mobility may not have been constant over the extent of the occupation.

Chapter 6

Hafts in the Phillip's Garden osseous assemblage

6.1 Introduction

The morphology of osseous materials, particularly antler, makes them well suited as hafts for holding or bracing (in the case of composite implements) stone tools. They are smooth by nature, and relative to harder materials, easy to grind and polish into a desired shape. In addition, osseous tools are light, and their toughness and flexibility allows movement and pressure to be exerted on the hafted tool without breaking the haft. There are 49 osseous hafts in the sample selected from Phillip's Garden, and although they are not represented in high numbers, they are present at the site in dwelling and midden features spanning the temporal extent of the occupation. The hafts fall into two general categories; large and small. There is some variation within each of the categories, which is described in detail in the following chapter.

6.2 Large Hafts

There are 14 from a total of 16 large hafts in the sample from dated features at Phillip's Garden; all but one whale bone example are made of antler. Nine are minimally altered in manufacture, mostly taking advantage of the natural caribou antler shape to create the desired form. In contrast, four of the large hafts show decoration on both proximal and distal ends, and a midsection that is narrowed to create a broad indentation (Figure 6.1).

Figure 6.1 Large hafts. Top row shows both surfaces of the triangular forms which incorporate the beam and palm of the antler. Note the stems at the proximal end created by removing a section from one surface, and in one case the addition of a line hole. The bottom row shows from left, the rectangular example with transverse grooves near the proximal end; the whale bone example with a stemmed proximal end and traces of incised lines transversely across the stem; and finally an example of the indented form with decoration incised into the proximal end.

One rectangular large haft is made from the beam portion of caribou antler, while eight are triangular in shape. The proximal end of the rectangular example has two deep, parallel grooves carved transversely across one surface and the remnants of what may have been a stem. The proximal end of the triangular specimens is carved from the narrower beam portion, and flares toward the distal end on the wider, palm portion of the caribou antler. At the palm, or distal end, the interior spongy material is removed to create a socket to accommodate a tool. The interior of the socket has straight sides that are pointed at the ends, probably to accommodate a bevelled tool (Figure 6.2). There is often a section cut from this form on the dorsal or ventral surface at the proximal end leaving a stem created from the antler beam section. Occasionally notches are carved into the stem, or deep grooves are carved into one surface just above the stem (Figure 6.3). It is likely that this stem held an additional part of what would have been a composite tool. The lateral edges of the haft are sometimes ground and polished to create a series of bevels.

Figure 6.2 Distal surface of large hafts. Note that the dorsal and ventral surfaces of the socket are parallel and straight, but angle to a point at the lateral ends. In addition, the example on the right has bevelled lateral surfaces that mirror the outline of the socket.

Figure 6.3 Variety of stemmed large hafts. Note the deep groove carved into the example on the bottom right. The example on the top left has been ground to a slight bevel on the lateral edges.

One large whale bone haft is stemmed at the proximal end with a series of parallel lines incised transversely across the stem on both the dorsal and ventral surfaces, and a line hole running dorsal-to-ventral through its proximal extreme (Figure 6.4). The dorsal surface seen in Figure 6.4a is flat with only faint transverse incisions on the stem, while a portion of the ventral surface toward the stem has been cut away creating a ledge between the stem and the body of the tool on this surface. It is possible that the surface on this side of the stem was positioned against another tool; however, it would be difficult to explain the role of the deep grooves on this part of the stem (Figure 6.4b). Nevertheless, the line hole may have been involved in attaching the haft to another tool such as a larger handle.

Figure 6.4 Two views of a large whale bone haft. The dorsal surface on the left (a) is flat while the ventral surface (b) has been cut away at the proximal end at the stem.

The large indented haft form is rectangular in shape with lateral edges that taper slightly toward the proximal end. Toward this end the base projects laterally at right angles to the side of the tool, then tapers toward the proximal extremity which is either slightly rounded, somewhat pointed or straight (Figures 6.5). One example is also flared at the distal end, but two others with this portion of the tool remaining have deep notches carved transversely just below the distal edge. All are constructed from antler and often there are transverse lines incised in both the dorsal and ventral surfaces near the proximal end. In an example on display at The Rooms Provincial Museum there are a series of parallel lines running the length of both dorsal and ventral surfaces (Figure 6.6).

Figure 6.5 Large indented hafts. Note that while they all have wide proximal ends the bases are either pointed as in the example on the left, rounded as on the top right, or straight as seen in the lower right example. The distal end of this last example is flared.

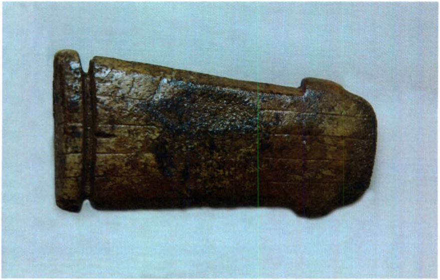


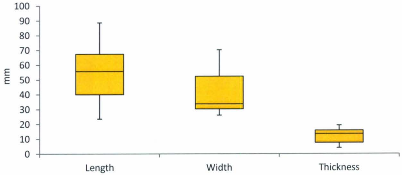
Figure 6.6 This complete example of a large indented haft in collections at The Rooms Provincial Museum is decorated on both the dorsal and ventral surfaces with a series of parallel lines that run the length of the tool, and a deep groove carved transversely at the distal end.

Table 6.1 presents the average, median and standard deviation for the large hafts. There is some variation in all measurements of length, width and thickness which is illustrated in Figure 6.7.

Table 6.1 Variation in the size of large hafts from selected features at Phillip's Garden.

	Length mm	Width mm	Thickness mm
Average	53.6	40.6	12
Median	55.7	33.7	13.5
Standard Deviation	20.6	14.6	4.9

Figure 6.7 Variation in length, width and thickness for large hafts from selected features at Phillip's Garden.



While few in number, the large haft forms are temporally spread from early in the middle phase to the late phase of occupation which is not surprising given that slate scraping tools are likewise well distributed over time (Knapp 2008) (Figure 6.8). House 4 and House 17 have more large hafts than other features; however these frequency differences are not significant. When presented as a proportion of the osseous tools in each feature it is only House 4 that continues to show a relatively large proportion of these tools (Figure 6.9).

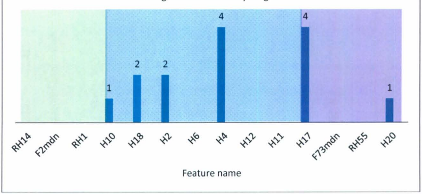


Figure 6.8 Number of large hafts from selected features at Phillip's Garden arranged from oldest to youngest.

Chi square = 4, p = 0.5494

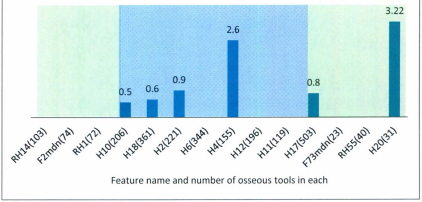


Figure 6.9 Percentage (%) of large hafts in the osseous assemblage from selected features at Phillip's Garden arranged from oldest to youngest.

6.3 Large Haft Preforms and Manufacture

There are two large haft preforms that offer some clues to the manufacture of these tools (Figure 6.10). They are sections of caribou antler beam that have been cut transversely across both ends and one of these has some of the interior spongy material removed from the distal surface (Figure 6.11). The blanks were removed from the antler core by cutting the harder outer portion of the antler on both the dorsal and ventral surfaces until the softer spongy material was reached, at which point the blank was snapped off leaving some of this material behind. In one example the tool socket was partially prepared; however, only the center of the spongy interior was removed. Furthermore, the interior surfaces of the socket had not been straightened as in finished tools, but angled toward the center to form a v-shaped interior concavity. At the proximal end of both preforms a section of one surface (dorsal or ventral) has been removed including the spongy interior, leaving a slightly tapered stem. Traces of cut marks show that this was achieved by cutting transversely across the tool surface and along the lateral edges of the preform. The transverse cut again penetrates to the spongy material before the debitage is snapped or levered off.

Figure 6.10 Large haft preforms. The distal ends (lower part of photo) have been cut through the denser antler material and snapped once the spongy material was exposed. Some of the spongy material protrudes from the example on the left. The specimen on the right has had some of the spongy material removed, but the sides of the socket are not yet straight. Both tools show the removal of a section of one surface from the proximal end.

Figure 6.11 View of the distal surface of a large haft preform. Note the ragged edges where this end has been cut and then snapped to prepare the preform. Only a small portion of the interior spongy material has been removed.

To summarize, while there are only two examples, there is consistency in the sequence of reduction for these hafts. Both preforms have been cut from the beam portion of caribou antler by cutting through the denser outer layer of the antler and then snapping the remaining spongy interior. No grinding has taken place to remove the jagged edge of the cut antler. The next stage involves the removal of a section of one surface, followed by the removal of the spongy interior. No traces can be seen of this procedure, but it begins with the step of removing the center, presumably followed by cutting and gouging to make the shape of the socket and to straighten the walls.

Microscopic examination of the tool socket interiors occasionally shows evidence of how its shape was achieved. Most traces consist of arch-shaped slices suggesting the use of a blade or retouched flake tool to slice downward at the lateral surfaces of the socket (Figure 6.12). These are interpreted as resulting from the manufacture of the haft since multiple tiny slice marks indicate a cutting action, rather than the crushing damage more indicative of use, that is, a tool being jammed into the haft.

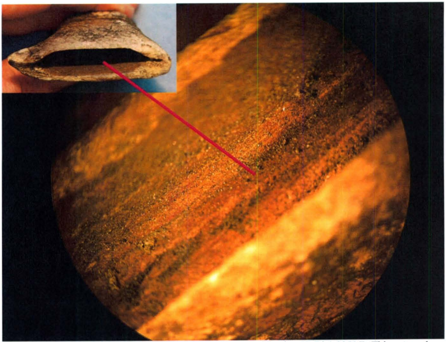


Figure 6.12 Interior surface of a large haft socket at 10x magnification (EeBi-1:33515). Thin cut marks can be seen indicating the removal of spongy material with a sharp blade during the haft manufacture.

6.4 Small Hafts

Small hafts were manufactured to accommodate smaller stone tools such as burin-like tools and cutting implements including microblades and retouched flake tools. In some cases they were used as braces, holding tools firmly within handles. The 35 from a total of 41examples in the Phillip's Garden sample are all generally rectangular with sockets cut into their lateral surfaces or distal ends, and occasionally with ledges cut into one of the surfaces upon which a tool would have rested (Figure 6.13). Most are constructed of antler, but often it is difficult to differentiate antler from bone, and all are well ground and polished (Table 6.2).

Table 6.2 Number and percentage of materials used in the manufacture of all small hafts.

Material	Bone	Antler	Bone/Antler	Total
Number	5	18	12	35
%	14.3	51.4	34.3	100.0

Figure 6.13 Range of small hafts. On the top row from the left are two examples that may have held larger tools, followed by a series with sockets on the lateral surface opposite single, or in the case of the last two, double notches. Note that the distal ends are either tapered to a point, or narrow and blunt. On the second row are two small hafts with double sockets opposite their notches. These are followed by four examples with sockets placed transversely at their distal ends. The last two in this row have small ledges for tools to rest on.

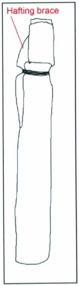
Thirty examples have small sockets carved into their lateral surfaces (Figure 6.14). Twenty-six of these have a single socket carved into one lateral surface toward the distal end, and a tiny notch in the opposite surface. Two examples have double notches opposite a single lateral socket, and two examples have double sockets for holding two tools (Figure 6.15). Almost all the side-socketed forms are flat on the dorsal and ventral surfaces. The only two exceptions are examples that are round to oval in cross-section, and larger than the other side-notched forms (Figure 6.14). Compared to the others, these two may have held larger stone tools such as bifaces. One of these has a line hole through the body of the haft and a series of slightly rounded protrusions on one lateral surface.

With the exception of the examples that have double sockets, all others side-socketed hafts are thought to have functioned specifically to brace burin-like tools in their handles (Figure 6.16a). The burin-like tool would have been inserted into the distal end or socketed lateral surface of a handle. One of its sides would fit into the lateral socket of the brace, and the brace would be bound tightly to the handle (6.16b). The brace keeps the burin-like tool securely in place as a fair amount of pressure is applied to it during work. Notches in the brace hold the fastening material in place.

Figure 6.14 Side-socketed hafting braces. Note the lateral notches positioned opposite the sockets. The first two examples on the left are round or oval in cross-section while those to the right are rectangular. The two size groups may have accommodated different tools.

Figure 6.15Double- notched small hafts. Photo a. shows two examples with a single socket on the lateral surface opposite each pair of notches. Photo b. shows two examples with double sockets opposite their two notches. Arrows point to the location of sockets.

a.



b.

Figure 6.16 Burin-like tools in hafting braces (photo a.). The drawing b. shows how the brace held the burin-like tool firmly in its handle.

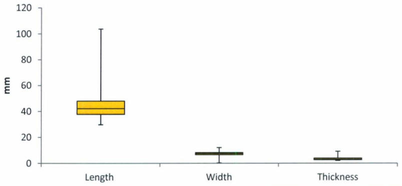
The tools with double sockets are more difficult to interpret. One example has two sockets on either end of one lateral surface with two matching notches on the opposite surface. Another example has two lateral sockets on opposite ends of opposite lateral surfaces with accompanying notches. It is possible that only one socket was fitted with a tool at a time, allowing it to be attached to a handle, or perhaps they were bound to tools without handles and simply held in the hand of the worker.

There is a fair amount of consistency in the size of small hafts; however there are a few specimens that are large, increasing the standard deviation for the length in particular (Table 6.3). Figure 6.17 illustrates the effects of the outliers in the length of this form.

Table 6.3 Variation in the size of side-socketed hafts from Phillip's Garden.

	Length mm	Width mm	Thickness mm
Average	47.3	7.5	3.8
Median	42.2	7.5	3.1
Standard Deviation	18.9	2.1	1.7

Figure 6. 17 Variation in length, width and thickness for side-socketed hafts from selected features at Phillip's Garden.



There are four examples of small hafts with sockets carved into the distal surface of the tool for holding a stone tool. These are referred to as end-socketed and include two complete examples that are very different in size suggesting some variation in the size of the hafted tool (Figure 6.18).

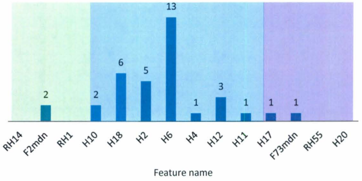
Figure 6.18 End-socketed small hafts. Note the size difference between these two complete examples.

Finally, there are two hafts with small ledges carved partially into one surface approximately 1 cm from the distal end (Figure 6.19). One example is diamond-shaped in cross-section with an incompletely carved hole placed into the surface opposite the ledge for securing a tool. The other is plano-convex in cross-section and more expediently constructed with no holes or notches. Both are made of bone.

Figure 6.19 Small ledge hafts. The example on the bottom has the early stages of a line hole carved into one surface.

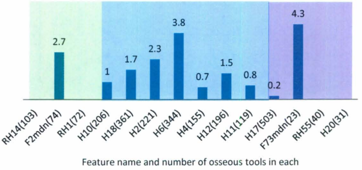
Figure 6.20 shows the number of all small hafts at Phillip's Garden. As with the large hafts, these are distributed widely at the site both spatially and temporally. All phases of occupation are represented and while not numerous, they are significantly more frequent in House 6. When presented as a proportion of all the osseous tools in each feature they are especially frequent in this particular house (Figure 6.21).

Figure 6.20 Number of small hafts from selected features at Phillip's Garden arranged from oldest to youngest.



Chi square = 36.714, p < 0.0001

Figure 6.21 Percentage (%) of small hafts in the osseous assemblage from selected features at Phillip's Garden arranged from oldest to youngest.



6.5 Small Haft Preform and Manufacture

One small haft preform, a burin-like tool brace, has been recovered in the sample from Phillip's Garden, from Renouf's House Feature 55 (Figure 6.22). It is unbroken and nearly complete; lacking only the placement of the lateral tool socket. Because there is a very shallow but obvious ledge on the lateral side of the unbroken example, there is a possibility that a socket was never intended and that this tool represents a slightly different form; however the shallowness of the ledge seems insufficient for holding a tool in place. Furthermore the complete lack of damage to the lateral side above this ledge suggests no tool had even been bound to the haft. This evidence weighs in favour of considering the piece an unfinished tool.

Figure 6.22 Burin-like tool brace preform. Note the small ledge on the lateral surface and the lack of a lateral socket.

With only one preform in advanced stages of manufacture it is impossible to demonstrate the earliest stages of manufacture, other than to state that in some cases the lateral socket is placed after much of the tool has been completed. However while the sequence remains indeterminate it is possible, based on finished tools, to describe the actions involved in making the small haft forms. Thin sections of caribou antler such as the palm, or mammal scapulae bone, were likely selected for the manufacture of side-socketed hafts. The ends and edges were ground and polished and notches and sockets were cut into the lateral surfaces. Tiny traces of cut marks can be seen at low magnification in the sockets of some tools suggesting the use of a sharp-edged tool such as a microblade or flake. However the slightly flattened appearance at the base of the socket suggests the additional use of a burin-like tool (Figure 6.23). The flat base does not look as though it was crushed by the insertion of a tool, rather it looks intentionally carved to securely hold it in place.

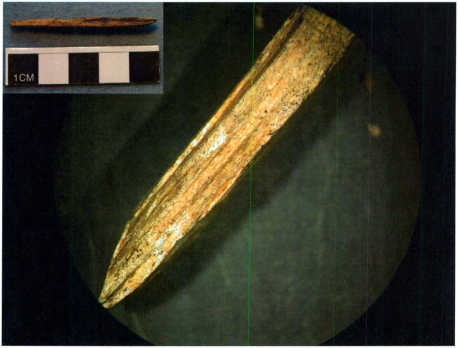


Figure 6.23The surface of a side-socketed haft at 10x magnification (7A323A49). Multiple thin cut marks and smoother areas are visible where burin-like tools chiselled to make a flat surface with straight sides.

6.6 Summary

Although very few in number, both the large and small hafts from Phillip's Garden are present at the site throughout its occupation phases. While they are fairly evenly spread throughout features, House 4 has a relatively high number of larger hafts, and House 6 has a greater number of small hafts. The variety of forms attests to the likelihood that a range of stone tools were hafted, and in the case of the large triangular forms, they may have been part of composite tools for holding adzes, or perhaps scraping tools.

Very few of the stone tools at Phillip's Garden are large enough to fit into the distal socket of the large haft forms. The exceptions are nephrite adzes and some of the slate scraping tools. The former are very rare suggesting slate scrapers a more likely tool. Furthermore, the haft sockets that are well preserved are often carved to fit a bevelled tool reinforcing the idea that these hafts functioned in holding tools involved in scraping.

The small hafts could have accommodated a variety of stone tools, but may have been most frequently designed for burin-like tools and some microblades which possess a complementary single notch. Because the sockets in the end-socketed hafts are similar to those of harpoon heads, it is possible that an endblade fit into these tools, or perhaps a tool similarly thinned in the base to be jammed, conceivably with shims or resin glue, into the socket. There were no notches for binding a tool in place suggesting that the tool may have been unbound in the socket. Furthermore, the surface of the haft did not indicate any transverse striations indicative of binding. Without binding material in place the range of the tool's movement was limited, since side-to-side pulling and pushing would quickly loosen the hafted tool. Consequently, it is likely the tool was used in a single, forward movement, perhaps as a projectile. The small haft with the ledge could have held a wide range of tools, particularly since tools would have had to have been bound to the haft.

The hafts from Phillip's Garden offer insights into how tools were made, held and used. Osseous material is tough and flexible, comfortable to hold, and relatively easy to shape allowing for a variety of designs. The hafts discussed above demonstrate designs that incorporate existing raw material shapes, and others that involve more elaborate transformation. The forms suggest that a variety of tools were hafted, and suggestions for the kinds of activities these tools were involved in have the potential to show the range of action in locations throughout the site and over time.

Chapter 7

The Varied Expressions of Osseous Representational Art at Phillip's Garden

"The preservation of this art not only reveals another side of Dorset culture but also helps to explain many of the otherwise baffling elements of Dorset technology and way of life."
(McGhee 1996:150)

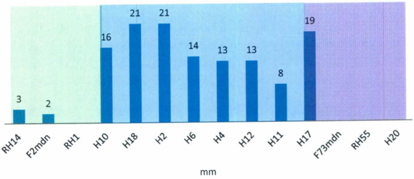
7.1 Introduction

Osseous materials were frequently used to create both realistic and abstract representations of tools and animals important to the Dorset at Phillip's Garden. This assemblage is strongly influenced by features common to Dorset traditions found throughout its geographic and temporal range, including numerous depictions of arctic animal species such as bears, seals and walruses (LeMoine et al. 1995; McGhee 1974/75; Taçon 1983; Taylor and Swinton 1967; Sutherland 2001; Sutherland and McGhee 1997), and miniature forms of tools such as harpoon heads and sled shoes (Maxwell 1985; Park and Mousseau 2003). Phillip's Garden has, in addition, a high frequency of very abstract depictions of animals. Despite the insubstantial development of identifiable features, it is sometimes possible to suggest the animals represented based on characteristics shared with more realistic forms.

This chapter introduces each of the forms including, where possible, a description of the variation in morphology, materials selected for their manufacture, details of their fabrication, and their distribution on the site spatially and temporally. Because the variation within the animal forms is great, a detailed presentation of size ranges would be inappropriate. However the miniature harpoon heads and sled shoes are much more standard in form and so their size ranges are presented.

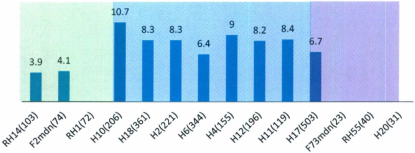
While some of the forms appear earlier in the occupation than others, when combined the representational collection first appears in the beginning of the early phase, increases during the middle phase, and declines shortly after the start of the late phase (Figure 7.1). There are some slight but significant differences in the frequency of the tools in each feature. When expressed as a proportion of the osseous assemblages their frequency continues to be higher for the middle phase and relatively even throughout this period. This spatial and temporal distribution is generally maintained when each of the specimens is presented separately.

Figure 7.1 Number of representations from selected features at Phillip's Garden arranged from oldest to youngest.



Chi square = 32.308, p = 0.0002

Figure 7.2 Percentage (%) of representational objects in the osseous assemblage from selected features at Phillip's Garden arranged from oldest to youngest.



Despite being manufactured on a range of materials, the use of ivory is greater for these objects compared to other osseous material culture (Table 7.1). While this is the case for representations in general, some of the forms are rarely or never made from ivory. The following sections treat each form separately.

Table 7.1 Number and percentage of materials used for making miniature harpoon heads.

Material	Bone	Antler	Bone/Antler	Ivory	Total
Number	84	15	8	23	130
%	64.6	11.5	6.2	17.7	100.0

7.2 Miniature Harpoon Heads

Representations of harpoon heads are similar in form to the full-sized self-pointed harpoon heads, the main difference being their much smaller size (Figure 7.3). Figure 7.4 compares the available range of length measurements of full-sized self-pointed harpoon heads to the miniature varieties. It is clear that there is a distinct range for the miniature forms that differs markedly from the larger forms; however the sample of miniature harpoon heads is too small to confidently represent the population.

There are 12 examples of miniature harpoon heads in the Phillip's Garden collection of which 8 from dated features are examined in this thesis. All are generally triangular and self-pointed, five barbed and two unbarbed. One exception is a specimen that appears to represent a Kingait closed harpoon head, but with the addition of a carved endblade. All but one has a foreshaft socket carved into the proximal end; however, none has an endblade socket. Line holes are absent on one specimen and, with the exception of one example which is round, the opening of holes tends to be square in shape.

Figure 7.3 Miniature harpoon heads. The example on the top row right has no foreshaft socket, and the first specimen on the bottom left is the only example that resembles a Kingait closed harpoon head.

Figure 7.4 Distribution of miniature harpoon head lengths compared to self-pointed harpoon heads.

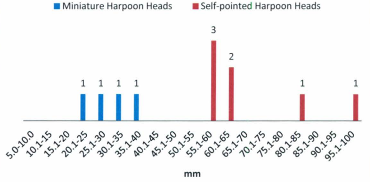
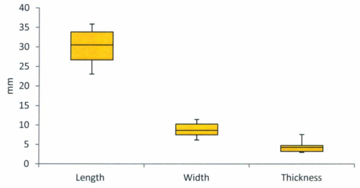


Table 7.2 shows the size of these specimens and the range of length, width and thickness measurements are displayed in Figure 7.5. The greatest variation is in the length and width.

Table 7.2 Variation in the size of miniature harpoon heads from Phillip's Garden.

	Length mm	Width mm	Thickness mm
Average	30	8.9	4.4
Median	30.5	8.7	4.4
Standard Deviation	5.7	2.0	1.5

Figure 7.5 Variation in length, width and thickness for miniature harpoon heads.



Most miniature harpoon heads are made from ivory, with only one of antler and one that could have been bone or antler (Table 7.3). Despite the difference in materials chosen for the miniature forms, the techniques employed in their manufacture are mostly similar to those used to make the larger forms of harpoon head.

Table 7.3 Number and percentage of materials used for making miniature harpoon heads.

Material	Antler	Bone/Antler	Ivory	Total
Number	1	1	6	8
%	12.5	12.5	75.0	100.0

Figure 7.6 shows the line holes inserted into a miniature harpoon head at 8x magnification. Like the full-sized examples the walls of the line holes show parallel channels where a narrow stone tool was inserted downward to shape the hole. However the holes have uneven edges that may have been pecked by a stone point. Furthermore, the edges of the holes do not show any more polish than is evident elsewhere on the tool's surface suggesting that lines were either absent or held very loosely in the holes.

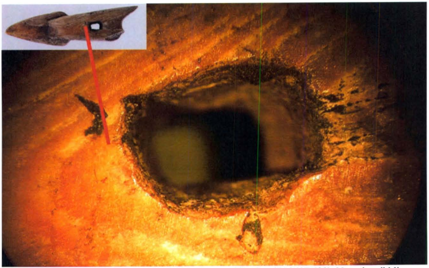
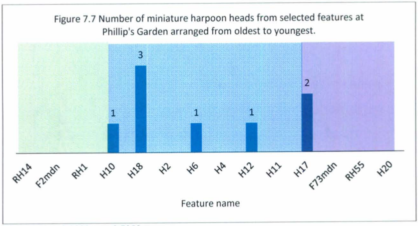


Figure 7.6 Miniature harpoon head line hole at 8x magnification (7A349D688). Note the nibbling around the margin of the hole that suggests a chisel-like action to make the sides of the hole straight, and while there is surface polish it is not extensive around the edges of the line hole.

From the small sample available, it appears that the miniature harpoon heads are present during the middle phase into the beginning of the late phase in numbers that are not significantly different (Figure7.7). The sample size is too small to generate meaningful proportions of this form.



Chi square = 2.0000, p = 0.7358

7.3 Miniature Sled Shoes

There are 33 miniature sled shoes at Phillip's Garden, all from dated features and all but two made of sea mammal bone and the remaining of antler (Figure 7.8). While they retain the long, narrow outline, dorsal groove and upwardly tapered anterior end seen in the full-sized examples, most of the variation in their form is in the placement of line holes in some examples (Figure 7.9).

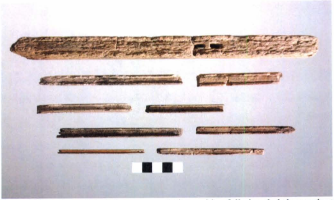


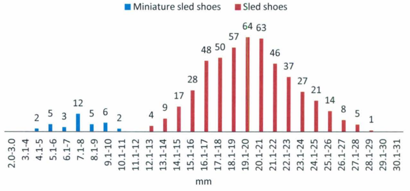
Figure 7.8 Variety of sled shoe representations with a full-size sled shoe at the top. Note the variety of widths represented. The example at the bottom left was made on antler, the others of sea mammal.

Seven examples retain either complete or partial line holes. Three miniature sled shoes have holes carved through their lateral surfaces; in two cases there are two sets of holes, and the remaining four examples have line holes from the dorsal to ventral surfaces.

Figure 7.9 The top three sled shoe representations have line holes through the lateral surfaces, and the bottom three through the dorsal to ventral surfaces. The line holes on the bottom two examples are on the right side, at the ends.

The miniature sled shoes are significantly smaller than the full-size examples (Figure 7.10). Because there is only one complete example measuring 86.5 mm, the widths of both miniature and full-sized sled shoes are compared showing how they cluster into two size groups.

Figure 7.10 Width ranges of miniature sled shoes and full-sized sled shoes from dated features at Phillip's Garden.

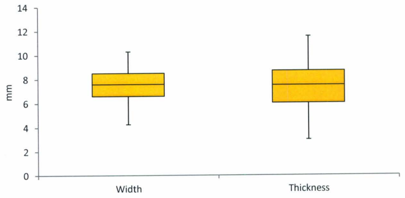


Size variation is limited to width and thickness measurements listed in Table 7.4. Figure 7.11 illustrates the range of variation within the form, which is greater for thickness.

Table 7.4 Variation in the size of miniature sled shoes from Phillip's Garden.

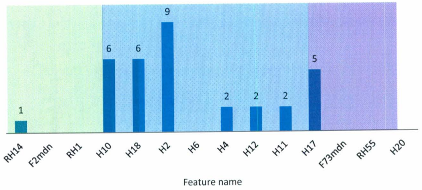
	Width mm	Thickness mm
Average	7.6	7.5
Median	7.6	7.5
Standard Deviation	1.5	1.9

Figure 7.11 Variation in width and thickness of miniature sled shoes.



Miniature sled shoes are well distributed in house features beginning in the early phase and extending to the beginning of the late phase of occupation, but the differences in their frequencies were not significantly great (Figure 7.12).

Figure 7.12 Number of miniature sled shoes from selected featrues at Phillip's Garden arranged from oldest to youngest.



Chi square = 11.5, p 0.1182

There are no miniature sled shoe preforms to offer insights into the early stages of making these objects; however details of the final stages of shaping are visible under low magnification. Surfaces show striations indicating abrasion. The dorsal groove was formed in two ways based on the width of the groove. For the narrower examples the surface of the groove is uneven and multiple incision marks are apparent (Figure 7.13). Likewise, the inner surface of the raised edges of the grooves shows occasional tiny shelves indicating a slicing motion down to keep these edges straight. This suggests the use of a flake tool for much of this operation. The flat surfaces of the grooves of wider examples have two distinct surface characteristics that suggest a manufacturing method similar to full-sized sled shoes. The sides of the grooves tend to be deeper than the middle area, leaving indentations along the inside edge of the grooves that are relatively smooth and may have been fashioned with burin-like tools (Figure 7.14). Furthermore, the central surface of the grooves tends to be flat and even implying the use of a scraper or abrader rather than a sharp-edged or burin-like tool to remove unwanted debris.

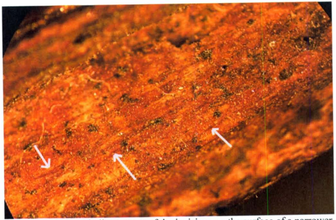


Figure 7.13 Arrows indicate some of the incisions on the surface of a narrower miniature sled shoe groove (EeBi-1:6333) at 20 x magnification.

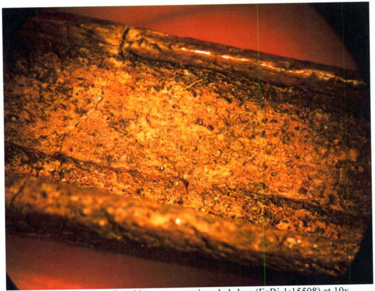


Figure 7.14 Flat surface of a wider representation sled shoe (EeBi-1:15508) at 10x magnification. Note the deeper channel on one edge of the groove.

7.4 Walrus Representations

There are 11 walrus representations in the Phillip's Garden collection, of which seven from dated features are presented here. Despite sometimes being quite stylised, a number of features define these forms. Facial features are the most diagnostic, with broad, flat snouts that are often incised to represent nostrils, mouths and whiskers (Figure 7.15). There are sometimes traces of the tusks, but only one full tusk is present in the collection. The heads are sometimes attached to bodies, but even when present, the bodies exhibit few details, the overall shape being somewhat elongated and approximately as wide as the head. One example retains small front limbs.

a. b.

Figure 7.15 Two walrus representations showing facial features. Photo a. portrays more features including eyes, mouth, nostrils and whiskers while Photo b. has eyes, nostrils and an incised line down the length of the head.

Despite the standard practice of depicting facial features, there is a great deal of variation in the form of walrus representations as the following four forms illustrate. The first, which is broken in half laterally, consists of a single carved tusk with a highly stylised face (Figure 7.16). It is made of ivory and has two line holes, one at the top of the head portion running dorsal to ventral, and the other running diagonally from the lateral edge to the ventral surface.

Figure 7.16 Ivory walrus representation broken laterally.

The second example resembles a Kingait closed harpoon head and is made of sea mammal bone (Figure 7.17). It has a deeply incised groove at one end very similar to an endblade socket, and a deep socket at the opposite end that is oriented in the same plane as the distal end; however unlike a typical harpoon head this socket is very deep, the sides and ends forming two walrus faces that may have shared a pair of tusks. Their snouts are clearly incised to depict mouths, and there is evidence of eyes carved in bas relief on the top of each head. Viewed in profile this end also resembles the lateral view of the bear heads found in the collection.


a.

b.

Figure 7.17 Walrus carving resembling a harpoon head. The proximal end is carved into two walrus upper jaws that may have shared a set of tusks (a). Photo b. shows the lateral view displaying shallow incised grooves and a jaw similar to bear carvings. The posterior end resembles a harpoon head endblade socket.

The third example is rectangular with a hole in the middle, and fairly thin through the dorsal to ventral surfaces. It had part of a walrus face carved into both ends, each retaining the remnants of tusks (Figure 7.18). In addition there is a single incised groove running from the hole to one end on the dorsal surface. This specimen is made of antler.


a.

b.

Figure 7.18 Walrus representation. The mouth and nose of the walrus are clearly represented in Photo a. Photo b. shows the ventral surface and the remnants of tusks.

While there are examples of whole walrus representations from undated features, only a single specimen has been recovered from a dated context (Figure 7.19). The face is stylized with just the faint remnants of a mouth, and nose. One of the small protrusions that resemble tusks does not appear to have been broken suggesting that these may never have been any longer. There are small forelimbs carved, but the hind end is simply tapered with a line hole running from the dorsal to ventral surface.

Figure 7.19 Stylized full body walrus representation.

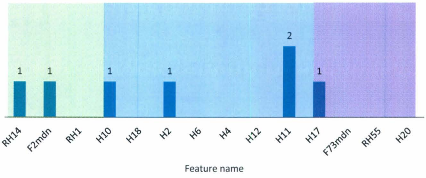
The representations of walrus were most frequently made of bone, but there is one example each of antler and ivory, and one specimen where it was impossible to determine if the source material was bone or antler (Table 7.5). All bone examples were made from sea mammal, of which one could be positively identified as whale.

Table 7.5 Number and percentage of materials used for making walrus representations.

Material	Bone	Antler	Bone/Antler	Ivory	Total
Number	4	1	1	1	7
%	57.1	14.3	14.3	14.3	100.0

While the sample size is small, the walrus carvings are present from the earliest phase to the beginning of the late phase in similar quantities (Figure 7.20).

Figure 7.20 Number of walrus representations from selected features at Phillip's Garden arranged from oldest to youngest.



7. 5 Bear Representations

Twenty-eight representations of bears are examined here from a total of 37 in the Phillip's Garden assemblage. Since the Dorset in Newfoundland would have shared their environment with black bears as well as occasional polar bears, it is worth considering that either species may be the subject of these carvings. None of the examples in this assemblage can be identified to species using morphological characteristics; indeed many are quite abstract in form. Nevertheless I assume that it is polar bears that are represented, particularly as they are a relatively common and temporally enduring subject in Dorset art (Sutherland 2001; Taylor and Swinton 1967). Furthermore, marine mammals dominate the animal representations at Phillip's Garden, and there are no other terrestrial animals depicted. Finally, two of the representations at this site depict a bear swimming. While both species are able to swim, this activity is more frequent among polar bears. Consequently, while I cannot demonstrate that the bears depicted in art at Phillip's Garden are not black bears, I have greater confidence that they represent polar bears.

The characteristics that most define the bear and distinguish it from other animal representations are the ears and snout. The ears are well defined, triangular and lie flat against the head. The snout is relatively long and blunt or slightly rounded. Nevertheless, the depictions of bears can be grouped into three general categories including, full-body representations, three dimensional heads, and flattened, stylized heads. Apart from two full-body examples, all bear carvings are of heads only and despite the consistency in anatomical portion selected for depiction, there is a fair amount of variation in form and the materials used for their creation (Figure 7.21).

Figure 7.21 Variety of bear representations. The first two on the left of the top row were made from the roots of teeth, the last of antler. The middle row shows antler and bone examples, and the bottom row on the left is a base relief example resembling an arrow, but with bear facial features, and the two to the right are flat and more abstract in appearance.

While three dimensional whole bears have been identified in Dorset assemblages throughout the Arctic (Lemoine et al. 1995; Sutherland 2001; Taylor 1967a), there are only two examples from dated features at Phillip's Garden. One is made of ivory and has well-defined front limbs that appear to depict the animal swimming or flying (Figure 7.22). The hind legs are not defined but remain joined around a line hole running from the dorsal to ventral surface. Lines are incised transversely across the dorsal surface and along the dorsal surface of the forelimbs. The only facial features depicted are eyes. The other example is similarly shaped with forelimbs extending and hind limbs joined, but the head has been broken off. This specimen was made of terrestrial mammal bone.

Figure 7.22 Swimming or flying bear representation made of ivory and displaying numerous incised lines.

The most realistic bear head form is three dimensional with facial features such as well-defined ears, eyes and mouths and includes ten specimens (Figure 7.23).Often the mouth has a circular hole that leads to an open groove running the length of the ventral surface. As with the mouth, the posterior end is a circular, enclosed hole (Figure 7.24). The line running through the holes and along the ventral groove would have allowed the piece to sit flush and slide freely along the line. While relatively consistent there are examples that are generally longer and thinner than others.

Figure 7.23 Three dimensional bear heads. Examples in the row on the right are long and slender compared to those on the left.

Figure 7.24 Ventral surface of three dimensional bear heads, showing the holes on both anterior and posterior ends joined by a deep groove.

There are two small three dimensional bear heads that show some variation from this form. They have eyes and ears that are very subtle in form and no line holes (Figure

7.25). One specimen is made from antler and the other, larger example is made on either antler or sea mammal bone. All surfaces are smooth suggesting that, with the exception of the nostrils, the forms may have been made largely by gentle grinding and polishing.

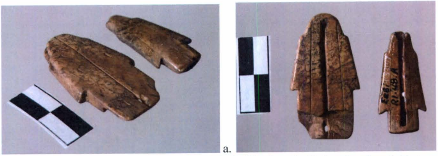
Figure 7.25 Two bear head representations. The ears are very faint, and eyes are carved only on the example on the right, which also exhibits well defined nostrils. There are no details on their ventral surfaces.

There are three representations of bear heads, each carved at the end of a sliver of antler (n=1) or bone (n=2) that is otherwise left unmodified. Apart from well defined facial features, these examples have central lines incised on the center of the dorsal surface from anterior to posterior. Figure 7.26 illustrates one of the two examples that exhibit greater details of the mouth, eyes, ears and nostrils. The third example is carved in bas relief on a small piece of bone. It resembles an arrow and has few facial features, but retains the central line incision, and the snout and ears are very bear-like in appearance (Figure 7.27).

Figure 7.26 Antler bear head representation.

Figure 7.27 Arrow-like bear head representation carved in relief on terrestrial mammal long bone.

There are 11 representations of bear heads that are flat and more abstract than those discussed above. They are almost two dimensional with very thin lateral sides (Figure 7.28). Most are made of ivory (n=4), followed by antler (n=3), bone (n=2), and two which could not be determined. Details of the bear head anatomy are largely confined to outlines; there are no eyes and the mouth is either carved to resemble a harpoon head endblade socket or a rectangular line hole. On the ventral surface there are line holes at anterior and posterior ends joined by an open groove. The line holes are created in the same manner as the three dimensional bear heads. Incisions are apparent on some examples as short incisions or parallel lines running the length of one or both dorsal and ventral surfaces.



a. b.

Figure 7.28 Flat bear head representations. Note the lack of detail on the thin lateral surfaces in Photo a. The ventral surface is shown in photo B. The mouth area on the larger example is similar to a harpoon head endblade socket, while the smaller specimen has a mouth that is part of the line hole.

A variety of materials were used to make the three dimensional bear heads, including antler, ivory, (possibly teeth or tusk), and bone (Table 7.6). Four of the bone examples appear to have been made from the roots of mammal canine teeth and retain the hole that would have run through the root to the pulp chamber. Indeed, the tool maker would likely have taken advantage of this channel when making the line hole through the carvings. One of the ivory examples retains some of the cementum from the root of the tooth; however, it is not clear whether the remaining ivory specimens were made from tusk or teeth.

Table 7.6 Number and percentage of materials used for making three dimensional bear heads.

Material	Bone	Antler	Bone/Antler	Ivory	Total
Number	9	6	3	10	28
%	32.1	21.4	10.7	35.7	99.9

The process of manufacturing the ventral groove and holes is similar to other osseous working techniques at Phillip's Garden. Holes would have been created, or in the case of tooth carvings, widened by the insertion of a small chisel-like flake (Figure 7.29). The margins around the holes are characterized by irregular edges that were slightly smoothed by subsequent friction with the cord that would have run through them. The walls of grooves in bone and antler examples are usually straight-sided near the top, but often slightly undercut with scars where slices of material were removed further toward the base of the groove. This suggests that flake tools were used. Likewise, the base of grooves is streaked with long narrow scars characteristic of a thin cutting tool, perhaps in conjunction with burin-like tools (Figure 7.30). In ivory examples the walls of grooves are sometimes very straight sided, with few striations, suggesting the use of burin-like tools in particular.

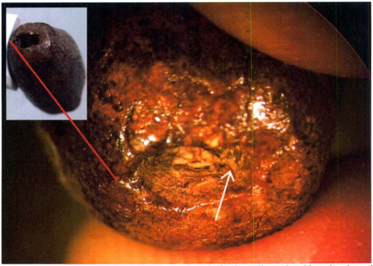


Figure 7.29 Line hole in the anterior or mouth end of a three dimensional bear head carving (EeBi-1:11991) at 10x magnification. Note that while the margins of the hole are smoothed from subsequent use, the edge is uneven from the downward penetration of a small chisel-like flake tool used to make the hole. The interior shows some scars from this action (see white arrow for example).

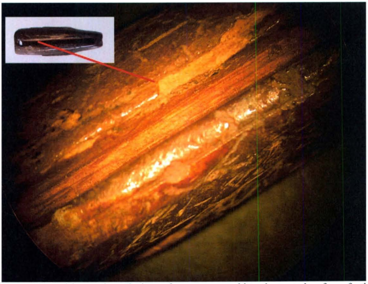
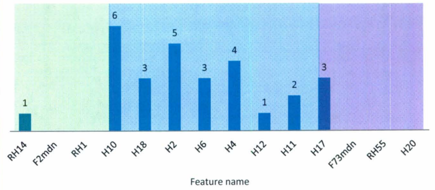


Figure 7.30 Incision marks at the base of a groove carved into the ventral surface of a three dimensional bear head carving (EeBi-1:16806) at 10x magnification.

Representations of bears are distributed in houses dating from the early to the beginning of the late phase, but are most common during the middle phase (Figure 31). However, the differences in their frequencies are not significant.

Figure 7.31 Number of bear representations from selected features at Phillip's Garden arranged from oldest to youngest.



Chi square = 6.667, p = 0.5730

7.6 Seal Representations

There are 15 representations of seals in the Phillip's Garden collection of which eight from dated features are presented here. These carvings are more abstract than the other animal forms at Phillip's Garden as they lack distinct facial features (Figures 7.32 and 7.33). They are recognizable by their overall shape which is generally flat, and includes features such as broad, rounded heads that are often slightly raised and small front flippers (Figure 7.34). Some examples are longer and thinner than others (Figure 7.35). The hind flippers are usually not well defined and meet around a line hole; however there is one antler example that has hind flippers (Figure 7.36).


a.


b.

Figure 7.32 Dorsal (Photo a.) and ventral (Photo b.) surfaces of a seal carving. Note the rounded head, sloping shoulders, small forelimbs and hind flippers that meet around the line hole. Photo b. shows two parallel incised lines running the length of the ventral surface. This is the only example with decoration on the ventral surface.

Figure 7.33 Seal representations at the Parks Canada Visitors Centre in Port au Choix. Note decorative incisions on the examples on the left. There are two short lines projecting transversely from the two parallel lines running the length of the tool. In addition, there are a number of v-shaped incisions at the end of the head. The example on the far right shows a series of parallel lines, most near the hind end of the animal.

Figure 7.34 Lateral view of a seal carving showing the flat profile and somewhat raised head.

Figure 7.35 Thinner variety of seal representation.

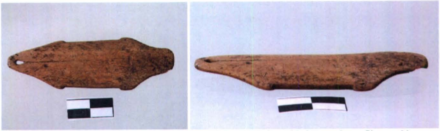


Figure 7.36 Dorsal (left) and Lateral (right) views of a seal carving with front and rear flippers. Note an incision on the dorsal surface projecting from the line hole.

There is one seal carving that is unlike all others as it represents a profile view of a seal head that is made on highly degraded antler (Figure 7.37). The sides of the eye hole are remarkably straight; however the surfaces are too degraded to suggest how the hole was created. There is no evidence of striations or channel-like scars on the interior of the hole. The unusual appearance of this piece and the lack of diagnostic wear of any kind makes it likely that this is a fragment of antler that has an accidental resemblance to a seal.

Figure 7.37 Profile of a seal found at Phillip's Garden.

Decorative incisions are apparent on five of the eight seal representations, all occurring on the dorsal surface; however one example has two parallel lines incised along the ventral surface (Figure 7.32). There is one example of a single incision leading from a line hole (Figure 7.36), but otherwise examples have one or more parallel line. One of the seals housed in the Parks Canada Visitors Centre in Port au Choix has two small additional incisions running transversely at the midsection of the carving (Figure 7.33).

A variety of materials were selected for the manufacture of seal carvings (Table 7.7). Bone dominated the material chosen, followed equally by antler and ivory.

Table 7.7 Number and percentage of materials used for making seal representations.

Material	Bone	Antler	Ivory	Total
Number	6	1	1	8
%	75	12.5	12.5	100

The details of early stages of manufacture are unclear as no seal carving preforms have been identified; nevertheless, some later stages are visible and indicate that their production followed some methods used elsewhere at Phillip's Garden. However, the line holes present on many of these specimens have not been made using a downward, chiselling action. This is probably because the holes were not intended to be round, but oval or teardrop shaped instead. The margins around most line holes are very smooth, likely polished by the lines strung through them, resulting in no definitive evidence for their creation. However just beyond the margins, thin slivers of material have been removed with a sharp flake tool slicing ever deeper from both surfaces (Figure 7.38).

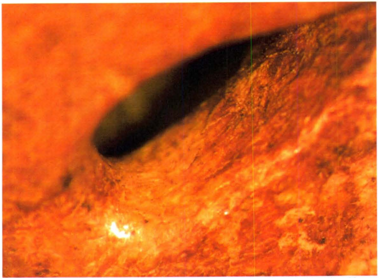


Figure 7.38 The line hole at the posterior end on a seal carving (EeBi-1: 10629) at 20x magnification. Note the polished margin around the edge of the hole and the darker lines at the top right of the hole that indicate thin slivers from slicing lengthwise to make the hole.

On the surface of some examples it is possible to see that incisions were placed after the specimen was ground as the pattern of multiple surface striations consistent with grinding are interrupted by the addition of these features (Figure 7.39).

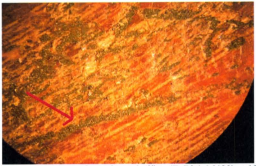
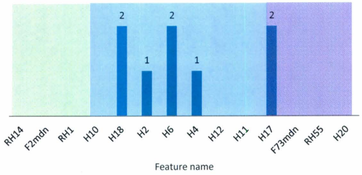


Figure 7.39 The surface of a seal effigy (EeBi-1:16480) at 10x magnification. The arrow points to an incision made in the surface of the specimen after it had been ground.

Seal representations at the site appear in similar quantities in house features in the middle phase and extend into the beginning of the late phase (Figure 7.40).

Figure 7.40 Number of seal representations from selected features at Phillip's Garden arranged from oldest to youngest.



7.7 Flattened Animal Representations

Flattened animal representations are characterized by vaguely defined morphological features that suggest they represent seals or bears, or perhaps pelts; however they cannot be assigned to any animal type with confidence. They are all thin, averaging 3mm in thickness, and appear as heads, distal limbs such as paws or flippers, and entire bodies (Figure 7.41). Occasionally there are very few morphological features and they appear as unadorned flat, almost circular pieces. Furthermore, in one unique case the form is quite bizarre with numerous holes and incisions, and in another, the shape of the animal is somewhat random and featureless (Figure 7.42 and 7.43). There are 48 examples in the Phillip's Garden assemblage, 46 of which are presented here from dated features.

Figure 7.41 Flattened animal representations. The two on the left of the top row could be seals, the lateral projections depicting limbs, while the two on the right resemble bear heads, the lateral projections being the eyes and ears. The examples in the second row have lateral projections which are apparent in both seal and bear representations, but they are too abstract to identify with confidence. They may represent animal pelts.

Figure 7.42 This flattened animal carving made on bone has ten holes and multiple incised lines. It measures a little over 8.5 cm in length.

Figure 7.43Flattened animal with few features other than vaguely defined ears and snout, reminiscent of bear carvings. This example measures approximately 10 cm.

Twenty-nine flattened animal representations have decoration in the form of thin, shallow incisions. These usually occur on the dorsal surface; however unlike the other animal carvings, there are six examples of flattened animals with pairs of parallel incisions along the length of their ventral surface. Decorations on the dorsal surface are usually double parallel, single, or less frequently a series of multiple short incisions at one or both ends of the object, all running lengthwise.

Most of the flat animals were made of bone, but there are antler and ivory examples as well as those that are difficult to determine with confidence (Table 7.8). In addition, it was impossible to determine the animal sources for all the bone examples with the exception of two which were made on terrestrial mammal long bone.

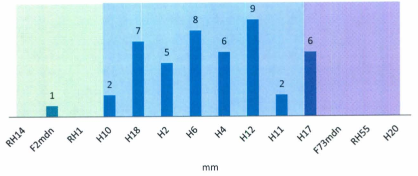
Table 7.8 Number and percentage of materials used for making flat animal representations.

Material	Bone	Antler	Bone/Antler	Ivory	Total
Number	34	4	3	5	46
%	73.9	8.7	6.5	10.9	100.0

As with the seal representations, the line holes in these flat animal figures are made by slicing into the surface in a downward fashion on both surfaces until the hole is achieved and subsequently widened. Likewise the holes are oval or slightly wider at one end and surface incisions are placed after the tool has been ground.

Like all the representational pieces described here, the middle phase has the greatest number of examples of flattened animal carvings. There is one example from a midden feature dating to the early phase and they continue to be present into the beginning of the late phase (Figure 7.44).

Figure 7.44 Number of flattened animal representations from selected features at Phillip's Garden arranged from oldest to youngest.



Chi square = 12.800, p = 0.1189

7.8 Summary

The Phillip's Garden animal and tool representations reflect a broad Dorset tradition of depicting animals and tools with many of the morphological characteristics similar to those seen throughout the Dorset range (Sutherland and McGhee 1997; Swinton 1967; Taylor 1967b). As in the wider Dorset context, animals that share their world are most commonly depicted, particularly bears, walrus, and seals, as well as some birds, fish and caribou. Bear heads, both naturalistic and abstract, and incised lines thought to represent skeletal motifs are a common theme at both Phillip's Garden and more distant contexts. Nevertheless, there is well documented variation in this assemblage interpreted as reflecting regional isolation from the Arctic (Harp 1969/70; Lyons 1982; Taylor and Swinton 1967:40). This is supported and expanded upon by the results of this research.

Artistic representations of objects in the Dorset world are present at Phillip's Garden including examples made of bone, antler and ivory. Animals dominate the subject of representation in the Phillip's Garden collection with 89 identified from dated features, while tools are depicted in 41 cases. Of the animals represented most are flattened, abstract carvings, some suggestive of bears or seals (Table 7.9).

Table 7.9 Number and percentage of materials used for making flat animal representations.

Material	Miniature harpoon head	Miniature sled shoe	Walrus	Bear	Seal	Flat animal	Total
Number	8	33	7	28	8	46	130
%	6.2	25.4	5.4	21.5	6.2	35.4	100.1

Their fabrication involved cutting and polishing techniques seen in other forms of material culture, and while many of the representations appear in small numbers in the early phase, their greatest frequency was during the middle phase with almost no examples after the beginning of the late phase. This temporal distribution is reflected in the representations of miniature sled shoes and harpoon heads which are more numerous during the middle phase.

Chapter 8

Evidence for Tool Manufacture in the Osseous Assemblage at Phillip's Garden

"Hunting man alone adapts some parts of the carcase which he is himself unable to eat to other ends, serviceable to his living, his comfort, his vanity or his whim." Cornwall (1968:88)

8.1 Introduction

The following chapter introduces two categories of artefacts involved in tool manufacture at Phillip's Garden. The first are those directly involved in the production of osseous tools, including cores, debitage, blanks, wedges, and refurbishing debris resulting from the reworking of finished tools. The second category includes objects that are used in the production of stone tools, including pressure flakers and punches. The presence in both house and midden features of all forms associated with tool making demonstrates that this was an important activity over the temporal extent of the site. Whale bone, and to a lesser extent, caribou antler are the most frequently worked materials in all features, although some caribou, bird, walrus, sea mammal and terrestrial mammal bone, are represented among the osseous tool making assemblage. In addition, small quantities of ivory are represented among the osseous tool assemblage. The significant dominance of whale bone suggests the material was acquired nearby, yet the primary reduction of elements is not represented in the assemblage and must have taken place elsewhere. Likewise, the absence of caribou bone from the unmodified faunal assemblage, the lack of caribou bone cores and the highly reduced state of the worked antler in the collection suggests that this material was partially reduced away from the site. Nevertheless antler was worked to make tools throughout the occupation, particularly during the middle phase.

8.2 Cores

An osseous core is an element from which a portion has been cut for the purpose of making a tool. In the primary reduction stage usable portions of an element are identified and prepared in such a way that one or more blanks for tool performs can be removed (Betts 2007, Morrison 1986, Nagy 1990, 1991). This often begins with the removal of extraneous portions such as articular ends to expose useable segments. This is followed by further reduction of the core segments into pieces from which a number of tools could be made. These slightly modified pieces are referred to as blanks (Collins 1975; Nagy 1990:80). Cores exhibit evidence of this process as cutting, hacking and wedging marks, but there are no signs of additional working such as scraping, grinding or polishing which would indicate the intention to create a finished tool. Cores with these features can vary widely in shape and size, providing blanks for a range of tools. They are discarded when small and exhausted and are sometimes difficult to distinguish from waste debitage. In this case, if more than one edge shows working they are designated as cores.

Cores make up a relatively large proportion of the osseous assemblage at Phillip's Garden with 534 specimens, of which 461 from dated features are examined in this thesis. Despite their high frequency in the collection, there is very little evidence for the primary reduction of core material from its element source. Three walrus mandibles from which cores were extracted have been identified, but this is quite small considering the frequency of sea mammal bone in the collection. Cores in this collection are often highly reduced with numerous edges showing evidence of having had blanks removed.

The range of sizes is great; there are long, thick portions of whale bone as well as small pieces of caribou antler and ivory with remnants of cuts on multiple edges (Figure 8.1). Almost all of the evidence for detachment appears as grooving and snapping; nevertheless there is some evidence of chopping, and occasionally wedges appear to have been used to remove preforms from some larger cores.

Figure 8.1 Assortment of cores. Note that the extent of blank removal suggests many cores are significantly reduced, and may have been considered exhausted. Row 1 at the top has, from left to right, one small piece of an ivory core and two bird bones from which blanks were removed. The second row features three antler core fragments. The third row has a number of dense sea mammal mandible fragments, the two on the right from walrus. The bottom two rows are whale bone core fragments.

It is usually impossible to determine the tool that was intended from a core; nevertheless there are 35 examples of known core types including needles, awls, sled shoes and metapodial tools, all described in chapters pertaining to the finished tool (Table

8.1). Cores for the extraction of sled shoe preforms are the most frequently represented type, all of them made from whale bone.

Table 8.1 Intended tool from organic cores at Phillip's Garden.

Bone Source	Awl	Metapodial Tool	Needle	Sled Shoe	Total
Number	2	1	12	20	35
%	5.7	2.9	34.3	57.1	100.0

The majority of cores are made of bone, although antler and ivory make up a portion of the collection (Table 8.2). It was possible to identify the source of some bone specimens to broad taxonomic categories (Table 8.3). Whale bone was the major source for bone cores followed by sea mammal. Terrestrial mammal made up a small portion of the bone cores; most of these were segments of long bone that likely came from caribou. Finally, bird bone cores made up approximately 5% of the bone cores, all undiagnostic long bone segments. Because of their dominance in the core assemblage, whale bone and antler will be discussed in detail in the following sub-sections.

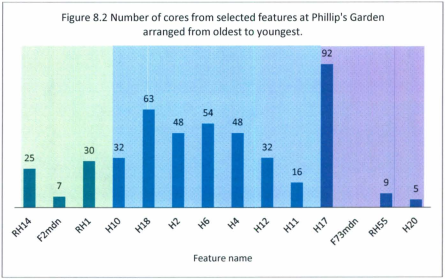
Table 8.2 Number and percentage of materials used for cores.

Material	Bone	Antler	Bone/Antler	Ivory	Total
Number	332	98	25	6	461
%	72.0	21.3	5.4	1.3	100.0

Table 8.3 Number and percentage of bone sources from which cores were selected.

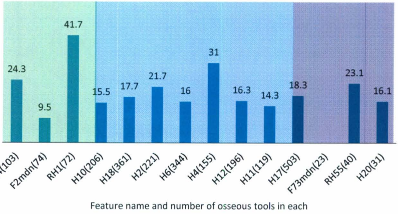
Bone Source	Bird	Sea Mammal	Terrestrial Mammal	Whale Bone	Total
Number	17	50	20	245	332
%	5.1	15.1	6.0	73.8	100.0

Cores are found in most features over the entire period of occupation at Phillip's Garden, attesting to the importance of osseous tool working throughout its history (Figures 8.2). There appears to be an increase in the number of cores from the early to middle phases, and apart from the very high number in Feature 17, a decline during the late phase. When represented as proportions of the osseous assemblage for each feature the distribution appears to be more even; however, midden features have lower proportions while they are higher in Renouf's House 1 in the early phase as well as House 4 in the middle phase (Figure 8.3).



Chi square = 205.48, p < 0.0001

Figure 8.3 Percentage (%) of cores in the osseous assemblage from select features at Phillip's Garden arranged from oldest to youngest.



8.2.1 Whale Bone Cores

At nearly 74% of the identifiable taxa used in making bone cores, it is clear that whale bone was an important raw material source at Phillip's Garden (Figure 8.4). The availability of long, straight elements of consistent material structure made whale bone particularly useful for constructing large tools such as sled shoes and foreshaft-like tools (Chapter 9). In addition, toughness, or ability to absorb the shock of impact without fracturing, made whale bone valuable for constructing pressure flakers, punches and wedges.


Figure 8.4 Assortment of whale bone cores showing the range in size.

Identifying the whale species and elements selected for raw material was difficult in this study. There was no suitable comparative collection of whale available, and generally, whale bone cores in this assemblage are fragmented with few diagnostic features such as epiphyses. Nevertheless, I was able to occasionally identify the use of mandibles and ribs. The mandible cores include both extremely dense posterior fragments and long medial segments, and while ribs do not include articular ends, their long, curved outline and smooth surface make them identifiable.

A number of cutting techniques were employed to remove preforms from cores. Most commonly the bones were grooved and snapped, and rarely, evidence of chopping and the use of wedges were recorded. Only six elements display chop marks, two have marks that indicate the insertion of wedges, and four elements show both chop and wedge marks.

Cuts associated with the primary reduction of elements from their complete form into segments for subsequent reduction are rare. Indeed, epiphyses are absent from the site preventing their examination for disarticulation methods. However, on the segments present almost all the ends appear to have been broken. The general lack of transverse cuts may be due to the porous nature of whale bone which sometimes makes it difficult to discern cut marks, and to taphonomic processes that may have degraded the bone, obscuring any indications of cutting. Where present, the cuts are very shallow and straight suggesting they may have been lightly incised with a retouched flake tool and then broken, and in one example an end has been cut by grooving and snapping.

Secondary reduction involved cutting the whale bone segments into various large portions from which a number of preforms could be removed. There is some evidence of both chopping and wedging, and sometimes a combination of both. Once ends were removed, segments were split lengthwise into one or more pieces. In some cases pointed stone wedges were inserted part way into the surface of the bone to facilitate this splitting. This is indicated by small rough-edged pits and oval indentations on the surfaces from the downward insertion of a tool (Figure 8.5). These pits do not penetrate the bone deeply, only just through the thin compact layer. From here the section of bone appears to have been chopped lengthwise along these surface cracks. In some cases only chopping lengthwise can be detected (Figure 8.6).

Figure 8.5 Whale mandible fragment showing the location of small triangular pits that suggest the insertion of wedges on the compact bone and chopping marks below along the cancellous material.

Figure 8.6 Chop marks on the lateral surface of a whale bone core fragment.

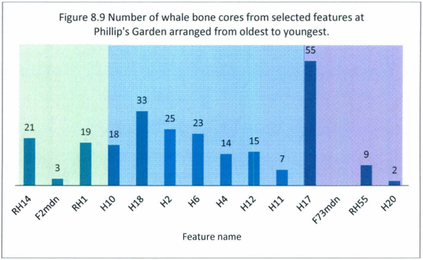
Occasionally wide, smooth indentations running through the cancellous bone on some large whale elements suggest the use of wider bone, or perhaps wooden, wedges (Figure 8.7).

Figure 8.7 Large whale bone core fragment showing wide, smooth scars suggesting the use of bone wedges to split the element.

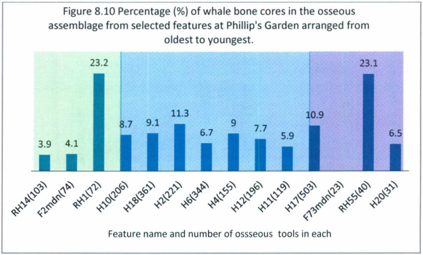
These large, generally flat, or slightly rounded segments would have then been further reduced to remove a series of tool blanks. At this stage the tool maker switched to a groove and snap technique for this more precise work (Figure 8.8). Grooves appear as uniform channels through the compact bone. The use of a burin-like tool maintained the uniform width and depth with a flat, often polished channel bottom. Cutting was further achieved with the use of a slicing tool such as a retouched flake. Grooves often run parallel to the length of the bone and are then cut transversely, resulting in long rectangular blanks. On longer cores these were likely used for constructing sled shoes, while shorter cores provided preforms for a variety of tools including foreshaft-like tools, blunt points and wedges.

Figure 8.8 Variety of sled runner core fragments.

The distribution of whale bone cores at Phillip's Garden shows that this material was worked throughout its occupation. These cores are more frequently represented in house rather than midden features and House 17 appears to have greater numbers compared to others (Figure 8.9). The differences among features are significant. When the whale bone cores are presented as proportions of the osseous tools for each feature, there is an even spread; however, there is a greater proportion of whale bone cores in Renouf's House 1 from the early phase and Renouf's House 55 dated to the late phase (Figure 8.10).



Chi square = 120.632, p < 0.0001



8.2.2 Antler Cores

The animal source of all antler cores at Phillip's Garden is caribou, and consists of the entire element including the beam, palm and tine (Figure 8.11). Often a number of antler core edges have been cut suggesting there was little wastage; indeed, there are no large pieces of antler such as those retaining both the beam and a palm for instance. Table 8.4 shows the number and proportion of antler parts in the core assemblage of this material. It is impossible to determine to what extent fresh or shed antler was selected; however very limited evidence in the form of one caribou skull with cuts at the points of antler attachment (pedicle), and five proximal ends (burr) of shed antler demonstrates that both shed and unshed antler were used as raw material (Figure 8.12).

Table 8.4 Number and percentage of antler parts in the core assemblage.

Antler Portion	Beam	Palm	Tine	Burr	Unknown	Total
Number	45	7	3	5	38	98
%	45.9	7.1	3.1	5.1	38.8	100.0

Figure 8.11 Assortment of caribou antler core fragments. The top row shows tine pieces, the second row palm, and the bottom row, beam segments.

Figure 8.12 Caribou skull fragment showing cut marks from the removal of antler (left), and portion of an antler burr (right).

Unlike Late Dorset antler working described by LeMoine (2005:139), the Dorset at Phillip's Garden did not chop antler, but cut grooves through the denser cortex, and cut through, or snapped the interior spongy tissue to remove the blank. A microscopic examination of the lateral surface of a cut shows the tiny striations where the cutting tool came in contact with this surface (Figure 8.13). The striations suggest the use of a retouched stone tool for part or all of this cutting work. All antler pieces appear to have been cut in this fashion attesting to an enduring technical practice for its reduction over the spatial and temporal extent of the site.

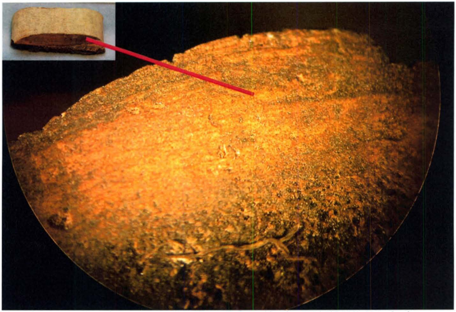
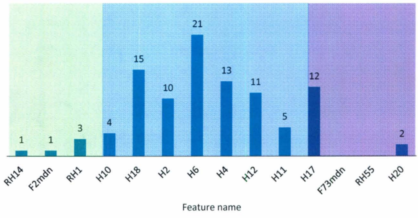


Figure 8.13 Cut surface of an antler core fragment at 10x magnification (7A259D913). Note the tiny striations. The inset photo shows where the spongy material on the interior of the core was snapped rather than cut.

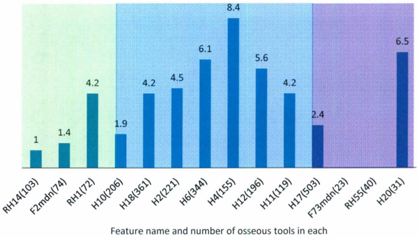
Although they are distributed in small numbers, the presence of antler cores in features that span the site's occupation demonstrates that antler working was a continuous part of technical life at Phillip's Garden and significantly more numerous during the middle phase (Figure 8.14). When presented as a proportion of each feature's osseous assemblage, there appears to be an increase in the frequency of antler cores from the early to the middle phase, after which there is a relative decline in its use for tool making during the late phase (Figure 8.15). The high frequency in House 20 is likely a result of the small assemblage size.

Figure 8.14 Number of antler cores from selected features at Phillip's Garden arranged from oldest to youngest.



Chi square = 52.250, p < 0.0001

Figure 8.15 Percentage (%) of antler cores in the osseous assemblage from selected features at Phillip's Garden arranged from oldest to youngest.



8.3 Debitage

Debitage are defined as fragmented pieces of osseous material too small to be reduced into tools and displaying a single cut edge and no other modification such as grinding or polishing. These pieces represent discard in the process of reducing material to a blank or preform and can be difficult to distinguish from highly fragmented cores (Figure 8.16). There are 445 pieces of debitage examined from dated features in this thesis from a total of 889 in the collection, most of it bone, but some antler and ivory (Table 8.5). The number of debitage pieces is unlikely to reflect their frequency since they may not have been recognized as modified specimens, and were thus not collected during Harp's excavations. Consequently they are excluded from calculations of proportions of tools.

Table 8.5 Number and percentage of materials represented in debitage.

Material	Bone	Antler	Bone/Antler	Ivory	Total
Number	372	50	20	3	445
%	83.6	11.2	4.5	0.7	100.0

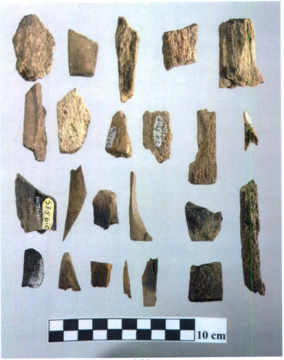


Figure 8.16 Variety of osseous debitage.

8.4 Organic Blanks

Blanks are portions of osseous material cut from cores that will be further reduced into tools. One or more proposed tools may be conceived at the time of removal, but the type is not always apparent. Blanks generally retain evidence of the ways in which they were removed such as grooving and snapping (Figure 8.17). Of the 215 blanks in the Phillip's Garden collection, 171 from dated features at the site are examined in this thesis.

Figure 8.17 Variety of osseous tool blanks. They are generally long and narrow and a number are rounded in cross-section. The large example on the bottom may have been intended as a sled shoe, but it is possible that this piece and others could have been destined for blunt points or large foreshaft-like tools (Chapter 9).

Most blanks are made of bone followed by antler (Table 8.6). The source of bone is mostly sea mammal or whale, with a small number of terrestrial mammal bone examples (Table 8.7).

Table 8.6 Number and percentage of materials used for blanks.

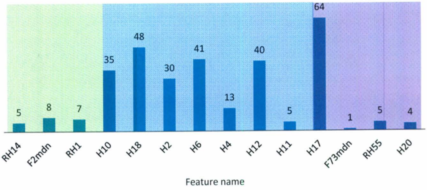
Material	Bone	Antler	Bone/Antler	Total
Number	161	7	3	171
%	94.2	4.1	1.8	100.1

Table 8.7 Number and percentage of bone sources for blanks.

Bone Source	Sea Mammal	Terrestrial Mammal	Whale bone	Total
Number	81	2	78	161
%	50.3	1.2	48.5	100.0

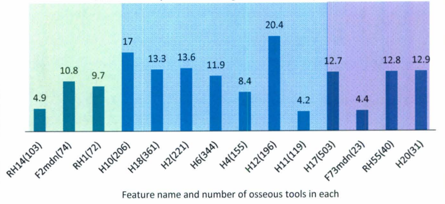
The distribution of blanks at Phillip's Garden includes midden and house features from earliest to latest occupation (Figure 8.18). There are a significantly greater numbers during the middle phase, and overall a fair amount of variation in their frequency. When the blanks are displayed as a proportion of the total osseous assemblage for each feature there is a much more even distribution among features (Figure 8.19). Nevertheless there are slightly greater proportions in House 12.

Figure 8.18 Number of blanks from selected features at Phillip's Garden arranged from oldest to youngest.



Chi square = 246.073 p <0.0001

Figure 8.19 Percentage (%) of blanks in the osseous assemblage from selected features at Phillip's Garden arranged from oldest to youngest.



8.5 Refurbishing Debris

Refurbishing debris is the remains of a practice where finished tools were cut in the process of reworking them into new tools (Figure 8.20). Forty-four pieces of refurbishing debris are examined from a total sample of 56 in the Phillip's Garden assemblage. The pieces or debris cut away often retain details that allow an identification of the original tool. Of the recognizable pieces, the most frequently cut original tools are sled shoes, but awls, blunt points, wedges, metapodial tools and whale bone foreshaft-like tools are also recorded (Table 8.8).

Figure 8.20 Variety of refurbishing debris. From left to right the top row consists of 3 anterior and 3 posterior sled shoe pieces. The posterior segments were cut partially through both lateral surfaces dorsally to ventrally and then snapped. Some of the bone remains in the center. The bottom row consists of 4 awl points on the left, followed to the right by a blunt point and two foreshaft-like tools.

Table 8.8 Original tool source of refurbishing debris.

Original Tool	Number	%
Sled shoes	14	50
Foreshaft-like tools	2	7.1
Awls	8	28.6
Wedge	1	3.6
Blunt point	2	7.1
Metapodial tools	1	3.6
Total	28	100.0

Given the high frequency of sled shoe pieces that have been refurbished, it is not surprising that bone is the most commonly used material in this tool category and most of it is from whale (Table 8.9 and 8.10). In addition, caribou antler, bone from sea mammal and caribou and a small piece of ivory show evidence that they have been cut in the process of transforming a tool.

Table 8.9 Number and percentage of materials used for cores.

Material	Bone	Antler	Bone/Antler	Ivory	Total
Number	28	9	6	1	44
%	63.6	20.5	13.6	2.3	100.0

Table 8.10 Number and percentage of bone sources from which cores were selected.

Bone Source	Caribou	Sea Mammal	Whale Bone	Total
Number	1	5	22	28
%	3.6	17.9	78.6	100.1

In all cases grooves are cut partially through one or more surfaces, and the remaining material is snapped to remove the unwanted portion (Figure 8.21). Most sled shoe refurbishing debris consists of the ends, suggesting that the tool maker was interested in obtaining a long narrow portion of sled shoe with a square cross-section for a preform.

Figure 8.21 Close-up photograph of two awl tips that have been cut using a groove and snap technique. It is clear that the tool was cut from a number of angles before the final break was made.

One foreshaft-like tool is simply cut in half, but another displays an intricate series of cutting stages to remove a new preform from the tool. On one surface there are the remains of grooves that ran mostly parallel to the length of the tool, but then curved in toward the center where they overlapped close to the end of the tool (Figure 8.22a). On the opposite surface a cut had been made transversely across the middle but only about half way through, then cut from the lateral surfaces and angled upward and toward the center of this surface (Figure 8.23b). The preform was snapped leaving only a small piece of bone at the end.

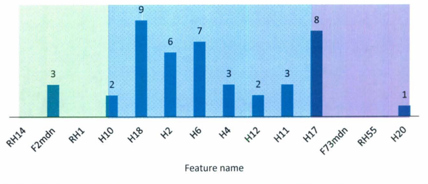
a.

b.

Figure 8.22 Refurbishing debris from a foreshaft-like tool. Photo a. shows the remains of grooves angled toward the center of the tool and overlapping. Photo b. shows the opposite surface with a transverse cut made partway through, meeting two cuts oriented from the lateral surfaces upward toward the center of this surface.

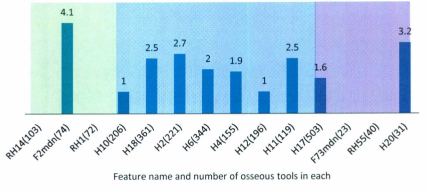
As with other osseous working tools, the distribution of refurbishing debris is apparent throughout the site's occupation in small numbers (Figure 8.23). The number of pieces expressed as a proportion of the osseous assemblage shows there is an even distribution throughout the site with a slightly greater frequency in early phase Midden Feature 2 and late phase House 20 (Figure 8.24).

Figure 8.23 Number of refurbishing debris from selected features at Phillip's Garden arranged from oldest to youngest.



Chi square = 15.222, p = 0.0850

Figure 8.24 Proportion (%) of refurbishing debris specimens from selected features at Phillip's Garden arranged from oldest to youngest.



8.6 Wedges

There are 31 osseous wedges in the Phillip's Garden collection of which 29 from dated features are examined here (Figure 8.25) (MNIT = 26). Wedges are used to split materials such as bone, antler and wood (LeBlanc 1992). While their widths do not separate into two discontinuous sizes, some are generally wider than others. They are rectangular in shape and defined by their distal working edges which are tapered on two surfaces by grinding. Many retain slight transverse scars incised to maintain the wedge in place during use (Figure 8.26). In complete examples, the proximal end is often polished somewhat; however many are broken at the proximal end, some with large flakes struck off. With the exception of one antler example, all wedges are made on whale bone.

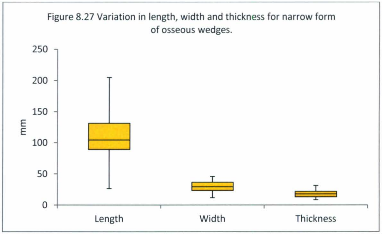
Figure 8.25 Assortment of bone wedges. The top row shows the wider form, and the bottom, the narrower form. The complete example, second from the left on the bottom row shows evidence on the proximal end of having been struck. Large flakes were struck from the first two examples on the top row, left.

Figure 8.26 Transverse incisions are visible on the distal end of three wedges.

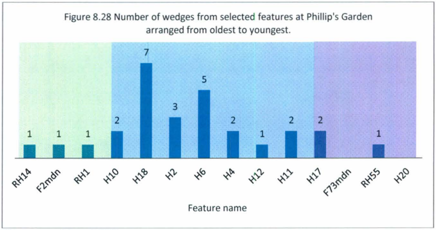
There is some variation in the size of wedges. Table 8.11 shows the variation in length, width and thickness, and Figure 8.27 displays the range.

Table 8.11 Variation in the size of osseous wedges from Phillip's Garden.

Wide form	Length mm	Width mm	Thickness mm
Average	103.2	29.4	18.4
Median	101.9	29.1	17.7
Standard Deviation	45.8	10.0	6.3



Wedges are found in small numbers throughout the site's occupation, and the difference in their frequency is not significant (Figure 8.28). When presented as a proportion of the osseous assemblage in each feature it is House 11 and Renouf's House 55 that show a slightly higher relative frequency (Figure 8.29).



Chi square = 14, p= 0.2330

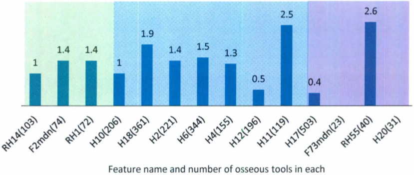


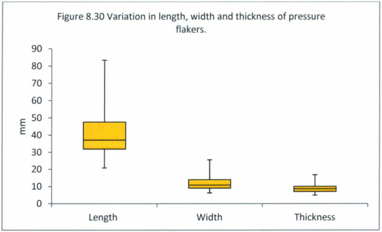
Figure 8.29 Percentage (%) of wedges in the osseous assemblage from selected features at Phillip's Garden arranged from oldest to youngest.

8.7 Pressure Flakers

Pressure flakers are used in the manufacture of stone tools. They are held firmly in a tool maker's hand or hafted and precisely directed continuous pressure is exerted to remove flakes. At Phillip's Garden these tools are manufactured on extremely dense sea mammal bone; likely on posterior portions of mandibles, possibly of walrus or whale. This bone is suitable for use as a pressure flaker as it is elastic compared to terrestrial mammal long bone, and so can withstand the application of pressure without snapping. There are 91 examples at Phillip's Garden of which 84 are examined in this thesis (MNIT = 66 based on distal end). While similar in shape, there is some variation in the size of these tools (Table 8.12, Figure 8.30). Many are relatively short, possibly from long use, and may have been difficult to hold. It is possible that these examples were hafted or were discarded as exhausted tools. The form is generally rectangular with a square cross-section, parallel lateral sides, a proximal end that tapers from the dorsal to ventral surface and a distal working end that is bluntly pointed and rounded (Figure 8.32). Other examples are more rectangular in cross-section, sometimes retaining the tapered end.

Table 8.12 Variation in the size of pressure flakers from Phillip's Garden.

	Length mm	Width mm	Thickness mm
Average	40.5	11.8	8.9
Median	37.2	10.8	8.9
Standard Deviation	14.1	3.4	2.5



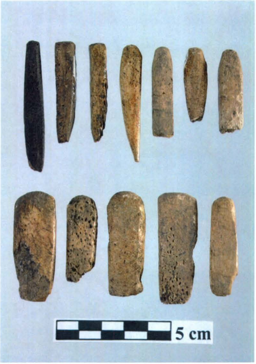


Figure 8.31 Assortment of sea mammal bone pressure flakers.

Viewed under 10x magnification the surface of the distal end is pitted and crushed from the pressure exerted to remove flakes and because the tool occasionally slips resulting in the removal of some bone. In addition, deep scratches and crushing can be seen along the margins of the surface (Figure 8.32).

Five pressure flakers are decorated, all with incisions that occur on one or more surfaces in pairs or singly (Figure 8.33).

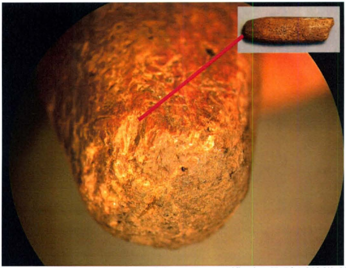
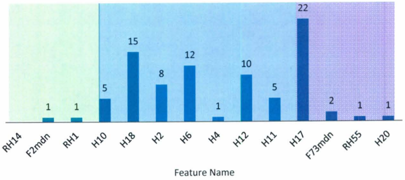


Figure 8.32 Distal end of a pressure flaker at 10x magnification (EeBi-1:31261). Note the scars and pitting evident on the tool surface.

Figure 8.33 Some examples of decorated pressure flakers. The first on the left has two parallel incisions while those to the right have single, discontinuous incisions along the midsection of the tool.

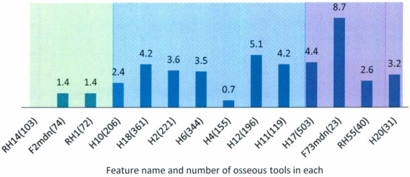
Since tool making and resharpening would have been an important activity at a residential site such as Phillip's Garden, it is not surprising to find that pressure flakers are found throughout the site over its entire occupation period (Figure 8.34). Their numbers are greatest during the middle phase, but there are significant differences among the features (Figure 8.35). When expressed as a proportion of each assemblage, their frequency becomes more even across features with the exception of House 4 where they remain low. Their high frequency in Midden Feature 73 may be partially a result of the small sample of osseous tools in this feature.

Figure 8.34 Number of pressure flakers from selected features at Phillip's Garden arranged from oldest to youngest.



Chi square = 77.333, p< 0.0001

Figure 8.35 Percentage (%) of pressure flakers in the osseous assemblage from selected features at Phillip's Garden arranged from oldest to youngest.



8.8 Punches

Punches used in the manufacture of stone tools are present at the site in small numbers. Nineteen of the 21 osseous punches used for tool making in the Phillip's Garden collection are examined in this thesis (MNIT = 19 based on distal ends). Most of them are rectangular in shape with square cross-sections and distal ends that are tapered around to form a blunt tip (Figure 8.36).

Figure 8.36 Range of punches showing size and form variation. On the bottom row, the first three resemble polar bear heads, the second displaying broad notches on the lateral surfaces.

The proximal end is flat, smooth and compacted from having been struck with a hammer (Figure 8.37). The nature of wear on the distal end is more difficult to understand. Under 10x magnification the distal end is somewhat concave, sometimes with undamaged edges. The center of the concavity is usually relatively smooth with small pit-like indentations, but these are not always present. Other examples have damaged edges in the form of single channels suggesting the tool slipped during its use (Figure 8.38).

Figure 8.37 Close-up view of the proximal end of a punch. Note the smooth flattened surface with slightly flared edging most apparent in the lower right of the tool. This is likely the result of percussion.

a.

b.

Figure 8.38 Close-up of the distal ends of punches at 8x magnification. Photo a. shows a concave distal surface with some pitting. Photo b. shows use damage around the margins of the distal end.

All examples are made on whale or other large sea mammal bone. There is some variation in form: five examples resemble carvings of polar bear heads and one has a broad notch in its midsection (Figure 8.36 above). Four specimens appear to have been made from pieces that had been intended for sled shoes as they retain traces of partially formed dorsal grooves (Figure 8.39).

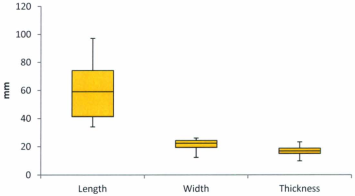
Figure 8.39 Punches exhibiting traces of parallel incisions for the manufacture of sled shoes.

While the punches in this collection are similar in shape, there is some variation in size, particularly in the length of the tools (Table 8.13, and Figure 8.40).

Table 8.13 Variation in the size of bone punches from Phillip's Garden.

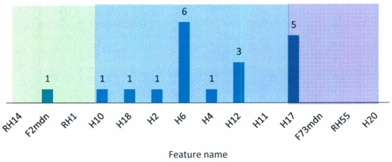
	Length mm	Width mm	Thickness mm
Average	58.4	21.4	16.9
Median	58.1	22.4	16.9
Standard Deviation	19.4	3.6	3.7

Figure 8.40 Variation in the length, width and thickness of punches.

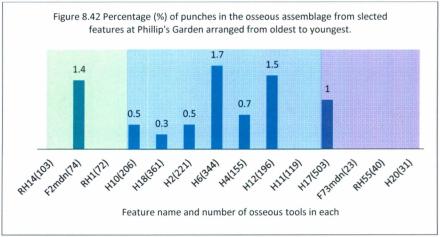


Despite their small numbers, the bone punches are distributed in features from the early to the beginning of the late phase at Phillip's Garden (Figure 8.41). The higher numbers seen in houses 6 and 17 are not considered significant. However, when expressed as a proportion of the whole osseous assemblage house 6 continues to indicate a greater proportion of the tools (Figure 8.42).

Figure 8.41 Number of punches from selected features at Phillip's Garden arranged from oldest to youngest.



Chi square = 11.200, p = 0.1301



8.9 Summary

This chapter presented a range of implements at Phillip's Garden associated with the manufacture of both osseous and lithic tools. These included cores, blanks, refurbishing debris, debitage, wedges, pressure flakers, and punches. While there are differences in the relative frequencies of each in house features there is a fairly even distribution suggesting that manufacturing was carried out at the household level throughout the site's history. Middens generally had lower proportions of cores, but much of the refurbishing debris was deposited in these features. An evaluation of the types of cutting methods employed in the production of blanks revealed some evidence for chopping and the possible use of wedges; however the practice of grooving and snapping osseous materials was much more common and enduring.

The animal sources of the osseous tool making assemblage is dominated by whale bone followed sea mammal, much of it likely whale in origin. In addition, there is caribou antler and, to a lesser extent, terrestrial mammal bone. It is clear both whale and caribou were important raw materials for osseous tool manufacture; nevertheless a review of the core fragments revealed that not all reduction of osseous material took place at the site.

All whale bone core material is represented by fragments beyond the primary stage of reduction. Likewise, caribou antler tended to be represented by small specimens with multiple cut edges implying relatively efficient use. Since there is almost no unmodified whale or caribou bone at the site (Renouf 2000; Murray 1992; Howse 2001; Hodgetts et al. 2003), these results suggest that these materials were acquired and partially reduced into tools elsewhere.

Chapter 9

Miscellaneous Organic Tools at Phillip's Garden

9.1 Introduction

While most tools can be organized into chapters that reflect their shared role in particular tasks such as hunting or hide working, it is impossible to determine with confidence the function of some of the artefacts in the Phillip's Garden collection. As the collection was sorted based on formal characteristics, a number of types emerged with common morphological traits for which functional information is either incomplete or nonexistent in both the archaeological and ethnographic literature. The following chapter presents the morphological, spatial and temporal distribution of five tool categories recognized in the Phillip's Garden collection. They are assigned names that are strictly formal; however based on a description of their features, a tentative interpretation of their place in the assemblage will be offered.

9.2 Polished Bead-like Pieces

From a total of 89 at the site, 74 highly polished, pea-sized ivory and bone or antler objects have been recovered from dated house and midden features at Phillip's Garden. Their absence in the archaeological literature, suggests they were at least rare, if not absent, from other Dorset contexts. Most bead-like pieces are round to cylindrical, or slightly conical, and some have socket-like grooves carved into them (Figure 9.1). While many are more amorphous in shape, they all share the common characteristic of exhibiting highly polished surfaces. Even when ridges are present on their surfaces, these are rounded and polished as though the objects have been tumbled (Figure 9.2). Despite variation in form they are fairly uniform in size (Table 9.1, Figure 9.3).

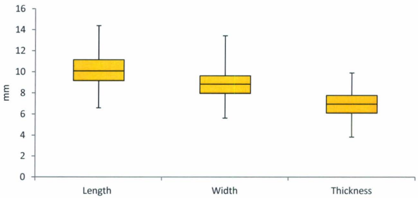
Figure 9.1 Variety of highly polished bead-like pieces. The top row specimens are all ivory and cylindrical with the exception of the specimen on the far left. The second row includes examples that have socket-like grooves in them. The fourth from the left in this row is made of sea mammal bone. The third row is made up of amorphously-shaped examples, and the bottom row is made of bone or antler examples that are generally cylindrical in shape.

Figure 9.2 Close-up of three ivory polished bead-like pieces. The first example on the left is a cut tooth. There are the remnants of where it had been cut on two sides leaving a thin area that was subsequently broken off. The remaining ridge is still visible, although well polished. Despite the various crevices on the top, and ridges on the area facing the viewer, high points on the middle example are well polished. The many edges on the third example are likewise well polished.

Table 9.1 Length, width and thickness variation in polished bead-like pieces from Phillip's Garden.

	Length mm	Width mm	Thickness mm
Average	10.1	8.8	7.0
Median	10.1	8.8	7.0
Standard Deviation	1.6	1.3	1.2

Figure 9.3 Variation in length, width and thickness for polished bead-like pieces.



Most bead-like pieces show evidence of having been cut; indeed, many may be small fragments of debitage from tool manufacture. Some appear to be human teeth, but they have been cut beyond precise identification. Approximately 50% of the specimens were made of ivory, while the remaining were made of either bone or antler (Table 9.2).

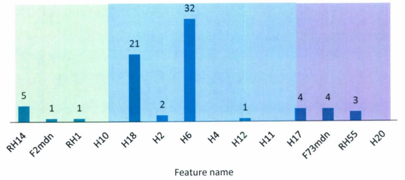
Table 9.2 Number and percentage of materials used in the manufacture of polished bead-like pieces.

Material	Bone	Antler	Bone/Antler	Ivory	Total
Number	1		36	37	74
%	1.4		48.6	50.0	100.0

The appearance of polish on all surfaces of these pieces suggests that they may have functioned as sound makers inside rattles or drums (Ritchie 1980). The high proportion of ivory in this type is similar to its use in representational objects, and while it could simply be an efficient use of an uncommon material, it is possible that these pieces could have played a similar ritual role, one involving music making. Alternatively they may have been retained in small numbers by individuals who would carry them in pouches or hold and rub them. Harp's field notes do not mention locating a concentration of these pieces, and Renouf's provenience database confirms their wide dispersal within her excavated features. This implies that the pieces were not deposited together as would be expected if they were collected inside a rattle or drum, but may represent a more widely dispersed context, perhaps as single or a few kept as personal items.

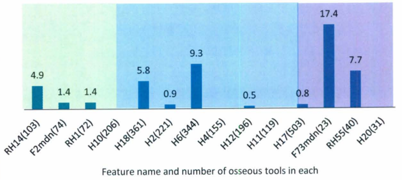
Figure 9.4 shows that the distribution of polished bead-like pieces spans the temporal extent of the occupation in house and midden features. Houses 6 and 18 have significantly more than others. This is maintained when their frequency is presented as a proportion of the total osseous assemblage (Figure 9.5). However, despite having conducted much more extensive excavations than Renouf, Harp collected only 54% of the total polished bead-like pieces, which suggests that he may not have consistently recognized them as modified faunal material; indeed, the bone/antler examples resemble tiny sesamoid bones that are found around seal carpals. Because Harp did not collect faunal material, he may not have recovered these pieces.

Figure 9.4 Number of polished bead-like pieces from selected features at Phillip's Garden arranged from oldest to youngest.



Chi square = 130.467, p<0.0001

Figure 9.5 Percentage (%) of polished bead-like pieces in the osseous assemblage from selected features at Phillip's Garden arranged from oldest to youngest.



9.3 Line fasteners

These objects are reminiscent of harpoon heads with the same outline and ends that resemble both endblade and foreshaft sockets; however the sockets are left closed and the function of these tools remains ambiguous. They may have adorned clothes and functioned as amulets. Alternatively, they may have been used to hold lines fast between harpoon heads and shafts, or as finger rests on harpoon shafts to keep the hunter's fingers from slipping. They resemble shaft attachments collected by Nelson on Nunivak Island off the southwest coast of Alaska (in Fitzhugh and Kaplan 1982:77). Shaft attachments were used to secure lines on composite harpoons. Tools referred to as harpoon line stops of similar design and function are seen in Thule collections (Maxwell 1985:269). Because of their flat profile, the Phillip's Garden examples could have fit flush to another flat object and been tied into place (Figure 9.6). Tim Rast (personal communication 2010) suggests they could have been bound to harpoon shafts to create a hook-like place to tightly loop line running to the harpoon head. He constructed an example that shows its orientation (Figure 9.7). This orientation gives them the appearance of an up-side down harpoon head. For consistency the discussion of these objects will follow the same orientation as harpoon heads, thus Rast's photo shows the ventral surface. However, when the line holes were examined microscopically, polish is limited to the lower portion of the hole, suggesting that they were bound with their ventral surface against another object (Figure 9.8). The portion above this level could not have held a loop, but could have provided a place for resting the hand when holding and thrusting a harpoon. While this microscopic evidence is limited to only a small sample (four of the 13 tools in the collection) it strongly supports this orientation, and suggests a possible function.

Figure 9.6 Lateral view of Phillip's Garden line fasteners. The example in the front has a line hole that goes straight through the midsection of the tool while the others go through the lateral surface to the ventral surface.

Figure 9.7 Line fastener and harpoon shaft reproduction made by Tim Rast.

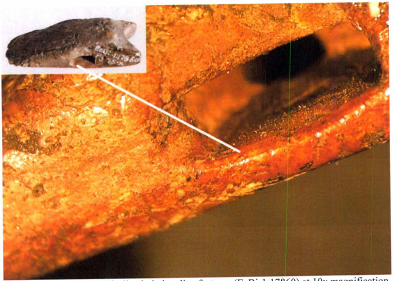


Figure 9.8 Ventral edge of a line hole in a line fastener (EeBi-1:17860) at 10x magnification. Note the polish on the edge.

All 13 line fasteners in the Phillip's Garden collection are finely carved and polished with line holes entering through the lateral surfaces, two going straight through to the opposite side, but more angled to come out on the ventral surface (n=5). A groove on the ventral surface allows line to be counter sunk to maintain an even profile. It would have been difficult to gouge a line hole completely through the lateral surfaces; this is done only in the thicker examples. While the Dorset were skilled at placing line holes through tools such as the Dorset parallel harpoon heads, the dorsal surface of these tools is kept wide laterally, and narrower through the dorsal to ventral surfaces, thus requiring smaller holes (Figure 9.9). To maintain a tool of this relative thinness with the desired profile it was probably necessary to place holes and grooves in the ventral surface.

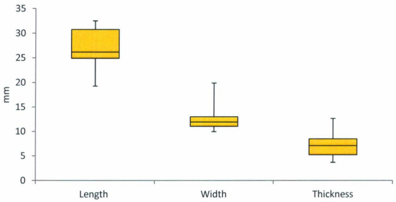
Figure 9.9 Dorsal surface of a variety of line fasteners.

Many of the tools are complete allowing for a detailed look at size variation (Table 9.3 Figure 9.10). While the width and thickness are fairly consistent with some outliers, the length of these tools shows the greatest amount of variation.

Table 9.3 Variation in size of line fasteners from Phillip's Garden.

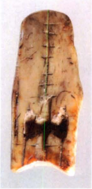
	Length mm	Width mm	Thickness mm
Average	27	11.3	6.2
Median	26.2	11.4	5.3
Standard Deviation	4.7	1.0	1.6

Figure 9.10 Variation in length, width and thickness of line fasteners.



Nine of the 13 tools could be examined in detail for the presence of decoration. There is a consistency in the type of decoration, but a great deal of variation in the location and design. Three examples have no decoration while six display an assortment. Decoration is in the form of incised lines, usually in pairs and usually parallel to one another, occurring on one or both surfaces of the tools and typically at the distal or proximal ends. Table 9.4 gives a detailed breakdown of the variation.

Table 9.4. An illustrated description of decoration on Phillip's Garden line fasteners.

Decoration description	Ventral Surface	Dorsal Surface
Two parallel lines with perpendicular lines extending from them toward the tool edge at the distal ends of both dorsal and ventral surfaces.		
Two parallel lines at the distal end of the dorsal surface.		
Two parallel lines at the proximal end of ventral surface with short lines perpendicular to the distal end of these. Two parallel lines at the proximal end of the dorsal surfaces plus a single, lengthwise incision down the center of the ventral surface with a series of short incisions cutting across it. Finally, there are three lines of staggered incisions down the distal half of the dorsal surface.		

Two parallel lines at the distal end of the ventral surface, as well as one groove the length of the center of this surface. There are two faint parallel lines at the proximal end of the dorsal surface.		
Two faint parallel lines the full length of ventral surface, and two parallel lines at the distal and proximal ends of the dorsal surface.		
On the ventral surface there are two parallel lines at the proximal end, three short parallel lines running lengthwise from both sides of the hole, and two lines at a slight angle outward at the distal end. On the dorsal surface there are two parallel lines at the proximal end.		

Line fasteners were made from a variety of materials including, most commonly, ivory and antler followed by bone (Table 9.5). The ivory is walrus, the antler is caribou, and the bone is unidentifiable, but most likely terrestrial mammal, with one possible sea mammal example.

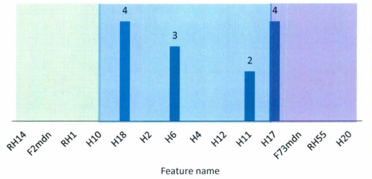
Table 9.5 Number and percentage of materials used in the manufacture of line fasteners.

Material	Bone	Antler	Bone/Antler	Ivory	Total
Number	3	5	0	5	13
%	23.1	38.5	0	38.5	100.1

These tools are finely made and leave few traces of the early stages of their manufacture. No preforms were recovered to offer evidence of the early stages. The surface shows some polish and small patches of striations that occur in groups that are oriented in one direction. The striation patches appear in multiple orientations, evidence the tool was turned during grinding. Polish is most notable where binding material came in contact with the line hole.

While a rare form, line fasteners are found in four houses that span the entire middle phase of occupation at Phillip's Garden (Figure 9.11). However, the differences in their frequency in features are not significant.

Figure 9.11 Number line fasteners from selected features at Phillip's Garden arranged from oldest to youngest.



Chi square = 0.667, p = 0.8810

9.4 Metapodial Tools

There are 76 tools made of caribou metapodial bones, of which 62 were selected from dated features at Phillip's Garden (MNIT = 24 based on proximal portion). The use of metapodial bones for the manufacture of tools is well known from various northern cultures (Jordan 1980; Mary-Rousselière 1984b, 2002; Morrison 1986; Taylor 1968; Yesner and Bonnichsen 1979). The metapodial is considered a good element for the fabrication of a tools functioning in a variety of ways. Yesner and Bonnichsen (1979) noted that many are used for making awls. Morrison (1986:115) also mentioned their use as awls as well as spatulas for marrow extraction by the Mackenzie Delta Inuit. Taylor (1968:55) suggested they were used as daggers or lance foreshafts by the Dorset inhabiting the Tyara site on Sugluk Island in Hudson Strait. Likewise from Dorset contexts, Mary-Rousselière (1984b, 2002) found numerous examples at Saatut and

Nunguvik on Baffin Island and offers a number of suggestions for their use. He agreed with Taylor that at least some were used as daggers, in particular to kill seals. He suggested that more blunt-tipped varieties may have been used as boot crimpers or as spatulas for marrow extraction. Jordan (1980:620) recovered metapodial tools from a Middle Dorset site in Labrador which he described as foreshafts. His photograph of an example shows the distal end as broad and flat (ibid:619).

At Phillip's Garden metapodial tools are long and narrow with straight sides that taper toward slightly pointed, but blunt ends (Figure 9.12). Some retain portions of the proximal articular end of the element, but there are only five complete examples in the assemblage. Most examples have a line hole, usually located near the proximal end and slightly off-center. The examples from this site are too blunt to have functioned as awls. Likewise with somewhat rounded, blunt ends they are unlikely to have been used as foreshafts, and the lack of caribou bone in the faunal collection suggests they were not used to extract marrow.

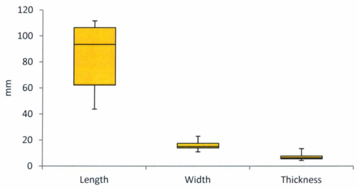
Figure 9.12 Metapodial tools from Phillip's Garden. Parts of the proximal ends is retained in examples in the top row.

The length, width and thickness are presented in Table 9.6 and Figure 9.13. There is variation in the length, but their width and thickness measurements are more consistent.

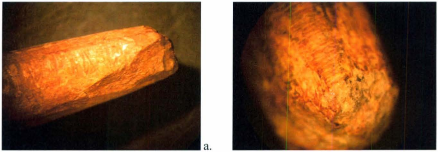
Table 9.6 Variation in size of metapodial tools from Phillip's Garden.

	Length mm	Width mm	Thickness mm
Average	83.5	15.7	6.8
Median	93.5	15	6.3
Standard Deviation	29.3	2.9	1.7

Figure 9.13 Variation in length, width and thickness for metapodial tools.



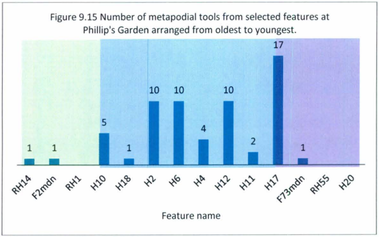
The choice of caribou long bone as a material source of the tool, and wear apparent on the metapodial tools are used to suggest its function at Phillip's Garden. The results indicate a possible combination of uses that involve some percussive activity coupled with contact against relatively soft materials. The selection of caribou bone would imply the need for a strong tool that could withstand a relatively large amount of steady force applied to it rather than sudden impact. The ends are often chipped, showing the removal of small bone flakes, or sometimes indentations and pits similar to the damage seen on pressure flakers (Figure 9.14 a and b). This implies the tool was used in percussion; however the edges of the flake scars are often polished from subsequent contact with a soft material. The surface of the tool shows two kinds of striations that appear to occur sequentially. The entire surface shows faint traces of striations running along the length of the tool, thought to be related to manufacturing; while more pronounced striations run transversely across the tool only on the pointed, distal end, and are interpreted as use wear related to the function of the tool. Transverse scars would suggest wear from a twisting action against a material (LeMoine 1997:36). Twisting to penetrate hides is unlikely as the distal ends of these tools are too blunt to be effective. It is possible that they may have been used, as Mary-Rousselière suggests (1984b:44), as boot crimpers.



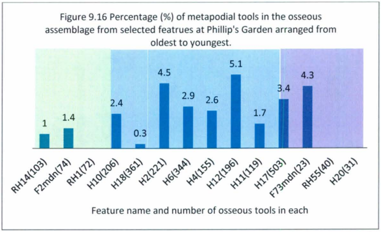
a. b.

Figure 9.14 Distal ends of metapodial tools. Example a., on the left, (EeBi-19763 at 10x magnification) shows flaking at the distal extremity and transversely-oriented striations. Example b., (EeBi-1: 14875) also displays transverse striations and end damage in the form of small pits.

The distribution of metapodial tools at Phillip's Garden spans the temporal extent of the occupation, and they become significantly more numerous in the middle phase toward the early part of the late phase (Figure 9.15). When numbers are expressed as a proportion of the total osseous assemblage for each feature House 2 and House 12 emerge has having a greater proportion of the tools, although overall, the differences among features does not appear to be as great (Figure 9.16).



Chi square = 42.333, p < 0.0001



9.5 Foreshaft-like Tools

From a total of 121, a sample of 100 specimens of a unique class of tools from dated features has been identified at Phillip's Garden (MNIT = 87 based on broader end). These have been identified as foreshaft-like tools for their resemblance to Thule foreshafts, but can only be given a tentative functional interpretation at this site. There is some variation in the forms which could indicate differing functions, but they all share a number of characteristics. They are all made of whale bone and are generally long and narrow; some are wider laterally toward the center of the tool, while others are straight-sided (Figure 9.17). The overall cross-section of most is oval, but there are diamond-shaped and triangular examples. One end of the tool is pointed, although almost without exception, the points are very blunt and generally round to oval in cross-section. The opposite end is tapered to a flattened end. Line holes are present on all examples; these typically occur singly, and are usually placed mid-way along the length of the tool and off-center toward the lateral edges. Nevertheless there are examples that have two, and in one case, three line holes. A groove radiates from one end of the line hole toward the tapered end. Presumably this groove holds a line coming from the hole flush with the surface of the tool.

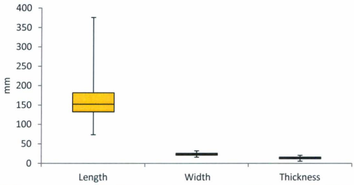
Figure 9.17 Range of whale bone foreshaft-like tools. From left, the first two examples have line holes on the lateral edges of the dorsal/ventral surfaces, three on the first example, and two on the other. The third tool from the left has a single, central hole just above a point at which the tool becomes narrow. All other examples show have line holes that are at or near the midpoint of the length and off-center. Grooves are often carved near one or both the longitudinal ends of the line holes, presumably to sink a line below the surface of the tool. Note that the top of the tools in the photo are sharp to mostly blunt points, and the bottoms slightly tapered and flattened. The two examples on the far right are the only sharply pointed examples.

The length, width and thickness measurements of foreshaft-like tools are presented in Table 9.7 and Figure 9.18. Most measurements cluster, although there are outliers in the lengths that demonstrate a wide range for this characteristic.

Table 9.7 Variation in size of whale bone foreshaft-like tool from Phillip's Garden.

	Length mm	Width mm	Thickness mm
Average	165.1	23.6	13.8
Median	152.3	23.6	14.0
Standard Deviation	70.4	3.5	3.1

Figure 9.18 Variation in the length, width and thickness of foreshaft-like tools.



While some (n=4) examples of foreshaft-like tools are sharp enough to have been used as lances, most are blunt at both ends and would not have been able to penetrate flesh. They closely resemble Inuit foreshafts for lance or harpoon heads (Maxwell 1985) and the selection of whale bone with its ability to withstand sudden impact without breaking suggests this type of function. However, they are much too large and have the wrong shape to fit in the rectangular foreshaft sockets of any Phillip's Garden harpoon heads. Nor would they bind well with the few lances at the site. It is possible that these tools do function as foreshafts for tools that are not available in the archaeological record at the site. There may have been tools made with dense portions of the local wood that have not survived.

In addition to its toughness, whale bone was a material that would have been suitable for constructing these relatively long, thick and straight tools, and the choice of material may have had little to do with mechanics and be more a result of size. It is possible that the tools functioned to hold and feed line in the manufacture of netting, another potential hunting tool. Nelson describes netting needles used by Bering Strait peoples (Nelson 1899:192). These are long, narrow bone tools that are tapered at both ends. The midsections are wider and have single holes through them. He states that these were used for repairing fishing nets. There are morphological similarities to the tools at Phillip's Garden, and while fish makes up very little of the faunal record at Phillip's Garden, these may have been used for netting seals between ice leads during the hunt. Netting harp seals during their annual migration is a common and successful practice in modern times in this region of Newfoundland, and may have been important in the past.

Use wear is usually not apparent under low powered magnification for almost all tools. The surface of worked whale bone is porous, and these tools are further degraded by taphonomic processes. There is some polish on high points, but not widespread enough to be considered particularly diagnostic. However one example had a series of small striations transversely across the tapered end of the tool which suggests the possibility it was bound at this end, or inserted into another tool (Figure 9.19). Nonetheless this is insufficient evidence with which to characterize the tool type.

The function of the whale bone foreshaft-like tools remains ambiguous. The most likely possibilities are that they were part of an unknown composite hunting tool or for producing or repairing nets. Some of the sharp examples may have functioned as lances; however since these are rare; the majority would have functioned differently.

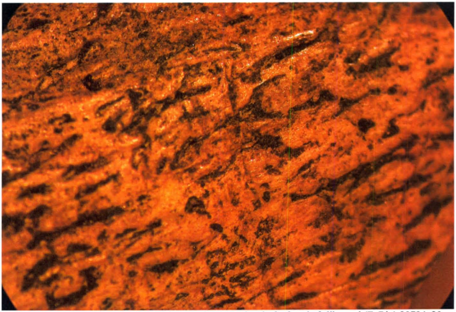
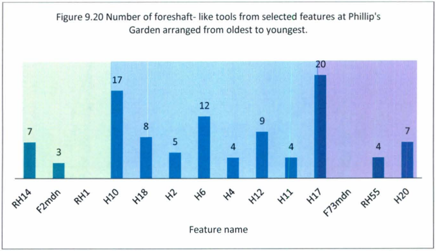
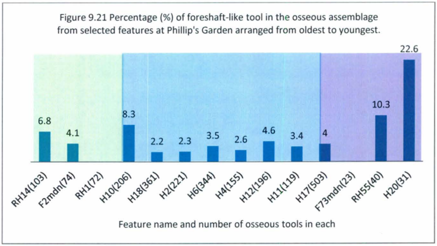


Figure 9.19 Small striations transversely across the tapered end of a foreshaft-like tool (EeBi-1:20794, 20x magnification).

The tasks associated with this tool were prevalent at the site during all phases of occupation (Figure 9.20). The distribution is significant and suggests they were more frequent in Houses 10 and 17; however when the frequency is expressed as a proportion of each assemblage, only House 10 retains a higher frequency. Renouf's House Feature 14 emerges as having a relatively high frequency as does Midden Feature 73, although in this case it is likely a result of this feature's small sample size. Overall, higher frequencies are apparent for the early and late occupation phases (Figure 9.21).



Chi square = 34.750, p = 0.0003



9.6 Foreshaft-like Tool Preforms

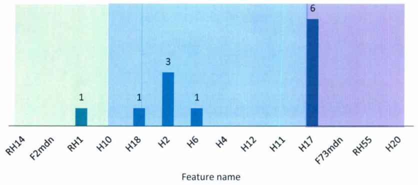
There are 12 foreshaft-like tool preforms in the collection (Figure 9.22). Their overall shape is rectangular, but some have an oval or diamond-shaped cross-section.

Cutting to remove the preform from the core is clear on two of the examples, both suggesting the use of a flake and burin-like tool. Cutting is apparent through the compact bone, which was then likely snapped through the remaining trabecular bone. This is the case for both the longitudinal and transverse ends. Some surface preparation is apparent on most of the examples and line grooves have been cut into the surface of three specimens. No line holes are apparent, suggesting that line grooves were placed before the addition of the hole. In sum, limited evidence shows that cutting, shaping (probably with scraper and/or abrader), and the installation of line grooves are some of the early stages for the fabrication of these tools.

Figure 9.22 Sample of foreshaft-like tools. The example at the top retains the marks of cutting. It has a diamond-shaped cross-section. The other examples are oval in cross-section and the example on the bottom right has part of a line groove incised into its surface.

The foreshaft-like preforms occur in small numbers in houses from the early phase to the beginning of the late phase (Figure 2.23). The differences in their frequency are not significant, and given their low frequency it is not necessary to present their proportions.

Figure 9.23 Number of foreshaft-like tool preforms from selected features at Phillip's Garden arranged from oldest to youngest.



Chi square = 8.000, p = 0.0916

9.7 Blunt Points

There are 70 blunt whale bone points of which 52 are examined from dated features at Phillip's Garden. These tools look similar to the foreshaft-like tools but there are characteristics that separate them. They are made exclusively of whale bone and are round or square in cross-sections with either flattened, or slightly rounded blunt ends (Figure 9.24). They are not decorated and lack line holes and grooves; and while there are only six complete examples, it appears that the proximal end is left unmodified. The surface of these tools is too degraded to identify any form of micro-wear under low powered magnification. This is unfortunate since their function remains a mystery. The distal points do not show damage that would indicate use as stakes or ice picks, nor do the proximal ends display evidence of having been struck. Presumably they did work for which the readily available wood sources were inappropriate.

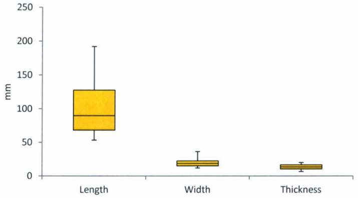
Figure 9.24 Blunt points. The examples on the top row are round or square in cross-section. The bottom row includes flatter examples with broad distal ends.

There is variation in the length of tools, but this is based on very few examples (Table 9.8 and Figure 9.25). While there are outliers in widths, most fall within a narrow range.

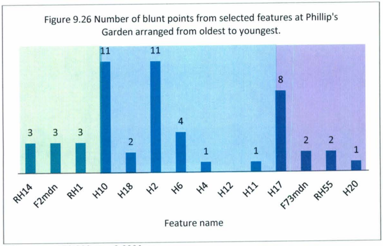
Table 9.8 Variation in size of blunt point from Phillip's Garden.

	Length mm	Width mm	Thickness mm
Average	104.3	19.6	13.4
Median	89.6	18.8	13.4
Standard Deviation	52.1	5.5	3.5

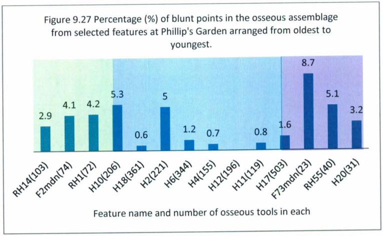
Figure 9.25 Variation in length, width and thickness for blunt points.



Blunt points are found in almost all features spanning the extent of the occupation (Figure 9.26). The differences in their numbers are significant, showing a higher frequency for Houses 10, 2 and 17. When these numbers are presented as a percentage of the total assemblage for each feature, House 2 and House 10 frequencies remain high. The overall impression is that there is a higher relative frequency of blunt points during the early and late phases of occupation, and generally less during the middle phase (Figure 9.27).



Chi square = 39.000, p = 0.0001



9.8 Summary

A quantitative and qualitative description of five tools of unknown function were introduced in this chapter, including polished bead-like tools, line fasteners, metapodial tools, foreshaft-like tools and blunt points. All of them, with the exception of the line fasteners were present on the site throughout the period of its occupation. Some tentative interpretations were offered for how they may have functioned at the site as a starting point for integrating them into the wider sphere of life at the site. This chapter ends the presentation of the tool forms, their raw material sources and their distribution over time and space at the site. The discussion will bring together the elements of the preceding chapters to present a picture of technological life at the site with implications for the occupation of the broader region.

Chapter 10
Discussion: Technological Life at Phillip's Garden

"Through the activities and social relations involved in material production, people create things. These processes of material production and their end products, in turn, become material and symbolic structures through which the world is perceived and responded to" Dobres and Hoffman 1994:215.

10.1 Introduction

This chapter synthesizes the results of the material culture analysis to present a picture of technological life at Phillip's Garden. Technology is defined with emphasis on its socially embedded nature, where acts of acquisition, manipulation and use of osseous materials place people in social contexts, the structures of which are reinforced, negotiated and changed, ultimately forming the character of a worldview. The ecology of the region constrains some of the conditions of technology, but solutions are addressed in a thoroughly social sphere. The winter and spring harp seal hunt was the subsistence focus at the site (Hodgetts et al. 2003; Renouf 2011b). Evidence suggests that the Dorset quickly recognized the richness of the region and altered their social organization to establish a large community focused on the hunt (Renouf 2011b). Intensification of occupation is seen in increasing numbers of contemporaneous house features, which become larger in size to accommodate greater numbers of people. In addition to hunting, activities around the processing of seal products and the acquisition and modification of raw material put people into social groups in time and space. In general, the distribution of tool types is fairly consistent throughout houses, suggesting that they operated in a similar fashion to one another; however, there were some differences. Indications of social grouping based on gender appear in some features during the most intense middle occupation phase. Furthermore, sled shoe frequency over time fluctuated; they were more frequent during the early and late phases. The distribution of tools places individuals and groups in social settings of differing constitution, and implies degrees of mobility. By examining evidence for material reduction it is possible to infer the distribution of the reduction process from first acquisition to use and discard. The analysis of osseous remains in this thesis is carried out with the ultimate aim of understanding their social context. The following will explore the practices that are reinforced and transformed at the site through the osseous material culture. Furthermore, the practices at Phillip's Garden have implications for actions that took place in the broader region.

10.2 Seal Hunting and Processing

Subsistence activities at Phillip's Garden were focused on exploiting the large harp seal populations that migrated close to the site during early winter (December) and again in spring (March to April) each year (Harp 1976; Hodgetts et al. 2003; Hodgetts 2005b; Murray 1992; Renouf 1991, 2000; Renouf and Murray 1999). The timing of the migration was predictable, but the duration of the hunt was less predictable and could be as short as a few days (Renouf 2011b:135). Nevertheless the abundance of valuable meat, fat and hide must have been an astounding event for the Dorset and other groups who witnessed it. Unlike other groups, however, the Dorset recognized and responded to the possibility of exploiting greater numbers of seals by hunting intensely for the short period during which the animals were available. The consequences of this decision influenced the way the Dorset organized themselves socially.

One indication of this intensification is seen in the localized shift in Dorset social organization, particularly in the construction of larger dwellings to accommodate larger social units (Renouf 2011a). The aggregation of people into houses that would have accommodated a number of families is seen as an organizational strategy for intense seal hunting at Phillip's Garden (Renouf 2011a, 2011b).

The short-term availability of harp seals would have shaped and constrained the character of the technological approach to its exploitation which, for the Dorset, was manifested in a larger population hunting intensely and cooperatively. Technological change around hunting was not expressed in material culture as much as through a shift in social organization that allowed the Dorset at Phillip's Garden to meet this unique resource opportunity.

10.2.1 Harp Seal Hunting Practices at Phillip's Garden

Dorset hunters at Phillip's Garden would have harvested harp seals in open water or in ice leads during both migration periods (Hodgetts 2005b). The animals were captured with composite harpoons fitted with endblades and harpoon heads, or barbed points mounted on shafts, and probably killed by striking the head or using a cutting tool such as a lance or biface. One tool unique to the site may have played a role in seal hunting. The whale bone foreshaft-like tools could have functioned in making nets to capture seals; although this remains highly speculative (see Chapter 9).

Apart from their short-term availability, the relatively large size of harp seals - weighing roughly 130 kg (Lavigne and Kovacs 1988) - would have compelled the Dorset to hunt cooperatively. While significantly smaller than walrus, harp seals would have presented a challenge to solitary hunters using harpoon technology, particularly in open water. Maxwell (1985:84) reports that modern Inuit on southern Ellesmere Island consider harp seals the most difficult to hunt on account of their agility and movement in the water. Once harpooned, the animal's sudden movements could capsize a small boat easily. It is likely that hunters worked together; a practice documented in both the archaeological and ethnographic literature for walrus hunting (Bodenhorn 1990:60; Freeman 1974; Murray 1996; Nelson 1969; Rae 1850). Indeed, it is likely that the entire community, and not only hunters, were engaged in intense activity during the hunt.

Murray (1996:103) states that co-operative walrus hunting was conducted by the Early and Late Dorset inhabitants at Igloolik where this species dominated the faunal collection. She suggests that walrus hunting would have involved at least two hunters, and probably more during times when the animals were gathered on land or water (ibid:104).

Ethnographic examples of walrus hunting emphasize the organization of a number of hunters around the task. Rae (1850:174) describes Igloolik region hunters tying several kayaks together to prevent them from being capsized by the struggling, harpooned walrus. Among the Inuit of Quebec in the western Hudson Bay region, walrus were hunted by as few as three or four men when they were encountered as solitary individuals basking on floating ice in the spring (Saladin d'Anglure 1984:489). When walrus were gathered in large herds in October they were hunted from boats which approached the animals on shore and mounted a surprise attack. In addition, hunters would surround the animals in water using kayaks and force them toward shallow water where they were harpooned. Siberian groups had a similar approach, driving walrus ashore by encircling them in boats and harpooning and lancing them (Hughs 1984:250).

Furthermore, like other groups that exploit seasonally abundant species, almost all members of the Phillip's Garden community would have been involved in the tasks surrounding the hunting and immediate processing of seals. While some community members were hunting, others could initiate the work of processing, allowing the hunters to immediately return to their task, and ensuring the recovery of many animals before the seals left the area.

There are numerous ethnographic descriptions of the intense community-wide efforts to process concentrated migratory resources during and immediately after the harvest. Among the Caribou Inuit of western Hudson Bay Nunavut, women and children were involved in driving herds of caribou toward hunters who would kill them from kayaks as they crossed waterways (Arima1975; 1984:449). They were hauled ashore where they were skinned and butchered by women, and the surplus prepared for winter storage (ibid; Birket-Smith 1929). Similarly organized hunting of caribou during their mass migration is described for western Greenland (Grønnow et al. 1983). In describing their salmon harvesting practices, the people of 'Ksan (1980:30) in south eastern British Columbia state that the busiest time of year is during the run when every person takes part; men build and set the traps, spear and net fish while women and children clean and carry the catch to the smokehouse for curing before it is stored for the winter. Intense, community-wide capture and processing is the case for other British Columbia groups who depend largely on the brief appearance of salmon which they process for later consumption (Teit 1906). Likewise when captured whales are returned to settlements they are met by most of the community who participate in the work of butchering and processing the various products. Indeed important preparation for whaling is not simply the work of hunters, but involves the wider community and includes rituals and behavioural prohibitions associated with the hunt (Bodenhorn 1990; Losey and Yang 2007; Murdoch 1892:272-276; Sheehan 1985).

The arrival of the harp seal populations at Phillip's Garden would have been a period of intense activity surrounding the many jobs associated with taking advantage of the short-term appearance of the resource. However, the intensity and order of activities, particularly around processing, would have been different for the winter and spring hunts. For instance, ambient temperature would have influenced the nature of activities during the two seasons. Hides and carcasses may not have required the same processing attention during the winter when these products could be frozen, but with the onset of warmer temperatures, prompt processing would be necessary.

10.2.2 The Winter Harp Seal Hunt at Phillip's Garden

While the December hunt may not have been marked by the appearance of dense concentrations of many harp seals compared to the spring, it remained an important period for their exploitation (Hodgetts 2005b). As in the spring, their presence would have been relatively short-term as they moved toward whelping grounds. During the hunt, seals would have been returned to the site for processing, possibly with the aid of sleds. The representation of body parts from faunal samples at Phillip's Garden demonstrates that seals were returned whole (Howse 2001; Linehan 1990; Murray 1992). Despite cold winter temperatures that would allow for the catch to be frozen, skinning, blubber removal, evisceration, and some carcass butchering is likely to have taken place immediately after the kill. Nevertheless, weather conditions and the intensity of work around the temporally restricted hunt would have prevented the complete processing of a large number of animals, particularly hide preparation. The frozen conditions would have made it difficult to wash hides and remove hair through soaking. In addition, according to local seal skin workers in the region today including Ross Noseworthy (pers comm.), scraping a frozen hide will result in cutting the skin. The skin needs to be unfrozen and supple to remove excess tissue while protecting the hide. Therefore, during and immediately after the December hunt, the Dorset would likely have removed only the blubber and most extraneous tissue from the hide. It would otherwise be left to freeze until further processing during the warmer season. Furthermore, since attention would have focused on tasks around the hunt, some of the time-consuming jobs connected to skin preparation and associated product production would have been delayed. Noseworthy reports that pelts can remain frozen without removing the blubber, but once thawed, there is only a short window of opportunity to scrape them before the fat begins to break down the skin and hair.

An examination of cut marks on seal bone from Phillip's Garden suggests that carcasses were butchered into meat packages during the winter hunt. Wells (1988) studied the pattern of cut marks on a large sample determining that cut marks are rare, likely due to the precision of cutting around joints, and chop marks are the least observed form of cut. In almost all cases, cuts were made with very fine blades, unlikely tools to have been used to cut frozen meat (Wells 1988). Ethnographic studies of large carcass pieces left frozen for the winter show somewhat random and heavy cutting as portions of the carcass are exposed from under the snow and chopped (Binford 1978).

10.2.3 The Spring Harp Seal Hunt at Phillip's Garden

The March to April hunt likewise took place during a cold period. Seals would have been moving north for the summer, occasionally hauling out on land, but also now on ice that could have been driven onshore depending on winds. If females occasionally whelped on this ice, these would have been abundant years as hunting would not have been particularly dangerous, and without the need for boats, more people could have been involved in the harvest. Furthermore the newborn seal pups would have been covered in a pure white coat for this period, offering a rare opportunity to collect a pelt of this colour and texture, perhaps for special accents on clothing. The routine of returning animals from the kill location to shore would have continued and the entire community would have been involved.

The cold temperatures meant that ponds were still frozen and seals would once again have been partially processed and temporarily stored frozen until they could be processed. However, scheduling around work would have become extremely important now as temperatures would have begun to rise by the time the hunt ended, and a surplus of both winter and fresh, spring hides, blubber and meat would need to be processed quickly to prevent decomposition.

While straggling harp seals, particularly the young, were still likely to have been exploited into the warm season, hunting activities would have largely given way to the very busy work of processing the hides for clothing, tent and boat covers, in addition to the preservation of meat for storage or transport.

10.2.4 Evidence for Skin Processing at Phillip's Garden

Evidence for the intense processing of seal hides at Phillip's Garden is well documented not only from the material culture remains, but in the environmental record where the impact of this activity has been recorded (Bell et al. 2005; Knapp 2008; Renouf and Bell 2008; Renouf et al. 2009).

Knapp examined the slate tool assemblage from Phillip's Garden, classified it and conducted experimental lithic analysis to demonstrate the character of use wear. Her results show that most of the types, dominated by tabular bevelled tools, were used in hide scraping. Renouf and Bell (2008) compare the slate assemblage frequencies from Phillip's Garden to other sites in Newfoundland. They are consistently higher in frequency at Phillip's Garden. The only other sites with comparable numbers are from other seal hunting sites around the island. Although slate industries are seen elsewhere, broader comparisons to sites off the island of Newfoundland show that the tabular slate scraping tools are largely a Newfoundland phenomenon (Renouf and Bell 2008:43-44).

Renouf and Bell (2008) argue that the frequency of this tool type at Phillip's Garden is related to its important skin processing industry, and go on to suggest that the intensity of this activity can be seen in the pollen and chironomid record of Bass Pond, approximately 500 m east of the site. High resolution analysis of radiocarbon-dated lake sediments demonstrates a distinct pattern of vegetation and soil change coinciding with the Phillip's Garden's occupation. This disturbance is unrelated to broader climate change as sediments collected within the region but approximately five kilometers from the site show no change (Bell et al. 2005). The results from Bass Pond represent isolated events likely associated with the introduction of numerous seal pelts to the pond to remove hair. The evidence includes an escalation in indicators for bacteria in addition to shoreline disturbance in the form of vegetation change (Renouf and Bell 2008:43).

10.2.5 Hide Processing Work and Social Organization at Phillip's Garden

The osseous tool assemblage from Phillip's Garden supports the evidence for extensive hide processing at the site. A range of tools is present including scrapers, awls and needles. Together these tools represent all stages of hide processing, from initial removal of fat and tissue to final manufacture into finished products. The distribution of the tools is widespread across the site and over time demonstrating the temporal and spatial extent of the activity. However these activities are more frequently represented at two middle phase dwellings adjacent to one another, House 11 and House 6. House 11 has a significantly greater frequency of awls, while House 6 has significantly high number of needles. This concentration indicates a greater emphasis of these tasks at the two houses suggesting a number of interpretive possibilities. For instance, particular houses could have been occupied by processing specialists who did more of this work than the occupants of other contemporary dwellings, or alternatively, members of the wider community may have congregated in these houses to work on tasks together. The latter explanation has merit as the timing of many of the processing tasks was spread out over a number of weeks, and probably extended into months after the seal hunt had ceased, and some portion of the community would have moved off to exploit other resources leaving houses less densely populated and a work force dedicated to one main task.

Tasks would have included constructing frames for lacing skins for drying. It is less likely that they were pegged out as the ground would have been wet with the spring thaw and drying would have accelerated with exposure to the wind on an upright frame. This is the method used by seal skin processors in the area today (Figure 10.1).

Figure 10.1 Harp seal skins laced out and drying on a warm sunny day in Shoal Cove East, north of Port au Choix on Newfoundland's Northern Peninsula.

The skins would have gone through multiple soaking and scraping episodes to remove tissue, and in cases where hair needed to be removed such as in the construction of materials for boats or waterproof boots, the skins would have been sunk in Bass Pond to allow the hair to decay and fall off (Figure 10.2). This initial hide preparation can take several weeks depending on the desired finished product. By summer cutting and sewing skins would have begun.

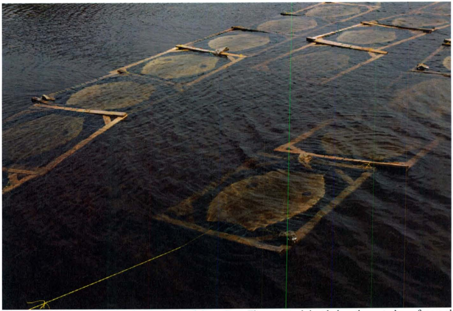


Figure 10.2 Harp seal skins on frames in Shoal Cove East. They are sunk just below the water's surface and left until the hair has fallen off. The skins are kept off the bottom of the pond to prevent organisms and mud from damaging them.

Given the expected volume and the time involved in processing skins, Phillip's Garden was probably occupied into the summer. While jobs were unlikely to have been strictly differentiated on the basis of gender, the social character of the community may have shifted to include a greater proportion of women and those less inclined to leave after the hunt such as the elderly and young children. Some hunters and their families may have moved off for various reasons, perhaps to harvest other resources such as caribou products and fresh fish, leaving a slightly different population configuration.

Northern ethnographies consistently describe sea mammal hunting as predominantly performed by men while women are more often involved in processing hides. There are references to men being able to do minor sewing, and some that refer to men taking part in initial hide preparation, but these are remarkable largely because they are out of the ordinary (Boas 1888:172; Issenman 1997:220; Oakes and Riewe 1998:15; Stefansson 1914:149; Taylor 1974:52). Based on limited circumpolar ethnographic literature it is assumed that hide working was largely the domain of women at Phillip's Garden. For those left to finish hide processing and engage in sewing, there may have been advantages to pooling domestic chores such as cooking (Boas 1888:169) in order to free up more people for skin working. In some instances, the nature of living in houses may have shifted from being composed of families, to task groups made up of mostly women sharing space while they worked. Unfortunately, it is impossible to determine whether the skin processing houses were occupied during working hours only, or if they became temporary residences for the skin working occupants. The concentration of hide processing tools in some houses represents a temporal shift in women's social organization on the site, removing them from the social structure surrounding the hunting and recovery associated with the two hunting events, to the skin processing group into the warmer season.

To summarize, the technological approach to harp seal hunting involved the organization of community members, particularly during the March to April hunt, around maximizing the recovery of animals for the short period they were available. This would have involved a sequential attendance to tasks beginning with hunting, followed by hide processing and the production of products such as clothing and tent and kayak covers. Houses grew larger to accommodate larger social units, likely working together as hunting teams. Processing and sewing is well represented through the tools involved and the impact seen in the wider environment. These tasks would have been most intense after the hunts, and toward the end of this period, some members of the community may have left to harvest other resources such as caribou. In addition, it appears that making skin products may have been concentrated spatially at some times, and likely involved an aggregation of women.

10.3 The Chaîne Opératoire of Osseous Technology at Phillip's Garden

The following discussion focuses on the social circumstances surrounding the acquisition and modification of osseous material at Phillip's Garden. Availability, the size and shape of intended tools and mechanical properties operated along with traditional notions of suitable materials for manufacturing tools to determine the materials chosen, and their finished form. The proportion and distribution of different materials is presented and discussed with reference to the location and timing of their exploitation. The reduction of materials is spatially and temporally variable and not all stages are represented at the site. Nevertheless the techniques of reduction endure over the occupation. Furthermore, while the faunal collection at Phillip's Garden is overwhelmingly dominated by seal remains, the osseous tool collection indicates a greater diversity of species sought, particularly by highlighting the importance of whale and caribou; thus broadening the economic character of Dorset society at the site. The tasks of harvesting products for tool manufacture may have been opportunistic at times, but more formally structured during other periods, particularly when associated with time-sensitive activities such as the seal hunt. This discussion puts the sequence of osseous material working into a social context both on the site and elsewhere.

10.3.1 The Acquisition of Osseous Raw Material

The acquisition of osseous raw material used in tool manufacture at Phillip's Garden was part of an overall economic strategy that involved exploiting products in the local area, the wider region of the Northern Peninsula, and likely through trade or travel, around and off the island of Newfoundland. Evidence suggests that different raw materials came to the site having been elsewhere partially or greatly reduced into finished tools. To some extent this may have been influenced by the distance from which raw material came, and the social organization of tool working tasks at Phillip's Garden.

Osseous materials used in the manufacture of tools include bird bone, ivory, caribou antler and bone, whale bone and more broadly identified sea and terrestrial mammal bone (Table 10.1).

Table 10.1 Identifiable specimens in the osseous assemblage from Phillip's Garden.

Osseous Source	Number of Specimens	Percent of Total
Caribou bone	77	2.4
Ivory	127	3.9
Terrestrial mammal bone	149	4.6
Bird bone	146	4.5
Antler	435	13.4
Sea mammal bone	832	25.6
Whale bone	1487	45.7
Total	3253	100.1

It is clear that all materials are present at the site throughout its occupation in differing proportions (Figure 10.3). The assemblage is dominated by sea mammal bone, much of it identified as whale. Indeed, much of the unidentified sea mammal bone is likely whale as the pores exposed in the trabecular portion of fragments are large, but they cannot be identified with sufficient confidence to discount other taxonomic sources such as walrus. Caribou was an important resource providing antler and bone; certainly much of the terrestrial mammal bone was likely caribou. To a lesser extent ivory and bird bone contributed to the osseous tool assemblage. The middle phase of site occupation has a greater proportion of caribou antler, and the early and late phases show more frequent use of whale bone (Table 10.2). While some materials may have been acquired near the site many were brought there.

Figure 10.3 Proportion % of osseous materials for dated houses and middens at Phillip's Garden arranged from oldest to youngest.

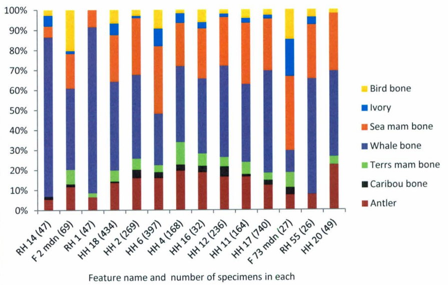


Table 10.2 Proportion of osseous materials in dated houses and middens from Phillip's Garden.

Feature Name and (# of Specimens)	Antler %	Caribou bone %	Terrs mam bone %	Whale bone %	Sea mam bone %	Ivory %	Bird bone %	Total
RH 14 (47)	5.4	1.4	0	79.7	5.4	5.4	2.7	100.0
F 2 mdn (69)	11.6	1.4	7.2	40.6	17.4	1.4	20.3	99.9
RH 1 (47)	6.4	0	2.1	83.0	8.5	0	0	100.0
HH 18 (434)	13.6	0.7	5.5	44.5	23.3	5.8	6.7	100.1
HH 2 (269)	16.0	4.1	5.6	42.0	28.3	1.1	3.0	100.1
HH 6 (397)	15.9	3.0	3.5	25.7	33.8	8.8	9.3	100.0
HH 4 (168)	19.6	3.0	11.3	38.1	21.4	4.8	1.8	100.0
HH 16 (32)	18.8	3.1	6.3	37.5	25	3.1	6.3	100.1
HH 12 (236)	16.5	5.1	4.7	45.8	24.2	1.7	2.1	100.1
HH 11 (164)	16.5	1.2	6.1	39.0	30.5	2.4	4.3	100.0
HH 17 (740)	12.3	2.4	3.6	51.2	25.7	1.9	2.8	99.9
F 73 mdn (27)	7.4	3.7	7.4	11.1	37.0	18.5	14.8	99.9
RH 55 (26)	7.7	0	0	57.7	26.9	3.8	3.8	99.9
HH 20 (49)	22.4	0	4.1	42.9	28.6	0	2.0	100.0
Average	13.6	2.6	5.6	45.6	24.0	4.9	6.1	

10.3.2 Whale Bone Acquisition and Use

Whale bone was the most frequently used source of osseous raw material for the tools of the osseous industry, yet it remained infrequent in the unmodified faunal assemblage from Phillip's Garden. In three assemblages of faunal remains from middens and dwellings at the site numbering 18,682 identifiable specimens, no cetacean elements were identified (Murray 1992:58-59). Consequently whale bone was likely returned to Phillip's Garden as a source for modification into tools rather than for subsistence. Renouf (2009) notes the high frequency of whale bone tools in two middle phase house features at Phillip's Garden, and suggests in addition, that whale ribs may have been used as posts in dwellings. The high frequency she found is supported in this study of all dated house and some midden features where whale bone artefacts makes up at least 45% of the material for osseous tools. This is a conservative estimate since much of the identified sea mammal osseous tool material is probably whale (Table 10.1).

This extensive use of whale bone for tool making at Phillip's Garden is unusual for Palaeoeskimo osseous assemblages. Elsewhere whale bone tools at Palaeoeskimo sites are reported in relatively small numbers (Grønnow 1996; Helmer 1996; Kramer 1996; Maxwell 1973, 1985; Renouf 2009; Taylor 1972). Taylor (1972:32) found one whale bone sled shoe fragment at Bernard Harbour II, a Dorset site on Cape Parry on the Arctic mainland south of Banks Island, and Maxwell (1973:181-2) found six Dorset sled shoe fragments and a pressure flaker of whale bone from Component 2 at the Nanook Site (see also Maxwell 1985:152). Other artefacts of sea mammal were recorded from sites elsewhere in the Tanfield Valley area including Component 1 at Nanook and at the Kemp site (Maxwell 1973). Finally, my examination of the material from house features 76 at Nunguvik and 1501 at Alarnerk revealed only one definite whale bone piece from the latter and three from the former. It is possible that whale bone may not be recognized or recorded in many descriptions of osseous tools from archaeological sites. An examination of photographs in some publications suggest whale as the bone source presented occasionally (McGhee 1981:91, Figures a-c; Taylor 1967b:235, Figures h, i, 236, Figures bb and cc; Taylor and McGhee 1979, Plate 15:n;). Nevertheless these are relatively rare finds and the number of whale bone tools seen at Phillip's Garden is extraordinarily large.

It is assumed that most whale bone was scavenged from beached animals and less likely harvested by hunting. Renouf (2009:101) suggests that while scavenging was a likely means of getting whale bone, there may have been rare occasions when hunters worked together to kill whales. Maxwell (1985:131) considers the possibility of Dorset whale hunting given the presence of its products on some sites. He argues that the challenges of hunting other large sea mammals such as aggressive walrus made the Dorset capable of taking whales. Regardless of the method of recovery, it is expected that whale bone was readily available in the Port au Choix area. Today whales are seen off Phillip's Garden almost daily throughout the summer, and they beach themselves in the region every couple of years.

Given their relative abundance in the Port au Choix region today, and assuming whale populations would have been much greater in the past, it is reasonable to suggest that whale bone was gathered close to Phillip's Garden. Furthermore, the amount of whale bone used to make tools, some including wedges, sled shoes, and foreshaft-like tools exclusively of whale bone, suggests that it was widely available throughout the occupation and likely available close to the site.

Despite the likelihood that whales were available close to Phillip's Garden, the Dorset appear to have conducted primary processing of the material prior to returning it to the site. Whale bone cores at Phillip's Garden retain no articular ends demonstrating that primary core reduction was performed off site. Furthermore, large core pieces had been partially split longitudinally before reaching the site.

The presence of relatively high proportions of whale bone in features dating to the earliest occupation implies that the resource was quickly recognized and became a dominant material source. The presence of whale bone in the local area would have expanded its resource base and further contributed to an overall sense of abundance in the Port au Choix region.

10.3.3 Caribou Bone and Antler Acquisition and Use

Caribou bone and antler were also important at Phillip's Garden, and probably account for much of the terrestrial mammal bone artefact assemblage. Many important tools were constructed from antler, including harpoon heads, scrapers and barbed points. Caribou raw material makes up an average of over 15% of the artefact assemblage (Table 10.1), yet unmodified caribou bone and antler is almost entirely absent from the site. Only occasional articular ends of long bones and a few antler pedicles have been recognized in the unmodified faunal collection. The almost total lack of identifiable elements of caribou bone in the core assemblage suggests blanks, preforms and tools were fashioned elsewhere. Furthermore, antler core material consists of small, often exhausted pieces, indicating that antler was efficiently used, with little wastage. Clearly, caribou bone and antler would have been acquired elsewhere and transported to the site as part of the tool assemblage. Unless meat arrived detached from bone, it did not contribute to the diet at Phillip's Garden. While recognizing that the exploitation of caribou had a more important role than is apparent in the subsistence remains, it is evident that hunting caribou was not part of the economic life at the site (Renouf 2000).

Caribou bone and antler was either traded to members of the Phillip's Garden community from those living elsewhere, or more likely, its exploitation required travel to places where caribou were hunted, and transport of most of the bone materials to Phillip's Garden by residents in a mostly finished form. Schwarz (1994:65) examined Dorset settlement patterns and concludes that settlement was most intensely focused on coastal areas with brief interior occupations which he suggests were for caribou hunting. With a predominant focus on the coast it is unlikely that there were Dorset groups in the interior who would have traded with coastal people of the same culture for caribou products, but that groups made brief trips to the interior to harvest caribou products for themselves. On the Northern Peninsula, the best time for this would have been late summer to early fall when caribou are fat and have antler that has shed its velvet. This period would not have overlapped with the harp seal hunt, allowing Phillip's Garden tool makers time to acquire caribou antler and bone and assemble a supply of hunting gear.

Today caribou are present on the Northern Peninsula year round (Renouf 2000; Wells 2002:22). The Cloud River herd, as it is referred to, moves toward the coast in the late fall, and often scatters on the barren coastal region throughout the winter foraging under the relatively shallow snow for food (Northcott 1974; Earl Pilgrim, retired wildlife officer, pers. comm. 2001). Most caribou migrate in the spring to the mountainous areas to the east where calving takes place. Summer is largely spent in this region, keeping to cool, windy plateaus (Cameron 1958:105). Nevertheless, today small groups of three or four caribou are seen near Port au Choix during much of the summer. Presumably if caribou were hunted near Phillip's Garden carcasses would have been brought back to the site. Renouf (2000) suggests that although available during seasons when the Dorset were present at Phillip's Garden, there may have been an ideological prohibition against hunting caribou from an important seal hunting site. This may also have been the case with the transport of meat to the site, which would account for the absence of unmodified bone and antler; however, the osseous collection demonstrates that antler tools were at least partially fabricated at the site, and both antler and bone tools were used, a number directly involved in seal hunting.

10.3.4 Ivory Acquisition and Use

The ivory for tool making came from a number of sources, most of it walrus tusk. There are 22 fragments of ivory from the teeth of unknown carnivores accounting for 17.3% of the examples. Walrus are almost never seen in Newfoundland waters today, but were once present here in the thousands (Rose 2007:116). However, the small amount of ivory present at the site, the small size of ivory cores suggesting its efficient use, coupled with infrequent walrus faunal material, suggests that it is unlikely that walrus were commonly hunted close to Phillip's Garden. It is more plausible that this material arrived at Phillip's Garden from hunting locations elsewhere or through trade. No features show a particular concentration of the activity. Ivory working is nonetheless an activity carried on throughout the temporal extent of the site, and appears to have been exercised by members within all households fairly equally.

10.3.5 Bird Bone Acquisition and Use

Birds that could have contributed to the tool assemblage are available at the site year round, and the presence of unmodified bird bone in the faunal collection indicates their additional role as a source of subsistence (Hodgetts et al. 2003; Murray 1992). While species could not be identified, the core material appears to have come from gull-sized birds. The vast majority of faunal identification from the Port au Choix Archaeology Project has been done by experienced zooarchaeologists (including Darlene Balkwill and

Anne Rick both formerly of the Canadian Museum of Natural History, and Hodgetts (2005a, 2005b) and Murray (1992), all of whom would have recognized modified bone, particularly of the rare elements such as those of birds, yet cut bird epiphyses have not been reported. Nevertheless there are bird bone diaphyses present that were used as cores for needles. It is curious that initial core reduction even in these small, easily transportable elements may have been done elsewhere as is seen in other osseous materials. Nevertheless, the samples of both bird bone tools and unmodified faunal material are small, which may account for its rarity. In addition, the small size of bird bone may have made it particularly susceptible to destructive taphonomic processes.

10.3.6 Stages of Osseous Material Reduction

Taking all the raw material into consideration, there are very few indications of primary core reduction at the site. They are not completely absent as, for example, there are whole walrus mandibles with blanks removed as well as some proximal ends of caribou antler, but overall these instances are rare among the many, more fully-reduced cores. Materials appear to have been gathered off-site where they were reduced into small cores and blanks, and then transported to the site for further reduction. While some reduction was done elsewhere, there is a great deal of evidence that working osseous materials into new tools, and replacing broken tools, was widespread through time and space at the site.

The sequence of blank creation and fabrication of tools remained consistent spatially and temporally at Phillip's Garden. Furthermore, the same cutting techniques were employed on all materials reflecting the Dorset use of relatively small stone tools.

There are not many examples of chopping which would have required heavy tools; these are limited to a few large whale bone cores. In addition, these cores retain the only evidence of the use of wedges to separate large blanks from the source element. Otherwise, blank production employs the use of a technique that involves cutting grooves into the material until a small amount remains allowing the worker to simply snap off the blank.

Experiments to reproduce osseous tools in this thesis using reproductions of Dorset lithic tools determined the most effective lithics, and allowed an identification of various wear patterns (Appendix B). Retouched flake tools were most frequently used for cutting grooves, often in conjunction with burin-like tools. The flake tools leave multiple channels at the base of grooves which are generally v-shaped in cross section, while burin-like tools leave a smooth, almost polished base that is flat bottomed. The two tools complement each other when used by alternating them throughout the process. While the retouched flake could cut deep, narrow channels, the hafted burin-like tool was very effective at removing relatively greater amounts of debris that would have built up along the edges of the flake tool channels. Burin-like tools kept the sides of the groove straight, but if used alone their effectiveness would have diminished. Furthermore when cutting through thick material such as whale bone, the burin-like tools made a wider groove that was easier to penetrate deeply. Eventually with only a thin portion of material remaining attached to the core, the blanks were simply snapped. Many of the blanks in the collection retain the jagged edge where this action was performed.

Shaping the preform into a tool involved the use of sandstone abraders and probably stone scrapers. Small stone scrapers worked very well in experiments, particularly for scraping whale bone in the production of larger tools. They were efficient at removing debris when worked either by pushing or pulling the tool along the bone preform. Sandstone abraders represented by examples with various grain sizes would have further shaped the osseous tools. While I was unable to identify residual wear from scraping on our experimental whale bone tool (Appendix B), evidence of abrading was present on many of the archaeological remains even at low-powered magnification. Some small abraders were likely used to smooth the edges and notches in many of the tools. Many tools are still remarkably smooth with surfaces that were polished, perhaps with hide or other soft material; however, the specific details could not be observed under low-powered magnification. While it was not always possible to see evidence for the methods used to make notches and line holes, a number of tools retained clues to the techniques employed. Of particular interest was the construction of line holes in harpoon heads. Despite a lack of drilling technology, harpoon head line holes were remarkably round with straight sides. The edges of line holes were usually polished from contact with hide lines, but the interior of them retained narrow channels that were carved straight downward into the hole using a small, narrow cutting tool. Line holes that are oval in plan were more likely to exhibit the technique of flake tools cutting ever-deepening channels on two surfaces that eventually meet. The incision lines were often apparent at the margins of the holes.

Residual signs of use were apparent in various forms on some of the tools. Skin working tools such as the working ends of awls and scrapers often displayed polish, as did areas around line holes where the movement of sinew would have smoothed them. Alternatively, pressure flakers showed signs of crushing, flaking and occasional deep grooves where the tools slipped and were gouged during use. Sled shoes were probably mostly covered in frozen material, but sometimes they too showed damage as deep striations from having come in contact with hard material such as ice and occasional gravel.

Refurbished osseous cores, blanks, preforms and tools are found in dwelling and midden features over Phillip's Garden through time, demonstrating the widespread practice of making and transforming osseous tools at the site. The distribution of cores and blanks is fairly even; nevertheless some house features had slightly more or less of these tools suggesting there may have been slightly more or less emphasis on this type of activity. Middle phase House 11 has relatively few of both tools, while Renouf's House 1 from the early phase has a high proportion of cores, but not a particularly high frequency of blanks. This latter dwelling had a high proportion of whale bone artefacts and appears to have been a place where activities focused particularly on whale bone core reduction, with some blank production, most of it toward sled shoe manufacture. Conversely, House 11 exhibits a weaker focus on osseous working, particularly of whale bones in the early stages of reduction.

10.3.7 The Social Context of Osseous Tool Making at Phillip's Garden

The social context of osseous material acquisition and tool making at Phillip's Garden was variable, and while the actions associated with these circumstances were infused with meaningful gestures, some technological events would have been more formally structured than others. The sequence of reduction was spread out over a number of locations and through time, and may have involved different people working alone or in a variety of social groupings. Furthermore, the sense of immediacy and the social importance of the acts of tool making would have been diverse. For the Dorset at Phillip's Garden the acts of acquiring material and making tools created social contexts that would have defined relationships between people. In addition, the setting of these events would have had particular meaning based on the tasks and the social structure of the participants. Constructing scenarios for some of the tasks can help reveal likely details of the Dorset social and therefore, technological context.

Task groups may have been structured around the specific enterprise of gathering and reducing materials. The Phillip's Garden Dorset would have traveled to acquire materials and possibly reduce them somewhat to ease the load of transport or to fulfill social restrictions associated with the material (Renouf 2000). This movement would have been timed around the availability of the animals sought, and tied sequentially to subsequent activities in which many members of the community would have engaged, particularly the harp seal hunt. For example, it would have been important to have a sufficient number of hunting implements such as harpoon heads to reduce delays during the seal hunts. Likewise, sled shoe manufacture would have been an important task leading up to the cold season. These examples suggest specific technical events that would have involved a number of individuals working on the same tasks. The individuals involved in these singular tasks formed a social group likely enacting the tasks in a more formally structured pattern of action than if an individual alone collected bone material from a carcass opportunistically found during the performance of another task.

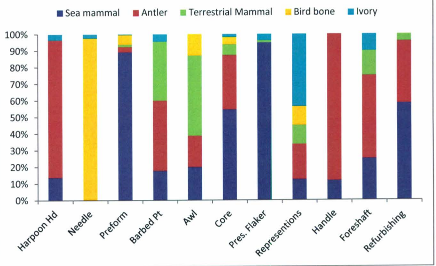
In contrast other tool making circumstances would have been wound into an existing task. For instance, an individual in need of a needle to replace one broken while sewing may simply remove a blank from a core and prepare it in order to carry on with their work. While there may have been less formality around some aspects of practice compared, for instance, to the distribution of materials acquired communally, the gestures and techniques employed would have been recognizable and followed a particular pattern.

10.4 Factors in the Choice of Osseous Raw Material

Many factors would have been considered in choosing materials for tool fabrication. Concerns such as the availability of materials, size and shape of the intended tool, and the mechanical properties of the materials in relation to their function would have informed the choices. Furthermore, use of particular materials would have been influenced by deeply embedded traditional practices. While these are some of the factors that appear to have influenced choices made by the Dorset at Phillip's Garden, some of the tool forms are constructed from multiple osseous sources, suggesting that the choice of material is based on a number of factors.

Figure 10.4 shows the proportion of materials used to make a range of tools in the assemblage. A number of tool types not included in this figure are constructed solely from one material source. All metapodial tools are made from caribou limb bones, while sled shoes, wedges, foreshaft-like tools, blunt points and punches are all made from whale bone. For the remaining tool types in this figure it is clear that while many of them are made from one material predominantly, others show greater variation in material choice.

Figure 10.4 Proportion of materials used in the manufacture of select tools from Phillip's Garden.



10.4.1 Factors Affecting the Choice of Materials for the Manufacture of Osseous Tools

While mechanical properties of antler and bone are consistent with the function of some of the tools in this assemblage, differences in the mechanical properties of various materials may not be of importance if the demands of the tool do not challenge the mechanics of potential materials. For instance, while antler is excellent for resisting fracture and is commonly used to make harpoon heads, barbed points and foreshafts at Phillip's Garden, these tools are often made of ivory in many other Dorset contexts. For instance, harpoon heads from the samples selected from Alarnerk and Nunguvik show a predominance of ivory in their construction. It is possible that the force of thrusting these tools may not have exceeded the point at which the tool would commonly break, making either antler or ivory suitable. Whale bone with its porous nature has the ability to resist breakage which can account for its use in making sled shoes at Phillip's Garden. But sled shoes from arctic contexts are usually constructed of ivory. Both materials may be strong and tough enough to withstand the rigours of the job. Ivory would have been more available to the arctic Dorset groups, suggesting that the use of alternate materials at Phillip's Garden may have been at least partially a result of differential availability. Nevertheless some tools at Phillip's Garden such as awls and needles are made from material mechanically suitable for the steady application of force. Indeed, needles are consistently made from bird bone- with some ivory examples - from arctic Dorset sites.

The animal and miniature tool representations are made from a range of materials, but slightly more of ivory than any other source. This diversity is possibly a reflection of the many forms in this tool category. Nevertheless, the use of ivory for the production of carvings displaying animal forms and miniature harpoon heads could reflect a desire to maintain traditions originating in the broader Dorset diaspora where ivory use is more common. Furthermore the hard, compact surface of ivory allows for the addition of clearly discernible design features such as incision lines, and a brightly polished surface lends a particular quality not matched in other materials. Moreover, these line designs are very durable in ivory, perhaps an important consideration with objects that may have been heavily curated. Finally, the more common use of ivory in representations and in pieces such as the heavily decorated line fasteners and polished bead-like pieces, suggests an important symbolic association with ivory. While the ivory implements may have had a mundane or practical function, the creation of representations and decoration signal a more sacred element to these tools. It is difficult to demonstrate with confidence, but this seems to be the case from other cultural contexts in and central and high arctic (McGhee 1977).

To summarize, the choice of materials for the manufacture of tools is influenced by factors of availability, mechanics and traditional practice. Regardless of the reasons, the outcome is a suite of technological practices that take form in places and reinforce identity. Choices of materials are dynamic as people recognize opportunities and shift their technological practices to suit newly conceived requirements. The following section demonstrates a shift in the design of sled shoes influenced by the availability of whale bone in the region.

10.5 Sleds, Transport and Mobility at Phillip's Garden

The examination of sled shoes, including their frequency and distribution at Phillip's Garden reveals the great importance of manufacturing and using these transport tools at the site. A number of observations were made. First, sled shoe pieces are relatively frequent at the site and make up the most frequently represented type of core blank and preform. Their frequency compared to collections in the literature and from the analysis of tool frequencies in samples from Alarnerk and Nunguvik (Appendix A), suggests a more pronounced practice of transporting greater amounts of goods over land. Secondly, sled shoes are more frequently represented at the site during the early and late phases of occupation. Thirdly and finally the sled shoes at Phillip's Garden have a unique design. These tools allow a discussion of the transport of goods associated with the site and demonstrate change over time in the way the site was occupied. Furthermore, they represent a design that reveals a significant technological innovation.

Compared to their frequency in other Dorset contexts, sled shoes make up a relatively large proportion of tools in the osseous assemblage at Phillip's Garden. Whereas they account for 0.4% of the osseous assemblage in the sample examined from Alarnerk, and 2.1% of the Nunguvik sample, they comprise 19% of the assemblage from Phillip's Garden. Additionally, in McGhee's (1981:62-63) presentation of the osseous assemblage from four Late Dorset sites on Dundas Island (RaJu-1, RaJu-2, RaJu-3 and RaJu-4) sled shoes made up 3.2% of the total.

Of the cores from Phillip's Garden for which it was possible to determine the intended tool, 57.1% were sled shoes. Likewise 65.9% of preforms that could be identified as intended for a particular tool were sled shoes. There were no sled shoe preforms and cores in the comparison samples from Alarnerk and Nunguvik, and I have not been able to find any recorded in the published literature. The volume of sled shoe production at Phillip's Garden is remarkable and clearly indicates a relatively strong focus on land transport of larger volumes of material than is seen elsewhere.

As cold weather tools, sleds were most frequently used from the beginning of the winter to the end of the spring seal hunt when ground was snow - or ice-covered. The frequency of sled shoes at Phillip's Garden demonstrates that some products of particular importance were transported on and off the site. Seal is the most likely product to be transported away, but whale bone, another relatively rich commodity in the area may have been transported away, or transported to the site from harvesting locations nearby. It is impossible to determine what particular seal products were selected for transport and in what state they were. Meat, blubber and hides, both processed and unprocessed, could have been transported after the winter hunt.

The higher frequency of sled shoes during the early and late phases suggests that the transport of goods, or mobility in general, was more pronounced during these phases when the population at Phillip's Garden is thought to have been relatively low (Harp 1976; Renouf 2006). In her discussion of the chronology at Phillip's Garden Renouf (2006:120) argues that based on overlapping radiocarbon dates, population size at the site began low then reached a maximum during the middle phase before dropping again by the late phase. The higher proportion of sled shoes during these periods implies that their use was largely based on relatively long distance transport rather than movement of goods within the site. If sled shoes were more specifically involved in transport within the site, their frequency during the most intensely occupied middle phase would be expected to be as great, or greater than during other phases. Consequently the sled shoes at Phillip's Garden are thought to represent a transport tool particularly related to relatively long distance movement.

Other sources of evidence support the suggestion of greater mobility during the early and late phases. Anstey and Renouf (2011; Anstey 2008) state that the relatively higher frequency of Ramah chert, a stone source confined to the north coast of Labrador, during the late phase of occupation may indicate greater mobility at Phillip's Garden during this period. Furthermore, data from the late phase suggest the reliability of the harp seal populations may have decreased in response to climate warming resulting in less intense settlement, and eventual abandonment of Phillip's Garden (Bell and Renouf 2008; Renouf and Bell 2009). The late phase saw a drop in the exploitation of seal from between 97% and 99% in the middle phase to just over 70%, with an increase in reliance on bird and fish species (Hodgetts et al. 2003). These authors (Hodgetts et al. 2003) point out that increased temperatures may have affected the harp seal populations. This is supported by chironomid data taken from pond samples confirming an increase in summer temperatures beginning around 1500 BP and continuing to 1100 BP (Rosenberg et al. 2005), the approximate date at which Phillip's Garden is abandoned (Bell and Renouf 2008). Bell and Renouf (2008) argue that ice conditions would have become increasingly less predictable with a rise in temperatures making the location and timing of the April harp seal herds more capricious. While harp seal continued to be a large contributor to the economic base here, during the late phase its fluctuation may have prevented settlement for the longer periods of the year suggested for the middle phase.

Additional sources of data suggest more frequent movement to and from the site during the early phase compared to the middle phase when settlement was more intense and may have extended over greater portions of the year. Before a full appreciation of the wealth and predictability of the harp seal populations was understood and the choice to intensify exploitation was made, the Dorset appear to have maintained a more mobile settlement pattern around Phillip's Garden (Erwin 1995; Renouf and Murray 1999). Renouf and Murray (1999:130) compare dwellings from the early and middle phases and suggest the site was initially more ephemerally occupied as a short term camp, one of many seasonal camping locations in a mobile annual cycle.

While the high number of sled shoes at Phillip's Garden is unique for Dorset sites, so too is their design. Sled shoes from Dorset contexts outside Phillip's Garden are fairly consistent in size and shape (Mary-Rousselière 2002; Maxwell 1985; McGhee 1981). They are rectangular pieces that are flat on both dorsal and ventral surfaces and include a series of paired holes counter-sunk on the ventral surface that run lengthwise along the tool. They range in length from approximately 110 mm to 125 mm and between 20 mm and 30 mm in width (Mary-Rousselière 2002:189; Maxwell 1985:152) (Figure 10.5).

Sled shoe fragments from Alarnerk and Nunguvik are slightly larger. Two incomplete examples from Alarnerk have an average width of 21.4 mm. Widths of the five Nunguvik sled shoes averaged 25.1 mm and from the two complete examples in this assemblage the lengths averaged 175 mm.

Figure 10.5 Ivory sled shoe from Feature 76, Nunguvik (PgHb-1), ventral surface. Note the counter-sunk line holes and the occasional deep scratches from contact with ice or other hard material.

In contrast, the sled shoes at Phillip's Garden are narrower, averaging 19.8 mm, and while there are no complete examples, lengths of many broken examples far exceed complete examples from other Dorset sites. In addition, the thickness of the examples from both Alarnerk (average 10 mm) and Nunguvik (9.3 mm) are much less than those from Phillip's Garden, which average 14.8 mm.

Apart from size variation, there are major differences in the morphology of the Phillip's Garden sled shoes. While examples of sled shoes from Arctic sites are made in segments that fit sequentially along the runner, the Phillip's Garden form appears to be a single piece fitting the full length of the sleds. All medial portions of sled shoes from Phillip's Garden are broken and do not represent complete segments. The anterior ends are tapered upward on the ventral surface with a pair of line holes positioned transversely on the shoe. The posterior end of the shoe is tapered on the lateral surfaces and has a pair of line holes positioned lengthwise on the shoe. The dorsal surface of the Phillip's Garden sled shoes has a broad channel carved the full length of the shoe to accommodate the sled runner and subsequent cross bars, both of which are absent at the site and presumed to have been made of wood. This channel added additional work to the sled shoe construction when compared to the flat examples from elsewhere in the Dorset range, but must have made a tight fit to the runner above. Finally, all the sled shoes at Phillip's Garden were made of whale bone while elsewhere materials included ivory, antler and whale bone (Mary-Rousselière 2002; Maxwell 1985). The availability of whale bone in long straight pieces probably influenced the shift in design which was apparent early in the occupation indicating the almost immediate adoption of this technological design. Furthermore, this availability was predictable and in sufficient volume for this design to have become firmly established, and the manufacture to be an important practice at the site.

In summary, the frequency and temporal distribution of sled shoes at Phillip's Garden demonstrate the importance of making and using sleds here. The apparent availability of large whale bone cores helped facilitate the development of a unique sled shoe design, one that allowed for single sled shoes to run the length of sleds. Possibly, the ease of getting wood for sleds inspired ideas for the overall design. The temporal distribution indicates differences in mobility practices at the site, suggesting greater movement to and from the site during the early and late phases. It is possible that since the harp seal hunts bracket the cold season, the higher frequency of sled shoes in these phases represents greater mobility between the December and April hunts. The Phillip's Garden sled shoes are tangible remains of a tool industry that was an important part of economic life at the site and signifies the transport of goods and perhaps children in the wider region.

10.6 Summary

Analyzing the osseous tool industry reveals details of the complex social life at Phillip's Garden over the geographic extent of the site, and throughout its lengthy occupation period. While long known as an important seal hunting location, it is clear that the Dorset did not simply incorporate the seasonal harp seal migration into their existing settlement and subsistence pattern, but made the decision to alter aspects of their technology at Phillip's Garden to hunt the animals intensely during the periods of their availability. This intensification led to a series of associated practices that are seen in the archaeological record that records technological change and endurance, and demonstrates the dynamic quality of the Dorset people at Phillip's Garden.

An analysis of the materials used in the osseous industry showed the importance of some animal species beyond considerations of subsistence. Identifying the animal sources of osseous tools permitted a discussion of the practical considerations of the timing and location of their exploitation in addition to how people would have been organized around their acquisition and use. An examination of the stages of reduction from unmodified elements to finished, broken or reworked tools related these tasks to locations associated within the broader region. This information helps to portray the range of activities within and around the site and how tool making tasks were enacted. Furthermore, availability of material influenced some designs seen at the site such as the unique whale bone sled shoes and the unexplained foreshaft-like tools.

The spatial and temporal distribution of tool types and their relative frequency offered a view to how tasks were organized at the site, and specifically in the case of hide working tools, implied the collective work of individuals, likely women, at some houses during the middle phase of site occupation. The temporal fluctuation in tool frequencies such as the sled shoes demonstrated the dynamic way in which the site was occupied.

Together with previous research at Phillip's Garden, the present analysis of the large and varied osseous assemblage informs an understanding of life at the site, but also in relation to broader locations of importance which form a more realistic picture of the important inter-relationship among places that included Phillip's Garden. Locations where hunting took place on the sea, trips to exploit materials for tool making and the water sources where skins were processed situate Phillip's Garden in a broader arena of important and interdependent social settings.

An analysis of the osseous assemblage at Phillip's Garden provided details of Dorset social life at the site. A presentation of the osseous materials used demonstrated the importance of animal products for the inhabitants beyond those of subsistence. The identification of the wide use of whale bone revealed its importance for the manufacture of tools, some made exclusively of this material. In the case of sled shoes a unique design was developed that took advantage of whale bone morphology. It must have been a readily available material in the area to have been so thoroughly incorporated into design and use at the site. Ivory was not as widely used a material, but its relative frequency for the fabrication of representational carvings suggests an important link with the broader Dorset traditions. While caribou bone and antler were infrequent in the subsistence assemblage at the site, its dominance as a material for the manufacture of harpoon heads and other tools expresses the importance of the products of this species as well. Both harp seal migrations are seen as a major focus at the site. Particularly in the spring, the predictability and abundance of harp seals inspired the Dorset to intensify their exploitation, and in doing so they transformed aspects of their social lives. They constructed large houses occupied by a number of families who worked together as cooperative households. The decrease in sled shoes during the middle phase suggests less mobility, perhaps as the community remained for the period between the December and March to April harp seal migrations. The short-term appearance of seals lent structure to the year for the Dorset living at this site. Preparation for the hunt such as the manufacture of hunting tools and the organization of workforces for the hunt and subsequent processing placed people in different social groups. Some groups would have been based on gender and others on hunting crews. Relationships among people performing these tasks were reinforced and sometimes changed. The Dorset people who inhabited Phillip's Garden were innovative in their occupation of the region. They maintained many traditional technological practices, but altered others to create a unique and dynamic community.

Chapter 11

Conclusion

"There are techniques for engaging with fellow humans just as there are techniques for engaging with the animals and plants on which life depends, or with materials such as wood, clay or stone in the making of equipment. Any or all of these techniques may involve the use of tools" (Ingold 2000:321).

In the introduction to this thesis technology was defined not simply as the outcome of human action but as embedded in a dynamic structure with traditions that are enacted through gestures in daily living. The processes of acquiring and distributing materials from which useable tools are made and used are all social events where people organize themselves according to traditional ways of inhabiting the world (dwelling). Repeating actions in a particular way reinforces social roles and world view, but at the same time, by both unconsciously and mindfully altering gestures and acts, these roles can be transformed. Since artefacts are the tangible remains of these social episodes they offer a particularly rich opportunity for exploring the social organization around them.

The Port au Choix region is recognized as an important location for most precontact cultures that inhabited Newfoundland (Renouf 2011c). The Dorset Palaeoeskimos in particular occupied much of the region with a number of habitation and burial sites. However, even after abandonment over 1200 years ago, evidence for intense Dorset settlement at Phillip's Garden literally stands out as a bright green patch of organic on the otherwise relatively soil-impoverished landscape. Unlike other groups who took advantage of the harp seal riches through their traditional patterns of settlement and subsistence, the Dorset transformed their social organization at this site. House architecture maintained many traditional design themes with central axial features surrounded by walls and platforms; however there was a transformation of scale that had significant impact on the way people occupied the space. House sizes grew to accommodate a number of families who occupied the interior space in a communal manner, sharing the platforms and central areas (Renouf 2011b). The design of houses involved the installation of central posts for roofing and construction of large walls and platforms indicating an investment in the house and the site. Renouf (2011b) states that this investment helped to reinforce a sense of permanence at Phillip's Garden. Furthermore the expansion of the households to include more people suggests communal hunting crews who would have worked to maximize the recovery of harp seals that may have only been available for two short periods each year.

Within this context the osseous assemblage offered an opportunity to explore a wide range of technological activities at the site and place them into a detailed technological and, therefore, social milieu. Others have explored aspects of the osseous collection such as the representations and design motifs (Harp 1969/70; Lyons 1982), or the frequency of whale bone use in some houses (Renouf 2009). The approach of the present research was to dramatically expand the data set to include analysis of over 3200 osseous tools representing 23 tool forms from 14 dated features that spanned the temporal extent of the site's occupation. The primary aim was to investigate the social nature of technological life at the site over time. This was approached through an analysis of the osseous material remains, the forms present, and their temporal and spatial distribution.

Functional information was available for most forms and allowed a discussion of the range and organization of tasks at the site. For instance, the numerous harpoon heads at the site were fairly evenly distributed spatially and temporally in dwellings at the site, reinforcing the suggestion that houses operated cooperatively in hunting. And while hide working technology was present in all features, the tools were less evenly distributed in houses. Higher frequencies of needles in one house during the middle phase suggested that the social organization inside dwellings may have shifted for the period when this activity was practiced, that is, once the hunts were over and hides had been processed to the point where they could be sewn.

A presentation of the temporal frequency of tool types offered the opportunity to recognize endurance and change. Practices of tool manufacture were similar over the extent of the occupation. Cutting with flake tools and sometimes in conjunction with burin-like tools was practiced in the production of preforms into finished tools. Nevertheless, change could be seen at various times. Polar bear carvings became less frequent as a subject of representations during the middle phase, while the few definitively identifiable seal forms were only present during the same period. The early emergence of an innovative sled shoe design and the widespread use of whale bone could be seen from an analysis of their relative frequencies over time.

Exploring the materials selected for tools offered insight into animal exploitation for purposes beyond subsistence, and by recognizing the stages of manufacture at which these materials arrived at the site it was possible to understand the temporal and spatial links to harvesting locations associated with, but some distance from, Phillip's Garden. This offered an interpretation of technological life that extended beyond the site scale and brings Phillip's Garden into a wider context of interrelated locations referred to as landmarks (Zedeno et al. 1997) or taskscapes (Ingold 1993), where the tasks performed at each impacted on, and were intertwined with, those happening elsewhere. For instance, recovering and reducing antler for preparing harpoon heads in time for the harp seal hunts, and collecting and fashioning whale bone into sled shoes for use during the cold seasons were tasks whose timing and location depended on spatially and temporally wider considerations.

Over the temporal extent of the site, the osseous assemblage shows how quickly technology was transformed. New forms of tools emerged including the small polished bead-like pieces, the lance foreshaft-like tools, and a new design for sled shoes. While styles of the wider Dorset diaspora remained, the proliferation of unique forms and the wide adoption of whale bone, for example, signal an innovative approach to life at the site. Over time, the relative frequency of tool types changes indicating shifts in the character of settlement at the site. The more intensely populated middle phase appears to have become a time of reduced mobility, at least during colder periods of the year, with a drop in sled shoe frequency. The uneven distribution of skin working tools suggests a seasonal shift in where some of these activities were taking place during the same period.

Phillip's Garden emerges from this analysis as a socially dynamic community made up of members who transformed many of their practices through either an unconscious or deliberate decision to intensify the exploitation of harp seals. The long-term shift to using more whale bone indicates that its availability may also have influenced the intensification of occupation seen at the site. Yet while the site is remarkable for its size, material richness and intensity of occupation, social and technological life here was constantly shaped, and likewise influenced by, events in a much broader Dorset world.

Appendix A

Comparative Osseous collections from Alarnerk (NhHd-1) and Nunguvik (PgHb-1) in the Canadian Arctic

A.1 Introduction

I examined two collections of osseous tools for comparison to the Phillip's Garden assemblage. The osseous assemblage was examined from one house feature (1501) at Alarnerk (NhHd-1), a large, coastal Dorset site on Melville Peninsula, Nunavut, Canada (Maxwell 1985; Lynnerup et al. 2003). The other the osseous tool remains were from a dwelling (House 76) at Nunguvik (PgHb-1), another multi-component coastal site in Navy Board Inlet, Baffin Island (Mary-Rousselière 1976; 1984a; 2002; Maxwell 1985). These dwellings had not been intruded upon by later occupations and their lithic and osseous assemblages appear to represent the Early to Middle Dorset period. I accessed the collections at the Canadian Museum of Civilization under the guidance of the Curator of Arctic Collections, Dr. Patricia Sutherland. The results of an analysis of the material from these contexts will be used to compare the relative frequency of tool types, their varieties, and raw materials selected for tool making.

Much of the same information was recorded for these comparative samples as those from Phillip's Garden including quantification, morphological descriptions, and raw material sources. Detailed information on manufacturing was not recorded due to time constraints.

A.2 Alarnerk (NhHd-1)

The archaeological site at Alarnerk is situated on the Melville Peninsula of the arctic mainland in Nunavut (Figure A1). The site is large, stretching along the coastline for 2.5 km on beach terraces ranging from 8-22 meters above sea level, and includes the remains of 208 dwellings. It is not well dated since the original radiocarbon measurements were performed on walrus ivory. Lynnerup et al. (2003:350) suggest a range of 2000 years from 800-600 B.C. to A.D. 1100-1200 based on available dates, beach terrace chronology, and harpoon head typology that has been tied to more reliable dates from other sites. The sample chosen from this site was recovered from the excavation of house feature 1501 situated on the 15 m beach terrace and includes 19 osseous artefact types (Table A1). The lithic and osseous tools from this feature are Dorset with no Thule intrusion, and the harpoon head styles are generally contemporary with Phillip's Garden.

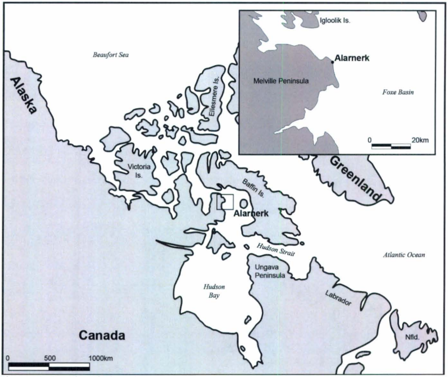


Figure A1. Location of Alarnerk

Table A1. The number and proportion (%) of osseous tools in House 1501, Alarnerk.

*Tool Type	Number	Proportion	*Tool Type	Number	Proportion
Adze handle	1	0.2	Ice pick	1	0.2
Awl	13	2.8	Lance	4	0.9
Barbed point	6	1.3	Metapodial tool	3	0.7
Blunt point	1	0.2	Needle	142	31.1
Box	4	0.9	Point	6	1.3
Burin-like tool brace	26	5.7	Preform	27	5.9
Core	1	0.2	Punch	39	8.5
Disk	1	0.2	Refurbishing debris	32	7.0
Foreshaft	61	13.3	Representational tool	5	1.1
Harpoon head	30	6.6	Sled shoe	2	0.4
Ice creeper	1	0.2	Unidentified tool	52	11.4
			Total	**457**	**100.1**

*Debitage is not included in the tool (n=30)

The material selected for tool manufacture includes antler, bone and ivory. Ivory is strongly represented in the assemblage from this site, almost equal to the number of bone examples (Table A2). Most of the bone tools (n=176) were made from terrestrial mammal sources, while the remaining (n=42) were made from sea mammal bone. Table A3 provides the proportion of materials used in the manufacture of tool types on the site.

Table A2 Number and percentage of materials used in the manufacture of tools from feature 1501 at Alarnerk.

Material	Antler	Bone	Ivory	Total
Number	30	218	209	457
%	6.7	47.7	47.7	100.1

Table A3 Number of bone, antler and ivory specimens for each tool type from feature 1501 at Alernerk.

Artefact Type	Bone	Antler	Ivory	Total
Adze handle		1		1
Awl	5	2	6	13
Barbed point	1	1	4	6
Blunt point			1	1
Burin-like tool brace	4		21	26
Box		4		4
Core			1	1
Disk	1			1
Foreshaft	7	4	50	61
Harpoon head Dorset parallel			7	7
Harpoon head Kingait closed		1	5	6
Harpoon head Wasp waisted		1	6	7
Harpoon head Unknown	1		9	10
Ice creeper			1	1
Ice pick			1	1
Lance	3		1	4
Metapodial tool	3			3
Needle	142			142
Preform	3	3	21	27
Punch	35	1	3	39
Refurbishing debris	6	2	24	32
Representation	1		4	5
Sharp point		1	5	6
Sled shoe	2			2
Unidentified tool	4	9	39	52
TOTAL	218	30	209	457

A.3 Nunguvik (PgHb-1)

Nunguvik is located on the northern end of Baffin Island along the coast of Navy Board Inlet that separates it from adjacent Bylot Island (Figure A2). The site stretches along the coast for 1 km and contains the remains of approximately 80 dwellings attributed to both Dorset and Thule occupations (Mary-Rousselière 1976). The site was excavated first in 1973 and again during a number of seasons in the mid to late 1970s (Mary-Rousselière 2002:27). Dates for the feature from plant, wood charcoal and caribou bone range from 1310±90 to 2090±50 BP (ibid:37). House 76 is located approximately 6 m above sea level and yielded 235 osseous tools representing 18 types (Table A3).

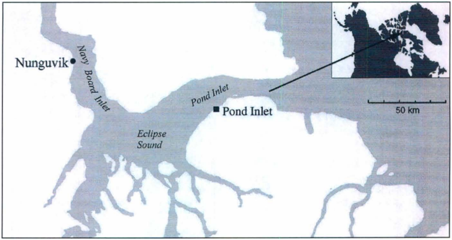


Figure A2 Location of Nunguvik, north Baffin Island (after Mary-Rousselière 2002).

Table A4 shows the range of tool types in this feature and their relative proportions. Cores and preforms are the most frequently represented type. A variety of materials are used in the manufacture of osseous tools. Bone, antler and ivory are used, and while it is not as prevalent as at Alernerk, ivory is strongly represented here (Table A5). Sea mammal accounts for 11 of the bone specimens, while the remaining 207 bone tools were constructed from terrestrial bone. Table A6 presents the number of pieces of each tool type that are constructed using these materials.

Table A4 The number and proportion of osseous tools in House 76 at Nunguvik.

*Tool Type	Number	Proportion	*Tool Type	Number	Proportion
Awl	6	2.6	Needle	19	8.3
Barbed point	2	0.9	Point	4	1.7
Blunt point	2	0.9	Preform	22	9.6
Burin-like tool brace	7	3.1	Punch	10	4.4
Core	63	27.5	Refurbishing debris	16	7.0
Foreshaft	8	3.5	Representational tool	2	0.9
Gull hook	1	0.4	Scoop	1	0.4
Harpoon head	16	7.0	Sled shoe	5	2.2
Lance	1	0.4	Unidentified tool	39	17.0
Metapodial tool	6	2.6	**Total**	**229**	**100.0**

*Debitage is not included in the tool (n=191)

Table A5 Number and percentage of materials used in the manufacture of tools from House Feature 76 Nunguvik.

Material	Antler	Bone	Ivory	Total
Number	51	107	71	229
%	22.3	46.7	31.0	100.0

Table A6 Number of bone, antler and ivory specimens for each tool type from House Feature 76, Nunguvik.

Artefact Type	Bone	Antler	Ivory	Total
Awl		5	1	6
Barbed point			2	2
Blunt point			2	2
Core	36	23	4	63
Foreshaft	4	2	2	8
Burin-like tool brace	2	2	3	7
Gull Hook			1	1
Harpoon head Dorset parallel			4	4
Harpoon head Kingait closed		1	2	3
Harpoon head Tyara sliced			2	2
Harpoon head Unknown		1	5	6
Lance	1			1
Metapodial tool	6			6
Needle	19			19
Preform	8	4	10	22
Punch	9	1		10
Refurbishing debris		4	12	16
Representation		1	1	2
Scoop		2		2
Sharp point	3		1	4
Sled shoe			4	4
Unidentified tool	19	5	15	39
TOTAL	107	51	71	229

A.4 Summary

These two samples of Dorset osseous tools from arctic contexts will be used for comparisons with the Phillip's Garden collection, particularly with the respect to the types of tools and their relative frequencies. The presence, absence and frequency of tool types will inform a discussion of the range and importance of particular activities, and the associated social configuration of the personnel present at the sites. A comparison of the raw material sources chosen for tool manufacture will allow an evaluation of issues such as availability, mechanical considerations and regional similarities and differences.

Appendix B

Osseous Tool Reproduction

B.1 Introduction

The following describes the manufacture of four osseous tools common in the Phillip's Garden assemblage, including a bird bone needle, a caribou bone barbed point, a whale bone foreshaft-like tool, and a caribou antler harpoon head. These experiments were done by Tim Rast who used reproduction Dorset lithic tools, all made with the same raw material. The fabrication of the osseous material began with the preparation of core material. The time it took to manufacture each tool was recorded, but these results should be considered approximations since some lithic tools were abandoned as impractical. In addition, the osseous sources included both wet and dry examples, characteristics which affect the time it takes to reduce the material. The time and effort involved in working dry bone is greater than if it is wet (LeMoine 1997:24; Wescott and Holladay 1999:66). These experiments offer insights into the characteristics of the osseous material including the characteristic appearance of wear and the relative efficiency of lithic tools.

B.2 The Lithic Assemblage Used

Tim used a variety of tools, mostly of stone, but including one antler wedge, for the manufacturing work. The finished lithic tool reproductions were of a quality that would make them almost impossible to distinguish from Dorset artefacts. They included microblades, unifacially and bifacially retouched blade-like flakes, burin-like tools, end scrapers, and sandstone abraders (Figure B1). Most of these tools were hafted to wooden handles using animal sinew and natural glues; however some un-hafted flakes were used from time to time.

Some of the tools proved to be excellent alone, or used together, while others were inefficient. The microblades, flake tools and scrapers were made from chert and the burin-like tools from nephrite. Most worked well, but Tim quickly abandoned the use of microblades. They quickly became blunt or their edges crumbled, often filling the incisions, and as a consequence, prohibiting further cutting. The investment of time in hafting microblades exceeded their use-life in cutting osseous materials. They are best suited for cutting much softer materials such as hide (http://elfshotgallery.blogspot.ca/2010/04/more-palaeoeskimo-hide-working.html). Tim found that hafted and unhafted blade-like flakes with unifacially and bifacially retouched edges performed well and retained their cutting ability, often for the extent of the job. In some cases he selected flakes that had a tiny tip that could be used to make line holes. Burin-like tools worked very well in conjunction with retouched flakes. Flake tools were sharp and their somewhat ragged edges cut narrow, deep incisions fairly quickly; however when the bone was relatively thick it eventually became difficult to get the tool into the incision. Furthermore, material began to build up at the base of the incision, making further cutting less efficient. The burin-like tool was excellent to widen the incision or groove, remove the many tiny ridges at its base, and gouge deeply to remove a relatively large amount of material. However, with continued use the groove eventually became almost polished by the burin-like tool and less material was removed. At this stage Tim switched to the flake tool which sliced into the base of the groove, making multiple cuts that could once again be gouged by the burin-like tool. This technique of switching between the flake tool and burin-like tool was used in making all the tool preforms in these experiments.

Figure B1 Examples of tools employed in reproducing Dorset osseous implements. From left to right; biface, uniface, burin-like tool and end scraper.

B.3 Bird Bone Needle Reproduction

A goose ulna (species unknown) was selected to make the bone needle. It was two years old and it was not soaked before working. It took approximately one hour and 45 minutes to remove the needle blank from the bird bone core. Rast's intention was to remove a narrow, rectangular blank from the ulna shaft reminiscent of those seen in Dorset collections. He began by incising two grooves approximately 7 cm apart transversely around the shaft of the bone. He started using a burin-like tool, but this tool slipped easily so he switched to a blade-like flake with which he could score around the shaft to control the initial incisions and then apply greater pressure to create a groove

(Figure B2). Using a sawing action he cut around the shaft until the bone was almost entirely cut through. It was not his intention to remove the articular ends, but to create a point at which his cutting tool would stop when he cut out the blank lengthwise along the core. He reasoned that he could apply equal pressure to the full length of the blank grooves with easy quick movements if there were articular ends; otherwise he would need to reduce pressure toward the ends so as not to have his cutting tool suddenly drop off the ends bringing his wrist into painful contact with the needle core. However during the process of cutting along the grooves one of the articular ends broke off at the incision. While he was forced to reduce pressure toward the ends, it was more difficult to free the portion of the blank that was still attached to the articular end, and in hindsight he would have removed both ends of the bone before proceeding with the lengthwise grooves.

Figure B2 Burin-like tool making an incision around a goose ulna.

Once the grooves were placed around the shaft Tim began cutting two parallel lengthwise grooves approximately 0.5 cm apart (Figure B3). He established the initial grooves using a flake tool, but once these were in place he alternated between the flake tool and burin-like tool. Both tools were pulled and pushed back and forth along the length of the groove.

Figure B3 Flake tool making the lengthwise groove in the bone shaft.

He suggests that if one were to use a bone for multiple needles it would be best to make a series of parallel grooves partially through along the length of the bone around the shaft. Since significant pressure is necessary to make the grooves, removing one entirely would make the shaft of the bone too unstable for removing many more needle blanks. Once a series of grooves are applied almost through the surface of the bone, it would take just a little pressure to remove the blank (Figure B4).


Figure B4 Bone core and needle blank.

Shaping the blank into a needle was accomplished by grinding it on a sandstone abrader (Figure B5). It was necessary to flush the abrader frequently with water to rinse debris from the stone. Moreover, this likely softened the bone slightly making the process easier. The eye was placed using a blade-like flake with a naturally occurring sharp point (Figure B6). A short, shallow groove was incised into the center of the opposite surfaces by pressing and scraping. When working on one of the surfaces Tim turned the tool in his hands so that he was pressing toward the center of the groove from both ends of the incision. He found that if he remained working from one end, this area became too steeply sloped toward the center. He wanted the deepest portion of the groove to be somewhat centered. He repeated this work on the opposite surface until a small hole appeared. It was quickly widened until it was judged to be wide enough to accommodate a line of sinew. The work of turning the blank into a finished needle took 90 minutes (Figure B7). The whole job took a total of about three hours and 30 minutes.

Figure B5 Abrading the needle preform.

Figure B6 A pointed flake is used to begin incising the eye of the needle.

Figure B7 Finished reproduction needle.

The core from which the needle blank was taken showed evidence of the work Tim had done. Figure B8. shows the transverse and one longitudinal groove with incision lines obvious even at 10x magnification. Also apparent are the occasional misplaced incisions made when the flake tool slipped out of the groove. Thin incisions with ragged edges can be seen at 20x magnification in Figure B9.

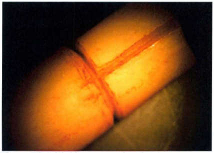


Figure B8 A bird bone core showing transverse and longitudinal grooves at 10x magnification.

Figure B9 The edge of a bird bone core after a needle has been removed. Note the cut marks along the edge of the groove and the residual bone remaining after the blank was removed (indicated by the arrow) (20x magnification).

Photographs of the finished needle at low-powered magnification show some of its characteristics. Because it had not been used, the eye in the needle still retained a grainy surface and ragged edge, and small incision lines are obvious at the edges (Figure B10). The point and surface of the needle show faint lines indicative of abrasion, but there is an overall graininess to the surface and no apparent polish (Figure B11).

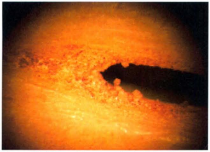


Figure B10 Eye of the reproduction needle at 40x magnification.

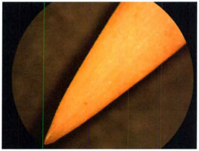


Figure B11 Point and body of the reproduction needle at 40x magnification.

B4 Barbed Point Reproduction

A caribou radius was selected for making the barbed point. The bone was three years old and was not soaked before working. Tim removed the proximal end of the bone using an electric saw, and following a faint sketch of a parallel-sided, pointed blank, he used a flake tool to incise the initial cuts. Once this was achieved, he alternated between the flake tool and a burin-like tool to make wide, even grooves (Figure B12). He used a pulling motion to remove bone debris, crossing the point at which the grooves met to maintain an even groove depth right to the intersection (Figure B13).

Figure B12 Caribou long bone with grooves incised along the shaft.

Figure B13 With a great deal of pressure Tim uses a burin- like tool in a pulling motion to incise a caribou radius.

The groove became greasy as Tim approached the point where it was going to break through. After approximately two hours of work, he pried the blank away from the core by inserting a stick into the marrow cavity. He was cautious to remove as much bone as possible before prying the blank away because experience had shown him that bone will fracture in a spiral fashion easily and leave a blank unusable. Indeed with only a transparent sliver of bone remaining, part of the break extended beyond the groove. In hindsight soaking in water would have likely reduced working time, and Tim suggests that making a rectangular blank, not curving the grooves would have been more effective since cutting in the curves put stress on the burin-like tool.

Tim took approximately twenty minutes to smooth the surface of the blank on a sandstone abrader and remove the jagged edges before beginning to form the barbs (Figure B14). Dorset barbed points usually have barbs that alternate down the tool on both sides. He used a bifacially flaked tool to score the position of the proposed notch, and while flipping the tool over frequently, he used a sawing motion to work in from the lateral edge of the blank (Figure B15). In addition he made slices from the inner edge outward.

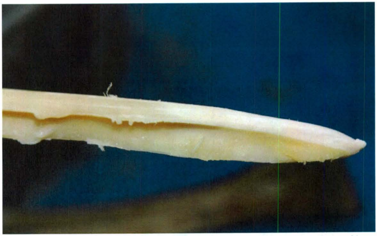


Figure B14 Barbed point blank before shaping begins. Note the fragments of ragged bone along the edges.

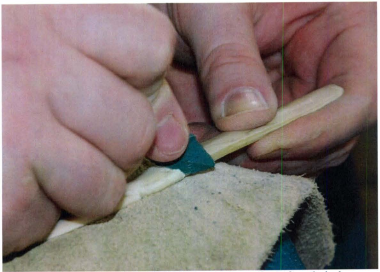


Figure B15 Tim uses a small retouched flake in a sawing motion to form the barbs.

He worked on a number of notches at once to get a sense of the proper position of each, but because the barbs remained fairly broad when the notches were removed, Tim used an abrader to finish shaping them. The line hole was constructed as it was for the needle by incising with a sharp flake from both surfaces. He found he could widen and smooth the sides of the line hole by running a sinew line back and forth through the hole. Finishing the notches, grinding and placing the line hole took nearly an additional three hours, making the construction of a barbed point a five and a half hour job (Figure B16).

Figure B16 Finished barbed point.

A microscopic examination of the barbed point showed details of the manufacture wear. The surface of the tool had multiple striations and while their orientation changed as Tim shifted his working position, the striations tended to occur in a series of parallel lines. The overall texture of the tool surface was slightly grainy with a small amount of polish (Figure B17). The flake tool incisions were apparent extending from the line hole, the margins of which appeared sharp and somewhat uneven (Figure B18). Likewise, incision marks were clearly visible at the base of the barbs (Figure B19).

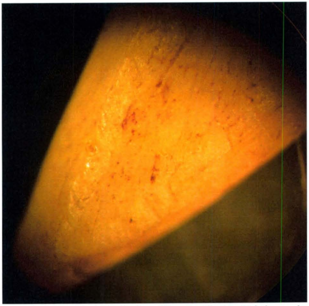


Figure B17 Tip of the barbed point at 30x magnification. Striations and some polish are apparent.

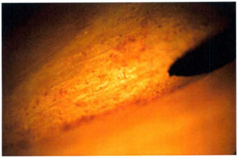


Figure B18 Line hole in the barbed point at 30x magnification. Note the sharp edge of the hole and the multiple incision lines.

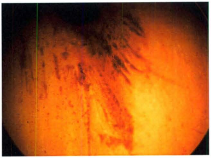


Figure B19 Incision scars at the base of a barb at 30x magnification.

B5 Harpoon Head Reproduction

A three year old caribou antler, soaked in warm water for two hours, was selected for constructing the harpoon head. A portion of the beam was chosen for cutting as it provided a relatively thick layer of dense outer cortex for strength and to give Tim sufficient thickness to create endblade and foreshaft sockets (Figure B20). One end of the antler had already been cut when work began. Tim used a hafted flake tool and burin-like tool to cut the antler segment needed to make the harpoon head, but found the burin-like tool slipped easily and so used the flake tool much more frequently. While the blank was still attached to the core Tim did some initial shaping of the surface to create flat edges and surfaces. He used a hafted scraper, holding it firmly and pulling and pushing the debris off the blank surfaces (Figure B21). He then removed the blank from the antler core and began to alternate scraping the preform surface and abrading it on a wet sandstone abrader.

Figure B20 Caribou antler, cut at one end. Some surface scraping is evident near the end that had been previously cut, and the placement of the initial groove is apparent at the opposite end.


Figure B21 Hafted scraper is being used to reduce the surface and shape the harpoon head blank.

He moved the tool in a circular fashion on the abrader as this motion keeps a small amount of grit released from the stone in contact with the tool (Figure B22). The blank removal and general shape was formed in approximately three hours.


Figure B22 Harpoon head blank being abraded on sandstone. The grit brought up during this operation aided in removing debris from the blank.

With the overall shape of the tool completed, Tim moved on to creating sockets and a line hole. He decided to begin with the endblade socket as it is the quickest job, and should it go wrong and the end break, he would not have invested a great deal of time in forming the more time consuming foreshaft socket and line hole. Tim used hafted flakes to form the endblade socket, and both a flake tool and a scraper to make the foreshaft socket of the harpoon head. Once the wedge of waste was removed from the foreshaft socket area (Figure B23), the surface was scraped and abraded to smooth out the ragged edges and a hafted flake was used to dig into the spongy material, sometimes rocking it back and forth to hook out debris and to keep the socket's sides straight (Figure B24). He used thinner flakes in the deepest parts of the socket to prevent widening the opening. A sawing motion was used to form the endblade socket; occasionally this was done in one direction to remove debris while cutting (Figure B25). Additional grinding and shaping along with the creation of sockets took one hour to complete.

Figure B23 Debris from the formation of the harpoon head foreshaft socket.

Figure B24 Abrading the foreshaft socket area.

Figure B25 A small hafted flake is used to form the endblade socket.

Using the sharp corner of a hafted flake, Tim placed short grooves on the dorsal and ventral surfaces where he intended to create the line hole. He made the grooves parallel to the length of the harpoon head. When a shallow groove was engraved, he inserted the corner of a flake and then while pressing down, rocked the tool back and forth, cutting away at the sides and center of the hole without extending the groove far. As the groove deepened to become a hole, he started to give the flake one quarter turns to remove debris from around the walls in an attempt to make the hole as round as possible (Figure B26). Turning the flake tool in the hole had to be done very carefully as a number of flake tools broke. As he widened and deepened the sides it became possible to twist more and more until he was making three quarter turns in the hole. Eventually he achieved a fairly round line hole, the interior of which he polished by running a length of leather through the ragged spongy material. The insertion of the line hole and final grinding took a little over an hour, making the manufacture of an antler harpoon head an approximately five hour job.

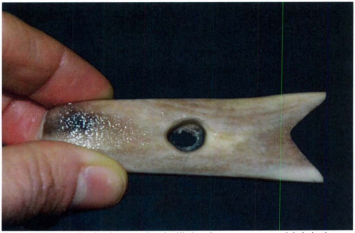


Figure B26 Reproduction harpoon head still showing some spongy debris in the line hole.

Evidence of manufacture wear on the harpoon head was evident under low power magnification. The surface of the tool displayed striations, usually running parallel, but occasionally striations are deeper and occur more randomly (Figure B27). Manufacture wear is most easily seen on the denser outer cortex of the antler. Striations in the line hole run horizontally along the wall of the hole indicating the turning action Tim used to round out the hole (Figure B28).

Figure B27 Harpoon head surface at 30x magnification.

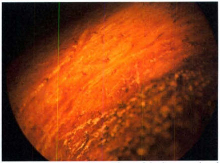


Figure B28 The interior surface of the harpoon head line hole at 30x magnification. Striations are visible on the antler's outer cortex.

Manufacture wear in the spongy portion of the line hole was not visible under low power magnification. This porous material appeared unmarked and protruded slightly into the opening of the hole (Figure B29). Small incisions were visible at the margins of the endblade socket and its interior appeared slightly rough. Likewise the foreshaft socket had a gritty appearance, and its interior surface showed no marks; however the exterior facet surfaces showed some striations from cutting and abrading, visible on the denser cortex (Figure B30). These, like the tools above, were characterized by short parallel lines.

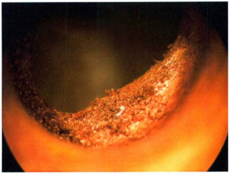


Figure B29 Harpoon head line hole interior spongy portion at 20x magnification. It appears rough and unmarked.

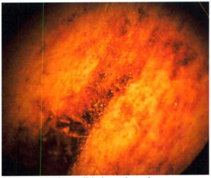


Figure B30 The endblade socket edge showing some incision marks at 30x magnification.

B6 Whale Bone Foreshaft-like Tool Reproduction

A dry piece of whale mandible (from a baleen whale, species unknown) was selected for the fabrication of the whale bone foreshaft-like tool. It was between three and five years old and was soaked for 24 hours prior to working. A short trial to cut and scrape the dry bone proved much more time consuming than working with the soaked element. The bone had been cut into a long rectangular piece using a circular saw which reduced the time involved in preparing a blank. Tim made two longitudinal cuts on adjacent surfaces, and later one transverse cut to remove a rectangular blank with a diamond shaped cross-section (Figures B31 and B32). He alternated between retouched flake tools (both unifacially and bifacially retouched) and a burin-like tool for cutting. A number of the flakes needed to be replaced as they broke or lost their cutting ability throughout the process. Nevertheless, although the bone was relatively thick, the cutting was less prolonged than it was with the caribou bone. This may be due to the soaking, as well as the porous nature of the whale bone. Tim worked quickly cutting the grooves, and became quite warm despite temperatures well below zero celsius in his work shed. It is hard to judge the total time it took to remove the blank as the core was cut before this project began, and the work achieved before the bone was soaked would have contributed to the total; however a rough estimate is three to four hours. The transverse incision at the uncut end of the core took over an hour. This seemed lengthy and may be partially due to the shortness of the cut, which made it difficult for Tim to apply much pressure with the burin-like tool. Toward the final stages of grooving the whale bone it became more difficult to cut into the deepening grooves as the cutting tool hafts began to prevent further penetration. Since there remained very little bone between the two grooves, Tim inserted a bevelled caribou antler tine to wedge the grooves apart (Figure B33).

Figure B31 Hafted, unifacially retouched flake tool cutting a deep groove in a section of whale bone. The colour difference denotes differences in bone density. The pale bone is denser and more difficult to cut than the darker.

Figure B32 Cross-section of the whale bone blank partially cut from the core.

Figure B33 The bevelled tine from a piece of caribou antler is used to wedge the blank from the core.

To achieve the oval cross-section common in whale bone foreshaft-like tools (Chapter 9), Tim employed both an end scraper and an abrader. He used a hammerstone to increase the grit on the abrader to speed the grinding process, and frequently flushed the abrading stone with water (Figure B34). This worked well, particularly toward the final stages of shaping. In the initial stages, Tim used a hafted scraper to remove relatively large amounts of bone debris by both pulling and pushing the tool (Figure B35). The wetness of the tool preform softened and loosened the sinew binding that held the scraper in its haft, forcing Tim to alternate with a fresh scraper. It is possible that the Dorset did not alternate the use of the scraper and abrader as Tim did, but saved most of the abrading until the final stage of shaping. The shaping of the tool took about two hours.

Figure B34 Abrading the tool surface with grit and water.

Figure B35 Using a scraper to remove bone and shape the tool.

The final stages of manufacturing the whale bone foreshaft-like tool took a little over one hour. This involved making the line hole and a shallow groove that led away from it. The line hole was formed as in the other tools, by incising a short groove into opposite surfaces using a small flake. Tim discovered the edge of a broken flake worked well to dig material out of the small groove, and a somewhat pointed flake was effective at deepening the hole. The groove running lengthwise from the line hole was achieved by cutting with a bifacially flaked tool. In addition Tim used a scraper, pulling it over the groove to keep the top of it smooth. It took approximately seven hours to finish the whale bone foreshaft-like tool (Figure B36). This estimate is far less than would have been the case had the core not been cut at both ends and split before the work here commenced.

Figure B36 Finished whale bone foreshaft-like tool.

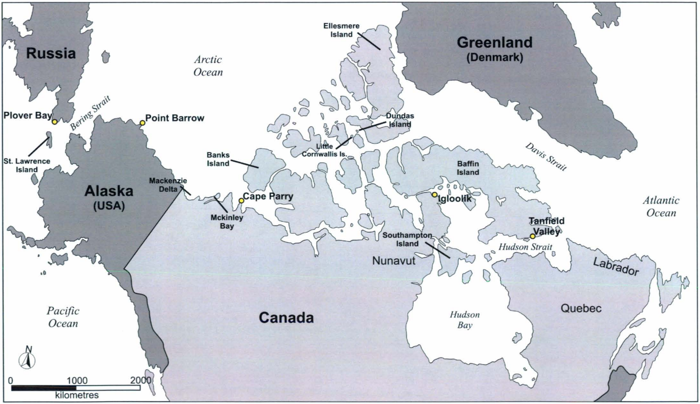
The porous nature of the whale bone tool makes it difficult to detect manufacture wear under the microscope. However there are some areas where traces of abrading evidence can be seen on the surface of the tool were a section of bone is relatively dense (Figure B37). These are identical to others; they are series of short, parallel lines running in a number of directions indicative of the change in orientation while abrading. Incisions near the line hole are also apparent under the microscope, but are less obvious than those seen on the antler and bone tools (Figure B38). The gritty nature of the whale bone obscures the incisions a little.

Figure B37 The surface of the whale bone foreshaft-like tool at 40x magnification. traces of abrading wear are visible.

Figure B38 Some smooth incisions can be seen running from the line hole at 20x magnification

B7 Summary

To summarize, the reproduction experiments using replicas of Dorset tools offer a number of insights for approaching an understanding of the Phillip's Garden osseous assemblage. The tools that worked best for cutting included the unifacially and bifacially retouched flakes. Microblades tended to crumble under pressure. Burin-like tools worked well in conjunction with the flake tools to efficiently remove material. In addition, the burin-like tool maintained a wide groove allowing for the penetration of relatively thick pieces of bone. Stone end scrapers worked well for shaping both antler and whale bone in both a pulling and pushing motion. Evidence of manufacture wear was apparent at low magnification and can be used along with published works as a reference for the archaeological material examined in this work. While the time it took to construct the tool was recorded, it is not considered an accurate measure of the actual time it took for Dorset craftspeople to make these tools. Using fairly old, dry bone for part of these experiments lengthened the working time, and all of the bones and antler had been partially cut prior to the experiments, thus shortening some of the time. Tim has extensive experience working with stone and bone tools, but would not have the equivalent knowledge, nor know the sequence that the Dorset had used. Nonetheless, bone tool working was likely a relatively lengthy process and these experiments with replica tools offers some understanding of the manufacture wear likely to be encountered.



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