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Once Upon a Time in the Arctic:

An Analysis of Late Dorset Metal Exchange and Interaction in the Eastern Arctic (AD 500-1300)

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Submitted in Fulfilment of the Requirements
for the Degree of Doctor of Philosophy

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2019

Declaration of Originality

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Title of degree ....Doctor of Philosophy

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Abstract

Around AD 500 Palaeo-Inuit groups, known archaeologically as the Late Dorset, resettled parts of the Canadian Arctic and Greenland their ancestors had left uninhabited for nearly five hundred years. At this time, they started to use and exchange metal that derived from two native sources on opposite ends of the Eastern Arctic and potentially through exchange with the Greenlandic Norse. Despite metal being found in generally low quantities, the presence of it alone in many Late Dorset sites across the Arctic, some nearly one thousand kilometres away from potential sources, has led some researchers to suggest it is under-represented in current collections. This drastically hinders any attempt at understanding how much metal was being used, where it was being used, and why it was being used. Moreover, given its known wide distribution and constrained source regions, metal is a potentially important, measurable, and, arguably, unique indicator of the maximum extent of Late Dorset interaction networks. Fortunately, most Arctic sites have good organic preservation leaving the Late Dorset archaeological record rich in ivory, bone, and wood objects, such as harpoon heads and knife handles, that may have held metal blades. This thesis quantitatively and qualitatively assesses two key potential proxy indicators of metal use that has in the past been used successfully in Inuit contexts in order to better understand the extent, intensity, and nature of Late Dorset metal use and exchange. First, the analysis demonstrates that the thickness of blade slots of harpoon heads, side-, and end-hafted handles can be a reliable indicator for the raw material of the blade it once held. Once compared with lithic and metal blades to provide a baseline, the data show that blade slot sizes, particularly in the case of harpoon heads, become thinner during the Late Dorset period. In the case of one Late Dorset harpoon head type, metal was used more frequently than stone. Second, deposits left behind on those organic objects through contact with metal endblades were identified with a microscope. Despite the identification of these metal deposits being impacted by the object's conservation and taphonomic history, no similar deposits were identified on any of the pre-Late Dorset material. This means that metal was being consistently and intensively exchanged over thousands of kilometers of Arctic landscape for a nearly eight-hundred-year period starting around AD 500. With these data in mind, the nature of this metal exchange can be examined with specific regards to the materiality of Late Dorset metal and the individual object itineraries that are created through the exchange process. The significance of metal within these continuous long-distance interaction networks enchained Dorset social relations through both time and space at a scale never before seen in the Eastern Arctic. It is along these same vectors of exchange that flowed the knowledge and ideas of what it meant to be Dorset.

To my mom,

without whom this would not have been possible

Acknowledgements

This thesis is the product of thousands of hours of work throughout the past four years. It contains 110,907 words and analyses 1288 artefacts. The primary data presented was collected in autumn 2016 from three museums and one university with thousands of individual artefacts inspected from sites across the Canadian Arctic excavated by numerous archaeologists throughout the past 70 years. While these statistics offer just a glimpse into inner-workings of what it took to bring this project to completion, what is impossible to quantify is the support, directly or indirectly, given to me by countless people throughout my time as a PhD student without which would have made this undertaking unachievable. I can never repay these people this debt but I hope these words are but a small step towards demonstrating how much they all mean to me.

This project was generously funded by a Dissertation Fieldwork Grant from the Wenner-Gren Foundation, an Emslie Horniman Scholarship from the Royal Anthropological Institute of Great Britain and Ireland, a Sue Green award from the Department of Archaeology at the University of Glasgow, and a number of Travel and Research bursaries from the University of Glasgow. The support provided by these institutions not only enabled the research reported herein but whose confidence in my early proposals was humbling.

I originally intended to use portable X-Ray Fluorescence to analyse the chemical composition of all Late Dorset metal objects in the collections of the museums I visited. Despite the work being funded from the institutions mentioned above, this part of the work was not undertaken due to unavoidable and unforeseen consequences on my or my supervisors' part. I still believe that the results would have been insightful and I hope that the work can be undertaken in the future (even if I am not the one who does it).

My PhD was expertly supervised by Drs. Colleen Batey and Nyree Finlay. In particular, Colleen has been there since the beginning and her patience, critique, and advice has been invaluable. She treated me as an equal and her enthusiasm for my project was obvious and sincere. Throughout this PhD, Colleen's supervision frequently went far beyond what was expected. Having visited many of the areas I discuss in my thesis, Colleen had unique insight into the Arctic landscape that few of us southerners have. Regardless of the topic, her advice was continually on-point even if it took me a little longer to realise it! She replied to my emails with such speed that I sometimes wish she took longer, especially when it came to thesis revisions! She was with me right from the start and is one of the few that experienced every bump on the road along with me. Her support never wavered and she always found a way to calm me down when the weight of the amount of writing I had to do became too much. She wrote countless reference letters for me throughout the past four years and never hesitated once when I asked. She also secured me a position lecturing to tourists on Arctic cruises which enabled me to visit archaeological sites across the Eastern Arctic. I probably never fully articulated how much her support meant to me during our meetings and how much gratitude I have for her mentorship. Colleen's supervisory prowess inspired me beyond the research process which is something that is unrequitable in every way.

Nyree was the theoretical ying to Colleen's methodological yang and our sometimes hours long chats about archaeological and anthropological theory not only left me with reams of reading but stimulated my mind outside the walls of its Arctic crucible. Much like Colleen, Nyree's interest in my project helped fuel me through the long, sometimes frustrating but ultimately rewarding process of writing. My appreciation for their guidance cannot be quantified.

Although not an official supervisor, William Fitzhugh provided mentorship to me that was invaluable. Desperate to get my trowel dirty, I emailed Bill out of the blue one spring in hopes of getting field experience. With no prompting or obligation, Bill welcomed me aboard his Arctic Studies Center field crew without hesitation. I assisted him and other students for two summers surveying and excavating sites throughout Labrador and Quebec's Lower North Shore. Our (very) early morning chats about any given Arctic topic after we set off our boat for the day's travel were foundational for me as a researcher. I am incredibly grateful for everything he has done for me.

Throughout this opportunity I was fortunate enough to meet a kindred spirit in Jamie Brake of the Nunatsiavut Government Archaeology Office. Jamie's sincere enthusiasm for all things Labrador was an inspiration and his knowledge of archaeology was more than educational for me. He diligently and efficiently answered my frequently too-lengthy emails about any given subject and helped me secure site data and references for the sites I analysed from Labrador. He was always refreshing to speak to and to bounce, sometimes crazy, ideas off of.

There are innumerous faculty and students in the Department of Archaeology at the University of Glasgow that provided their support and guidance throughout this process. In particular, I am incredibly grateful for the feedback and guidance of my panel members: Prof. Stephen Driscoll, Dr. Claudia Glatz, and Dr. Jeremy Huggett. In their own way, they always made our bi-annual progress meetings productive and supportive. In particular, I would like to thank Steve for his continued support and frequent kind comments since I started at the University of Glasgow. Dr. Effie Photos-Jones graciously spent her time training me in aspects of archaeometallurgy and in the usage of portable X-Ray Fluorescence. She did this without prompt and gave me an incredible amount of experience. Her mentorship made me a better laboratory archaeologist. Dr. Tessa Poller should also be thanked for always having her door open and for our frequent chats about the challenges of teaching theoretical and practical archaeology. Thanks as well to Gert Petersen for always putting up with my bizarre lab requests and for putting a smile on my face when I was in there.

Dr. Richard Jones and Dr. William Fitzhugh examined this PhD with both enthusiasm and (thankfully) kindness. Their comments improved the thesis greatly. They made the viva process pain-free and very enjoyable.

Jamie Barnes, Joss Durnan, and Tom Davis were great colleagues and friends always up for archaeological sparring matches. Their friendship both in and out of the field/office was greatly appreciated. Anouk Busset, Kevin Grant, Helen Green, Heather Christie, Catherine Johnson, Megan Kasten, Elsa Perruchini, and many other students in the Department of Archaeology made the PhD experience bearable and made sure I was not alone in the trials of being a graduate student. Thanks must also go to the countless fellow archaeology students I met in the field (from Canada, the US, and the UK) that provided relief from the daily grind. I would also like to thank Elizabeth Pierce and Al McFeeters for their company and good humour during our time in the Arctic.

The data presented in this thesis was collected from material held at McGill University (Montreal, QC), the Rooms Museum (St. John’s, NL), the Canadian Museum of History (Gatineau, QC), and the Prince of Wales Northern Heritage Centre (Yellowknife, NT). In particular, an incredible amount of gratitude is given to Drs. James Savelle, Pierre Desrosiers, and Lesley Howse for giving me access to their newly-excavated material from the Foxe Basin and for permission to include it in this thesis. Jim was particularly warm and welcoming during my visit to McGill and made me feel like I was at my home institution right from my first day there. Lori Temple (Rooms Museum), Stacey Girling-Christie (Canadian Museum of History), and Joanne Bird, Susan Irving, and Ryan Silke (Prince of Wales Northern Heritage Centre) were all incredibly welcoming and helpful at every stage of my research. Their help navigating their respective institutions was invaluable and this research would not have been successful without their help. I would also like to thank Dr. Sylvie LeBlanc (Department of Culture and Heritage, Government of Nunavut) who facilitated access to Nunavut collections and was always friendly and welcoming. All of these people were open with sharing catalogue and site data which were integral to the initial parts of my research.

Although too numerous to all name, I owe an incredible debt to my family and friends who provided financial, moral, and emotional support throughout this process. Sam Maskell, Karmen Shum, Terry Grazier, and Matthew Gardner provided great friendship and always picked up my spirits. I would also like to thank Ann and Peter Wright, and Lynsey Cunningham and family for making me feel at home in the UK and for always giving me a laugh when I needed it. They always asked how my PhD was coming along even though I probably always gave the same answer: an anxious “just fine”! I am also thankful for my aunts, Mary Hennessy and Judy Hennessy, for their support throughout my PhD and for their good humour. I apologise for occasionally forgetting the 8-hour time difference and waking them up early in the morning when I phoned. They were like mothers to me my whole life and I am thankful for everything they have done.

My mother, Darlene Hennessy and my father, Mitch Jolicoeur, relentlessly supported my endeavours without hesitation. They backed me at every turn and supported me when I couldn’t see the light at the end of the tunnel. Without them, none of this would have been possible. My mother in particular bore much of the stress and financial burden of my time as a PhD student and did so without complaint. She always listened and gave good advice even if I didn’t realise it until later. I cannot express in words how much she has helped me and what this means to me. For this and so much more, it is to her I dedicate this thesis.

Julio the Cat was a stalwart companion in the closing months of writing this thesis. He kept my lap warm and napped on my behalf. Although he was not the best proof-reader, his charm and never-ending love helped me through a number of late night writing sessions.

Lastly, I am unable to express the gratitude for the love, kindness, and support given to me throughout this process from Brogan Cunningham. She lifted me up when the burden of this PhD kept me down and sustained me in the late nights and early mornings. She unquestioningly supported me when I was gone for nearly 6 months to undertake the fieldwork and laboratory analysis during my PhD research. She never seemed to mind when I would incoherently talk at her for hours about Arctic interaction networks or the latest paper I had just read. She also never complained (and always gave good feedback) about the countless times I brought a newly edited illustration to her asking if it was okay. Finally, she was incredibly supportive during the many writing crunches I put myself in and always made sure to feed me and to not let the writing process frustrate me. Without her, I wouldn’t have wanted to do any of this.

I hope what I have written does justice to those that helped me. With their endless stream of support in mind, I can claim little of what follows except the errors and shortcoming in its interpretation.

Patrick C. Jolicoeur
Glasgow, Scotland
2018/09/30

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Chapter 1

Introduction

1.1 Overview

The Late Dorset are the first group from the Eastern North American Arctic (Figure 1.1) to consistently use metal. However, relatively little metal survives in the archaeological record (McCartney 1988). One solution that has long been hypothesised for correcting for this issue is to search for proxy indicators on the organic remains that are common in Arctic archaeological sites, such as metal manufacturing marks, iron oxide residues, or thin blade slots (Collins 1937; Semenov 1964). While much attention has been given to understanding this problem within an Eastern Arctic Inuit context (e.g. Gullason 1999; McCartney 1988; 1991; Whitridge 2002), comparatively little formal research has been dedicated to Late Dorset metal use despite being identified as an issue (Schledermann 1975). Similarly, Late Dorset interaction networks are thought to be wide-ranging but little past research attempts to formalise the extent and nature of it. By comparison, considerable research has looked at the extent of Inuit interaction networks by specifically examining the exchange of raw materials such as metal (Colligan 2017; Buchwald 2001; McCartney 1988; 1991; McGhee 1984a; Morrison 1987; Nagle 1984) and soapstone (Morrison 1991). Similarly, research using the exchange of materials as a vector for approaching Dorset interaction networks has been equally illuminating (e.g. Odess 1996; 1998; Milne et al. 2011; Nagle 1984; ten Bruggencate et al. 2015; 2016; 2017). If metal exchange is as extensive as what is hinted by the surviving metal assemblage, then more accurately (and quantitatively) defining it has the potential for being deeply informative about Late Dorset interaction networks more generally.

Figure 1.1: Map of the Eastern Arctic with important place-names and water bodies.

This thesis seeks to address how much metal Late Dorset people were using, where it was being exchanged and used, and why they were using and trading it. To accomplish this, Late Dorset organic remains were quantitatively and qualitatively examined. These data will then be cast through a theoretical lens that will aim to integrate Late Dorset metal use and exchange both within the wider Dorset and Arctic contexts.

This thesis will first test the utility of measuring blade slot sizes of Late Dorset harpoon heads and knife handles as a proxy indicator of Late Dorset metal use and exchange. This approach has been shown to be incredibly valuable for expanding the extent, intensity, and nature of Inuit metal use (e.g. Gullason 1999; Whitridge 2002). Additionally, those same organic objects will be observed under a microscope in order to identify potential metal residues that were left by the endblades. Applying this data with a theoretical framework focused at understanding how humans engage with their material world, a better understanding of the nature of metal use and exchange, beyond simply the functional aspects of the material, will be achieved. By sampling Late Dorset sites across the Eastern Arctic, the data presented herein represents the first attempt at formally understanding Late Dorset metal use and exchange outside of regional or site-based studies.

1.1 Research Questions

There are three main research questions that will be answered throughout the course of this thesis: (1) What is the extent of Late Dorset metal use and exchange? (2) What is the intensity of Late Dorset metal use and exchange? (3) What is the nature of Late Dorset metal use and exchange?

Research questions 1 and 2 will specifically be answered by assessing the validity of using potential proxy indicators of metal use on Late Dorset material culture. As such, the proxy indicators themselves will be tested and verified in a quantitative manner in order to ensure that the results are genuine and not due to another factor not discussed. In simplistic terms, research questions 1 and 2 are asking where metal was being used and in what quantity. Research question 3 seeks to apply the data generated by the metric and microscopic analyses to an appropriate theoretical framework in order to understand why the Late Dorset exchanged and used metal. In so doing, the ways Late Dorset engage with their material culture will also be debated. Ultimately, the conclusions of this thesis will broaden our understanding of both Late Dorset metal use and exchange and the ways the Late Dorset navigated their material world.

1.2 Structure of the Thesis

This thesis is separated into eleven chapters. Chapters 1 and 2 introduce the topic, research questions, and the background information and key themes regarding Late Dorset metal exchange. Next, Chapter 3 will detail the theoretical framework that will be applied to the data to help disentangle the nature of Late Dorset metal exchange. Chapter 4 describes the methodology employed to collect the data for the metric and microscopic analysis. Chapters 5, 6, 7, and 8 present the results of the analyses undertaken on organic material (Chapter 5), lithic material (Chapter 6), metal material (Chapter 7), and finally the microscopic analysis (Chapter 8). Then, these data will be integrated and discussed in Chapter 9. It is here that the questions regarding the extent and intensity of Late Dorset metal use and exchange will be answered. Chapter 10 will then use those conclusions as a basis for assessing the utility of the theoretical framework for understanding the nature of Late Dorset metal use. Finally, Chapter 11 will provide concluding thoughts on the results of the thesis as well as present suggestions for future research.

1.3 Terminology

Names matter (Berg 2011:19)! In order to avoid confusion with the existing literature on the subject, there are a number of terms that will be frequently used in this thesis that slightly differ from the common literature. Secondly, there is a traditional power-imbalance that has existed in Arctic in general but Arctic archaeology more specifically that privileges the, mostly white, Western settler tradition (see debate in McGhee 2008 over this issue). While the terms one uses to describe the subjects which one studies is vital for comparing work with others, it is important to note that the common term for almost all pre-European contact archaeology, with some exceptions, is named after Euro-Canadian/American places. In fact, the common name for most Arctic islands are named after European people or places. While Indigenous place-names exist, the existing literature prefers, by far, the non-Indigenous name. Circumventing this in the context of this thesis is not possible and therefore the common, Euro-Canadian name will be used although this section acknowledges the power-imbalance inherent in this act.

Likewise, the names archaeologists have used carry baggage from their Euro-Canadian/American beginnings. For example, the focal group of this thesis, the Dorset, were originally named after a small hamlet in southwest Baffin Island commonly known as Cape Dorset (called *Kinngait* by Inuit) (Jenness 1925). This region itself is named after Dorset in England despite the region having an Inuktitut place-name. The Late Dorset are the terminal culture (or period) in what is generally referred to as the “Palaeo-Eskimo” tradition. Recently, Friesen (2015) has argued that Palaeo-Inuit (or Paleo-Inuit) should replace Palaeo-Eskimo in order to avoid potential negative connotations. This renaming is also preferred by the Inuit Circumpolar Council, representing Inuit and other Arctic peoples across the North American Arctic, and will, therefore, be the term used throughout this thesis.

Secondly, the term “Thule” is used to describe early Inuit in the Arctic. However, Whitridge (2016:828) argues that despite the archaeological trace of early Inuit being named after the Thule region in northern Greenland, it is itself an exogenous place-name of European origin. He proposes the use of “precontact Inuit” be preferred as that removes the non-Indigenous aspect of the name but also connection of “Thule” with the Nazi society of the same name (Whitridge 2016:829). While the Nazi usage postdates the archaeological naming by Mathiassen (1927), this thesis will avoid both by, when possible, not using the term Thule. Additionally, while Whitridge (2016:829) acknowledges the contradiction, both “precontact” and “prehistoric” equally order major archaeological traditions by the presence and interaction with European groups. To avoid this, this thesis will simply refer to the earliest Inuit in the Eastern Arctic as simply “early Inuit” rather than “Thule”, “precontact Inuit”, or “prehistoric Inuit”. It is hoped that this does not create confusion but rather it should be viewed as a very, very small step towards decolonising Arctic archaeology.

Chapter 2

Background and Key Themes

2.1 Introduction and Overview

This chapter will give a background of Dorset in the Arctic and introduce some of the main concepts related to this that will be revisited throughout this thesis. While a brief overview of Arctic culture history will be given, this chapter will focus on the emergence of the Late Dorset around the 6th century AD, the key traits that are similar to and distinguish them from their predecessors, the existing data regarding their interactions with the Inuit and Norse, and, finally, their unresolved disappearance around the 14th century AD. The existing evidence for the way Late Dorset groups interacted with each other will also be highlighted. Given that the analysis and discussion in this thesis engages with an essentially Eastern Arctic-wide scale, the information presented below is not designed to be an exhaustive review but rather highlights key aspects of Late Dorset that will either be revisited in the analysis or discussion sections of this thesis or be foundational for the interpretations given. However, first a review of the main terms used in this thesis will be given.

2.2 First Arctic Peoples

The Late Dorset are the last archaeologically identified culture of what is termed the Palaeo-Inuit tradition. They are descendants of the first inhabitants of the Arctic, with a genetic lineage in the North American Arctic that stretches as far back as 2500 BC and lasts until potentially the 14th century AD. Naturally, throughout the 4000 year history in an area as vast as the Arctic, there were many different manifestations (i.e. “cultures”) of Palaeo-Inuit tradition that are sometimes regionally distinct (Figure 2.1). Palaeo-Inuit cultures are broken down into two main periods: “Early Palaeo-Inuit” and “Late Palaeo-Inuit”. The former is most easily understood as Pre-Dorset and other related but regionally distinct groups while the latter generally refers to Dorset groups (500 BC to AD 1300).

Some argue that there is a transitional period between the Early and Late Palaeo-Inuit periods or if even the earliest manifestations of Dorset are actually simply terminal Pre-Dorset (see Fitzhugh 2002; Hood 1998; Ramsden and Tuck 2001; Nagy 1994).

Some Arctic researchers refer to Palaeo-Inuit cultures as the Arctic Small Tool tradition (ASTt), highlighting the prevalence of small, finely crafted lithic tools and blades at many Palaeo-Inuit sites. While Alaskan culture history diverges from the Eastern Arctic, ASTt and Palaeo-Inuit are common terms used across the North American Arctic (Irving 1957). In the Eastern Arctic, Early Palaeo-Inuit are divided into effectively three, broadly geographically distinct (although there are some exceptions) groups: Pre-Dorset in the Canadian Arctic Islands, Independence (sometimes called Independence I) in High Arctic Canada and Greenland (Grønnow 2016), and Saqqaq in western Greenland (although Schledermann (1990) has identified Saqqaq components on Ellesmere Island) (e.g. Grønnow 2016; Meldgaard 2004) (Figure 2.2). Additionally, a potentially transitional Palaeo-Inuit group in Newfoundland and Labrador, referred to as Groswater, exists as a technologically distinct group from both Pre-Dorset sites in northern Labrador and Dorset sites in Newfoundland and Labrador. Despite the technological differences between Pre-Dorset and Groswater groups, there is some indication that their economy and settlement patterning is similar to Pre-Dorset groups (Pintal 1994:159).

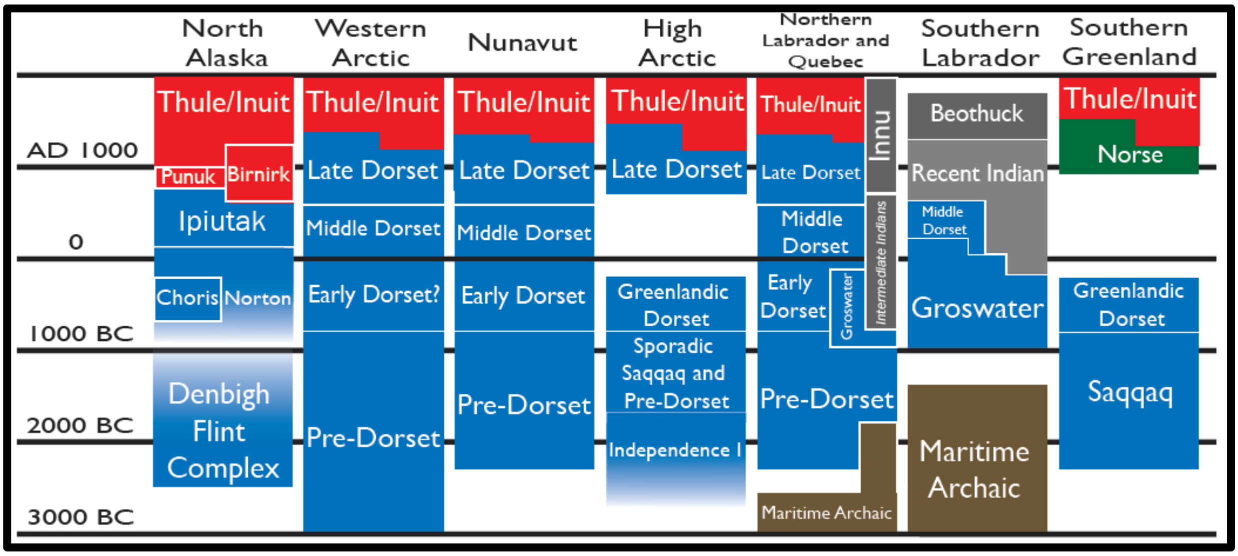

Figure 2.1: Simplified culture history of the Northern Alaska, the Canadian Arctic, and Greenland (after Raghavan et al. 2014:2). Note red denotes Inuit cultural tradition and blue denotes Palaeo-Inuit cultural tradition.

Dating the earliest presence of Palaeo-Inuit sites in the Eastern Arctic has proved challenging, with most dated materials being sea mammal bone or come from unsealed contexts (e.g. Milne and Park 2016; Savelle and Dyke 2002:518). In the literature regarding the earliest Palaeo-Inuit in the Eastern Arctic, dates are frequently reported (and subsequently cited) as uncalibrated radiocarbon years before present which has caused some confusion over what the earliest, although problematic, dates for the first peoples in the Eastern Arctic actually are (e.g. Savelle and Dyke 2002; 2014:249; Friesen 2004:685; Ryan 2009:83). While the commonly cited starting date is 4500 BP, the calibrated date ranges from the western Canadian Arctic and even Labrador fall before this date despite the issues with the radiocarbon dated materials (Table 2.1). In any case, it seems likely that the earliest Pre-Dorset settlement in the Eastern Arctic likely began roughly 5000 years ago.

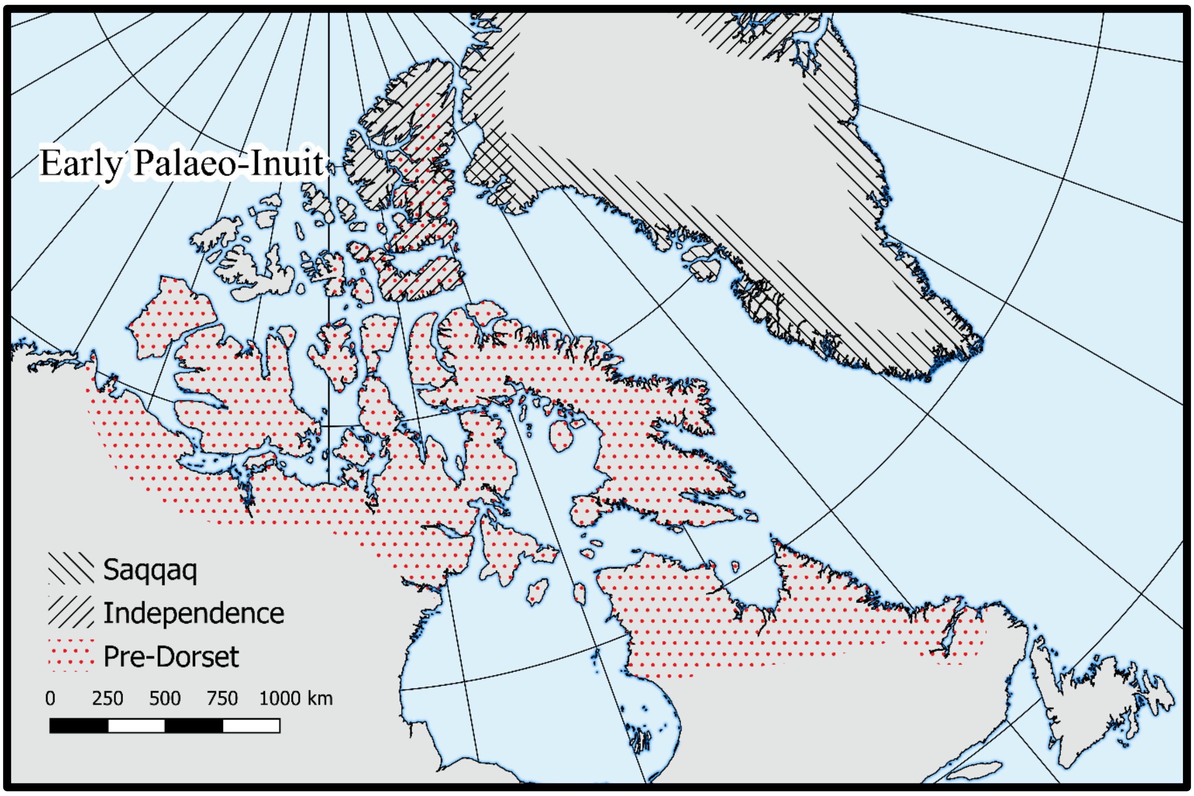

Figure 2.2: Map of geographical distribution of Early Palaeo-Inuit. Note the overlap of all three groups along the western shores of Smith Sound.

Site Name	**Borden Number**	**Lab Code**	**Material**	**^{14}C Years BP**	**Calibrated Date BP (2 sigma)**
Woodward Point		AA-40586	*Salix* charcoal	4133 +/- 42	4823-4566 (89.1%), 4560-4530 (6.3%)
Woodward Point		AA-51505	*Mytilus* shell	4393 +/- 54	5071-4850 (79.6%), 5277-5167 (14.1%), 5126-5108 (1.7%)
Woodward Point		AA-40861	*Salix* charcoal	3970 +/- 42	4530-4289 (95.4%)
Woodward Point		AA-40585	*Salix* charcoal	4154 +/- 45	4830-4568 (94.1%)
Woodward Point		AA-40587	*Salix* charcoal	4216 +/- 51	4770-4581 (63.2%), 4862-4781 (32.2%)
Woodward Point		AA-41509	*Mytilus* shell	4427 +/-52	5087-4866 (62.1%), 5284-5160 (27.0%, 5141-5101 (6.3%)
Page Point		AA-40591	*Salix* charcoal	4557 +/-45	5325-5046 (90.8%) 5444-5415 (4.6%)
Page Point		AA-40590	*Picea* charcoal	4455 +/-52	5293-4956 (88.4%) 4936-4881 (7.0%)
Page Point		AA-40863	*Salix* charcoal	4197 +/-41	4768-4611 (67.4%) 4848-4782 (26.3%) 4598-4585 (1.6%)
Kaleruserk (Parry Hill)	NiHf-1	K-1040	Walrus bone collagen	4040 +/-130	4850-4220 (92.9%) 4208-4156 (2.5%)
Kaleruserk (Parry Hill)	NiHf-1	K-1041	Walrus bone collagen	4080 +/- 130	4873-4227 (94.5%)
Kaleruserk (Parry Hill)	NiHf-1	P-209	Walrus or narwhal bone	4066 +/-133	4866-4223 (93.7%) 4205-4157 (1.7%)
Kaleruserk (Parry Hill)	NiHf-1	P-207	Walrus or narwhal bone	4118 +/- 168	5056-4148 (94.1 %)
Closure	KdDq-11	P-707	*Phocidae* (?) fat	4087 +/-81	4826-4423 (95.4%)
Closure	KdDq-11	GSC-1382	*Phocidae* fat	4690 +/- 380	6281-4437 (95.4%)
Closure	KdDq-11	GaK-1281	*Phocidae* (?) fat	4480 +/- 105	5327-4852 (91.5%) 5447-5386 (3.9%)
Little Ramah Bay		SI-4002	Not reported	4055 +/- 80	4829-4403 (93.6%) 4325-4300 (1.2%)
Rose Island Q (Band 4)	IdCr-6	I-5250	charcoal (unspecified)	3830 +/- 115	4529-3895 (95.4%)

Table 2.1: Radiocarbon dates for the earliest Pre-Dorset sites in the Arctic. All calibrated by author with OxCal 4.3 using the IntCal13 calibration curve (Bronk Ramsay 2009; Reimer et al. 2013). Dates from Woodward and Page Point are from Savelle and Dyke (2002), Little Ramah Bay and Rose Island Q dates from Fitzhugh (2002), and the other dates were retrieved from CARD (Martindale et al. 2016). None of the sea mammal material has been corrected for the marine reservoir effect and undoubtedly represent dates that are too old.

Early Palaeo-Inuit technology has some broad similarities but also differences across space. Despite some Pre-Dorset, Independence, and Saqqaq sites containing some amount of organic material, the vast majority of collections are comprised of flaked stone tools. Taken with the relatively small amount of harpoon heads and other organic remains that exist, the Pre-Dorset likely hunted both land and sea mammals. The existing harpoon heads are both toggling and non-toggling and are open socket or tanged based (Helmer 1991:306). Pre-Dorset harpoon heads may also be bladed or self-bladed. Along with this, Pre-Dorset populations also used the bow and arrow as well as lances to hunt terrestrial game. Recently, well-preserved Saqqaq sites from Greenland have demonstrated a wider range of organic material than what has previously been known (Grønnow 2017). Significantly, in addition to the broad geographical/cultural taxonomy presented above, the range of Early Palaeo-Inuit, and Pre-Dorset more specifically, are dependent on which other potential cultural influences exist. For example, there is evidence for Pre-Dorset and Maritime Archaic peoples in northern Labrador co-existing, despite minimal evidence for interaction (Hood 2008). Likewise, Pre-Dorset sites in the western Canadian Arctic have traits that are similar to those found in Norton Palaeo-Inuit sites in Alaska (LeBlanc 1994). Finally, the presence of certain previously unknown tool types from Pre-Dorset sites in the northern Boreal forests of the central low Arctic have been interpreted as interaction with neighbouring Na-Dene peoples (Milne and Park 2016:703). Altogether this evidence suggests an Early Palaeo-Inuit cultural landscape that was regionalised and historically contingent. Beyond the stylistic similarities (and differences) noted between different early Palaeo-Inuit groups, there is little evidence to suggest extended contact between these groups despite emerging evidence for significant long-term intra-regional seasonal mobility (ten Bruggencate et al. 2017; Landry et al. 2018).

2.3 Emergence of the Dorset

The Late Palaeo-Inuit period is solely represented by the Dorset culture. The mechanism and nature of this change between Early and Late Palaeo-Inuit is unclear, however. Some argue that the transition to Dorset culture was an Arctic-wide, in-situ development (e.g. Collins 1950; Taylor 1968) while others argue that it was a more localised phenomenon followed by large-scale population migration or acculturation from a “Core Area” in the Foxe Basin outwards (e.g. Fitzhugh 1976; Maxwell 1976; McGhee 1976). More recently, Savelle and Dyke (2014) have challenged the notion of in-situ transitional development between Pre-Dorset and Dorset and have instead suggested potentially another wave of migration with roots in the Norton culture expanding east out of Alaska into the Canadian Arctic around 2500 BP as the source for the Dorset Culture. Their key evidence to support this claim is that the once-thought-to-be demographically stable Core Area was just as susceptible to boom and bust cycles as what others have thought about “peripheral” regions in the Arctic (Savelle and Dyke 2014:273 cf. Schledermann 1990).

The Late Palaeo-Inuit period lacks the taxonomic diversity of the preceding period despite having some geographical diversity (e.g. Odess 2005). Lasting nearly 2000 years between 500 BC and AD 1300, the Dorset culture would be the final genetic representative of the Palaeo-Inuit peoples in the Canadian Arctic and Greenland prior to the arrival of the Inuit (e.g. Raghavan et al. 2014). Archaeologists separate Dorset into three main temporal/cultural periods, Early, Middle, and Late Dorset. However, some researchers, notably Odess (2005), Helmer (1994), and Sutherland (1996), have demonstrated the weakness of the Early/Middle/Late Dorset classification and opt for more region-based culture histories. Furthermore, there is significant debate over whether Early and Middle Dorset are as different as described by earlier researchers, such as Maxwell (1985), or if the earliest assemblages assigned to Dorset are just terminal expressions of Pre-Dorset (e.g. Desrosiers et al. 2006; Savelle and Dyke 2014:271).

Much like the Early Palaeo-Inuit cultures, the Dorset culture lived throughout the Canadian Arctic and Greenland. While the early stages of the Dorset culture seems to have links to the Early Palaeo-Inuit period, the Dorset would ultimately have a much different material culture and subsistence strategy than their ancestors. Frequently, the Dorset culture is defined by its lack of a number of tools that were frequently found in Early Palaeo-Inuit or Inuit assemblages. In particular, bow and arrows, dog sleds, large watercraft, and bow-drills are all technologies that are thought to not have been used by the Dorset people (Friesen 2000:208; Maxwell 1985; McGhee 1996:144; Sutherland 2005:4).

Although, McGhee (1971) reported that the Joss site and OdPc-4 on Victoria Island have produced two slotted foreshafts that Maxwell (1984:365) argues must have been produced for arrowheads. Additionally, there are two decorated fragments which appear to be remnants of a bow found in the Middle or Late Dorset house N73 from Nunguvik (Mary-Rousselière 2002:155). Furthermore, there are small hints that the Dorset utilised some sort of watercraft, such as a kayak (Heath and Arima 2004:143; Mary-Rousselière 1979:25;

McGhee 1996:146). The presumed lack of bow and arrow with a presumed increase in the prevalence of ice-edge hunting technology, such as toggling harpoon heads and crampons, has led some archaeologists to posit that one of the main developments between the Early and Late Palaeo-Inuit period is a decrease in inland hunting of caribou and muskox with an increase in sea mammal hunting of walrus and seal (Prentiss and Lenert 2009:241; Maxwell 1976:69; 1984).

However, caution should be exercised when making broad claims about a group of people as geographically and temporally expansive as the various groups living in the Arctic. There are plenty of Dorset sites in the Arctic that relied upon terrestrial mammals (e.g. Fitzhugh 1981; Friesen 2013; Howse 2008; 2018). It has been hypothesised that the Dorset would have used drive lanes and lances to hunt caribou or muskox rather than the bow and arrow (McGhee 1996:144). Moreover, differential taphonomic processes may be heavily influencing the available archaeological data. Grønnow (1994; 1996; 2012; 2017) has clearly demonstrated that with his study of frozen Saqqaq site that shows tremendous variability in organic tools despite the lithic tools being relatively similar to other Saqqaq sites. Couple this with the notion that the majority of archaeological material that has been recovered is generally associated with the latest phases of the Dorset culture and the possibility of sample and taphonomic-induced bias becomes much more likely (McGhee 1996:200; Schledermann 1990:329). In saying that, Maxwell (1984:365) argues that even sites that generally have very good organic preservation, such as the sites from Lake Harbour or Button Point, have not produced examples of supposedly “lost” Dorset technologies such as the bow and arrow.

While the settlement areas of Early/Middle/Late Dorset culture are different from one another, they do not exhibit the same level of geographical particularism or contemporaneity as the Early Palaeo-Inuit cultures (Figure 2.3). Traditionally, the Dorset trichotomy existed as a method of relatively dating sites when absolute chronologies were not available. As such, some have argued that there are similarities between contemporaneous Dorset groups. Various aspects of material culture and architecture have been assigned to each of the three divisions (see Maxwell 1985). However, much like the other attempts at taxonomic classification, there is considerable debate surrounding the validity of the tri-partite division of the Dorset culture. Both Helmer (1994) and Odess (2005) argue that more geographically specific classifications of the Dorset culture would better suit the existing archaeological evidence. In other words, the heterogeneity of artefact styles between contemporaneous Dorset populations makes the Early-Middle-Late division extremely problematic when using it to define archaeological styles (Odess 2005:87; Ryan 2016). Furthermore, Ramsden and Tuck (2001:8) argue that there are greater differences between Early and Middle Dorset than there are between Early Dorset and Early Palaeo-Inuit cultures. In light of the ongoing debate surrounding Palaeo-Inuit taxonomy, this thesis will focus on using the Early-Middle-Late division of the Dorset culture simply as a temporal framing device. As such, this thesis will follow Friesen's (2007:195) temporal classification of the "Late Dorset" as a population of Dorset groups living in the Arctic from AD 500 to roughly AD 1300. While there were undoubtedly differences between the various Late Dorset groups, there is a seemingly greater amount of uniformity between disparate regions of Late Dorset settlement than seen in Early or Middle Dorset periods. Moreover, a number of significant developments are seen in the Arctic during this time that are unlike anything seen in the prior 1000 years of the Late Palaeo-Inuit period.

The major changes witnessed in the Late Dorset period can be broken down into changes in settlement, material culture, and architecture. First, the areas in the Arctic inhabited by the Dorset culture shifted drastically at the start of the Late Dorset period. The High Arctic was not occupied during the terminal part of the Early Dorset period and all of the Middle Dorset period (Jensen 2006:67). However, the region was recolonised around AD 800 after more than 1200 years of abandonment (Schledermann 1990:201). Some Late Dorset sites in the High Arctic in addition to northern Quebec and Labrador have produced some very late dates, hinting at a Late Dorset survival in those areas until the 14th century (Appelt and Gulløv 1999). Some instances of abandonment also took place at the start of the Late Dorset period. Newfoundland and southern Labrador were abandoned altogether after nearly a one thousand year period of occupation. Late Dorset populations also began to establish settlements further to the west, with some being located as far as Victoria Island (McGhee 1996:200). Despite this vast geographic range, there are a number of striking similarities between seemingly disparate Late Dorset groups.

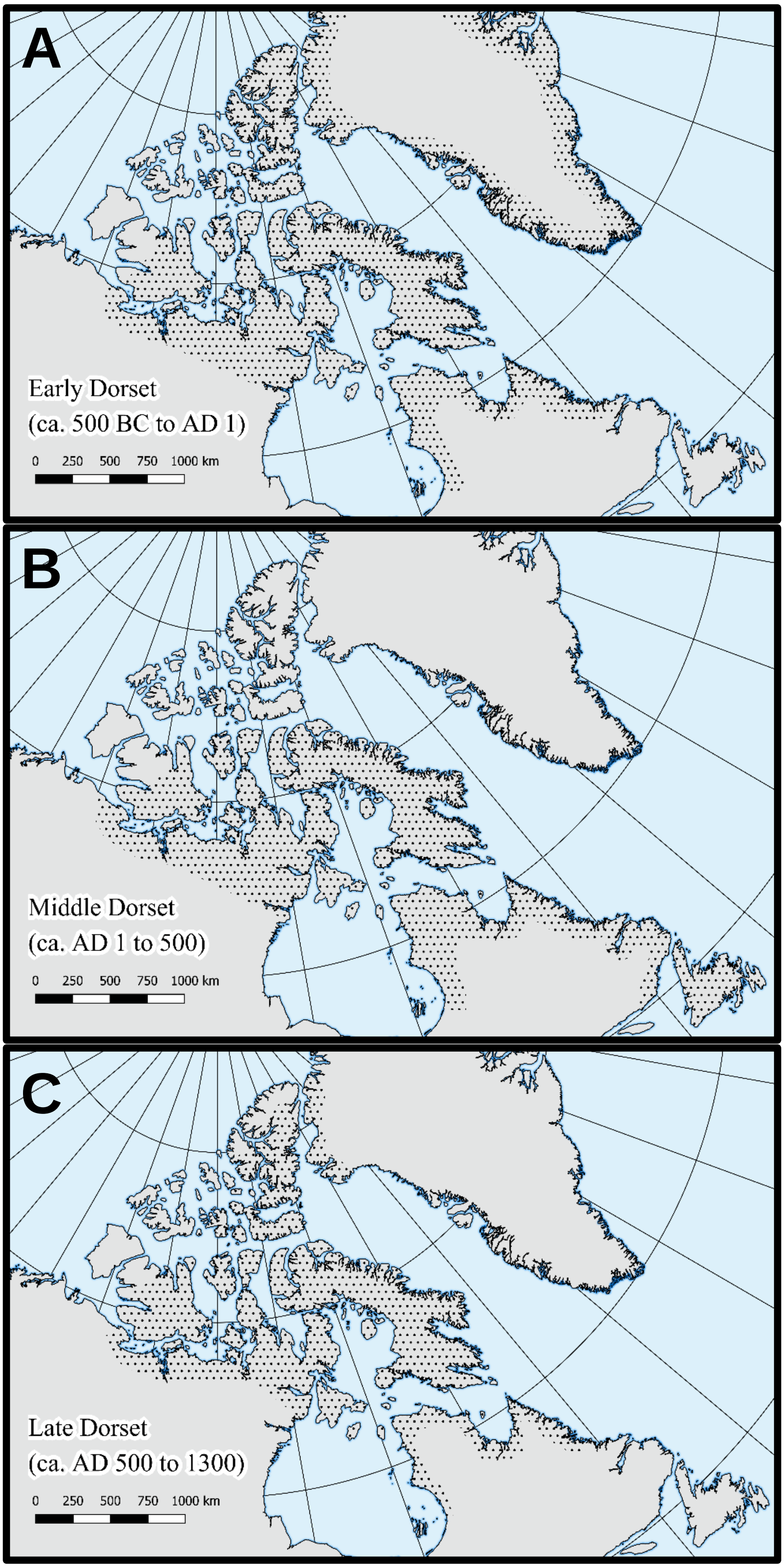

Figure 2.3: Approximate Early (A), Middle (B), and Late (C) Dorset settlement area.

2.4 Distinguishing Late Dorset: Longhouses and Metal

While the transition from Middle to Late Dorset remains poorly understood, there are a number of distinguishing features, both in terms of material culture and behaviour, which separates Late Dorset from Early/Middle Dorset groups (Appelt et al. 2016). The Late Dorset toolkit slightly deviates from the rest of the Palaeo-Inuit cultures. At the same time, it appears that there is striking homogeneity in the Late Dorset toolkit throughout the Arctic. McGhee (1996:201) attributes the similarity in artefact styles to an increase in communication and exchange networks during this final phase of the Late Palaeo-Inuit period. Much like earlier periods, the Late Dorset had a varied toolkit. Burin-like tools, triangular endpoints (with increasingly concave bases), scrapers (especially transverse scrapers), and bone needles were all tools that seem to be represented in earlier periods as well as the Late Dorset period (Maxwell 1985:220; Ryan 2009:120). However, following the trend in the Middle Dorset period, microblades become increasingly rare and irregular in Late Dorset period assemblages (Maxwell 1985:224; Owen 1988:99). Parallel to this development, metal becomes a potentially important raw material type during the Late Dorset period (LeMoine 2005:140; McGhee 1996:201; Rast 1995). Given the importance of this to this thesis, this will be given more detail in Chapter 2.6.

Lastly, the Late Dorset period saw a proliferation of finely detailed artistic objects, unrivalled in previous periods (McGhee 1996:202; Sutherland 2001:137). Some have argued that this flourish of artistic expression is the result of a supposed increase in social gatherings, ritual, or stress (Taçon 1983). Others have stated that the increase in finely detailed Late Dorset carvings was a result of increasing access to metal tools (LeMoine 2005:140; McGhee 1996:202). Unlike the apparent homogeneity in tool styles, the artistic products of the Late Dorset period were variable through space but were consistent in theme (Sutherland 1997). In particular, Hardenberg (2013) demonstrates that anthropomorphic carvings increase drastically in the Late Dorset period when compared to the relative proportion of human-likeness carvings in Early or Middle Dorset. Likewise, simply the overall raw count of carved objects increases in Late Dorset. In any case, the ability to produce, or at least have access to, these finely carved objects or exotic material such as metal was not variable either between or within sites as it was with early Inuit sites (e.g. McCullough 1989; Whitridge 2002). Friesen (2007) argues this may be the result of strict egalitarianism within Late Dorset society but it might equally be attributable to vast interaction networks that extend across the Arctic, although neither explanation is mutually exclusive.

New forms of architecture also arose during the Late Dorset period that were entirely unique when compared to any other period of human settlement in the Arctic. Concurrently, Late Dorset reoccupied High Arctic regions (e.g. Ellesmere Island and Greenland) that were abandoned for roughly 500 years. However, the Dorset presence in southern Labrador and Newfoundland contracted with the island of Newfoundland being abandoned entirely (Renouf 1999:405). The variety of dwelling types used by Late Dorset populations throughout these regions was incredibly diverse (see Darwent et al. 2018; Ryan 2003; 2009). Large, rectangular megalithic structures labelled “longhouses” or “Arctic Megalithic Structures” (see Appelt and Gulløv 1999:67) by most archaeologists were first built during the Late Dorset period, although there are hints that similar structures were built in Pre-Dorset periods (Rowley and Rowley 1997:247). Furthermore, Friesen (2016) reports a number of structures on Victoria Island that resemble Late Dorset longhouses but actually date to the Middle Dorset period. Unfortunately, none of these potential Middle Dorset communal structures have been fully excavated. Finally, Maxwell (1985:156) argues that the irregular architecture found at KdDq-9 (Nanook), typically dated to the Early/Middle Dorset period, is potentially an autumn/winter communal dwelling. Late Dorset longhouses are found as far west as Victoria Island (e.g. Friesen 2007), as far south as the Ungava Peninsula (e.g. Plumet 1985), and as far north as Ellesmere Island and northern Greenland (e.g. Schledermann 1990; Gulløv and Appelt 2001; Darwent et al. 2008). There have not been any longhouses found in the Foxe Basin, the supposed “core” of the Dorset culture, along the Labrador coast or the eastern coast of Ungava Bay.

In total there are more than 40 identified Late Dorset longhouses but only 15 have been wholly or partially excavated (Damkjar 2005:150). Ranging from 8 to 45 meters in length and 5 to 7 meters wide, these substantial structures could potentially house between four and twenty-five families (Damkjar 2005:148-149). While it is still being debated whether the longhouses were actually roofed or even inhabited, most argue that these structures played a significant role in Late Dorset rituals, social gathering, and economic activity (Damkjar 2005; Friesen 2007; Gulløv and Appelt 2001; McGhee 1996:207; Schledermann 1990:330). Interestingly, no longhouses have been identified on the Quebec-Labrador

Peninsula, along the Labrador coast, or in south-eastern Hudson Bay. It is tempting to view this fact in conjunction with Fitzhugh's (1997) model of population distribution networks (Figure 2.4). He classifies two basic types of population networks: nodal and linear (or peninsular). Fitzhugh (1997:395) discusses these networks in terms of population adaptation and survival with groups with more nodal neighbours than those in linear systems having buffered risks against, effectively, boom and bust cycles. The lack of longhouses in areas classified as linear networks (Labrador and south-eastern Hudson Bay) clearly support longhouses as important aggregation sites being placed in central (or at least semi-central) nodal places among the broadest scale Dorset interaction network. The lack of longhouses in the Foxe Basin may itself be a factor of survey bias but it being amongst the location with the greatest number of nodal neighbours might again also explain the lack of known aggregation sites. This has important implications for understanding Late Dorset exchange networks that will be more fully discussed in Chapters 9-11.

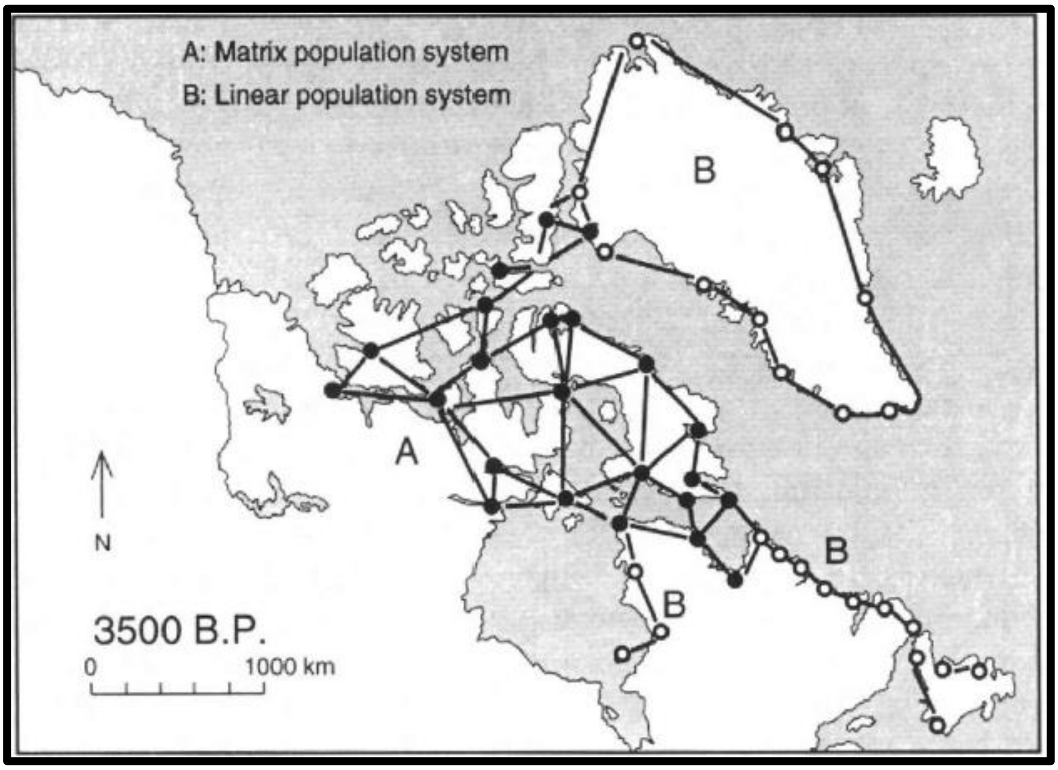

Figure 2.4: Late Dorset interaction network may have worked under similar circumstances (after Fitzhugh 1997:396).

Associated with many but not all longhouses are a series of linear hearth rows (e.g. Appelt and Gulløv 1999:31; Park 2003; Savelle et al. 2012:173; Schlederman 1990). The construction of these features is slightly variable with some being single hearth rows and others being paired and parallel hearth rows. In some cases, there are multiple “sets” at each site which has been interpreted as evidence for multiple occupations (e.g. Savelle et al. 2012:173). These hearth rows (or paired hearth rows) are frequently used as a key supporting piece of evidence to suggest the communality of longhouse sites (e.g. Friesen 2007; Plumet 1982; Savelle et al. 2012). Park (2003:246) demonstrates that the linear construction of both longhouses and hearth rows, despite being interpreted as important social and communal sites, would have actually made informal interaction between different families difficult beyond only interacting with those directly adjacent. This somewhat counterintuitive design however may have had a purpose beyond facilitating (or not) face-to-face interaction. Plumet (1989:321) considered the supposed importance of the longhouse and hearth rows in Late Dorset society and argued that they actually represent the spine or skeleton of a polar bear, an animal with noted importance in Late Dorset material culture (Betts et al. 2015). Taking this argument forward, Betts et al. (2015:106) extend this connection between the importance of polar bears and Plumet’s (1989) interpretation that they are represented by longhouses to describe longhouses themselves as a literal *axis mundi* of the Late Dorset world (as defined by Cummings 2013). There are other aspects of longhouse sites as well that are, like the linear hearth rows, seemingly counter their explicit purpose.

The thin and seemingly seasonal middens associated with many Late Dorset longhouses supports the interpretation that these sites were only occupied part of the year (Damkjar 2005:160). Furthermore, Damkjar (2005) notes that there is a slightly higher frequency of harpoon heads as well as quartz crystal when compared to other Late Dorset dwellings. While the quartz crystal was undoubtedly an important trade material, the faunal assemblage does not show a higher amount of sea mammal remains and is, in fact, slightly lower than other sites despite the higher number of harpoon heads (Damkjar 2005). Likewise, other than the quartz crystal, other exotic or potentially sought-after raw materials like soapstone, driftwood, or metal, are also not seen in drastically higher frequencies in longhouses. This could simply be an indication that interaction at these aggregation sites was different from what would be expected. Alternatively, the lack of certain materials, such as metal, might actually be an indication of differential taphonomic conditions that bias against the preservation of certain materials. Likewise, soapstone or even driftwood might be curated and repurposed more frequently than quartz crystal which would also support their frequency not being higher than normal. Therefore, the results presented regarding harpoon heads as proxy indicators of metal use in the subsequent chapters is a particularly important dataset for broadening our understanding of the types of interaction occurring at these longhouse sites. While more excavation is necessary to more completely understand the function of the longhouse in Late Dorset society, it is clear that they were important communal sites that likely brought together a number of different groups of Late Dorset people at certain times of the year. Given the widespread prevalence of known metal and finely-crafted "artistic" objects and the broad similarities seen in Late Dorset material culture, it is without any significant doubt that, unlike preceding Palaeo-Inuit periods, the Late Dorset had both intensive and extensive interaction networks that spanned across the Eastern Arctic.

Taking together the drastic increase in large gathering sites, the homogeneity in artefact style, and the distribution of new raw materials, such as metal, it seems increasingly likely that perhaps one of the best defining characteristics of the Late Dorset period is the interconnectedness of the various groups across the Arctic. Both Odess (1998) and Nagle (1984) present data that demonstrates Late Dorset were exchanging lithic raw materials potentially in quantities and frequencies greater than preceding Dorset cultures (cf. LeBlanc 2000; 2010). In particular, the presence of Newfoundland cherts in Labrador Late Dorset contexts (located only in the northern portion of Labrador) is potentially demonstrating that Late Dorset interacted with Point Revenge groups (i.e. ancestral Innu) in southern Labrador who, in turn, frequently employed Ramah Chert from northern Labrador in their tool making (Nagle 1984:274). Furthermore, Late Dorset sites in Nunavik (northern Quebec) have relatively high amounts of Ramah chert which suggests further contacts with more northern groups as well (Nagle 1984:274).

However, as demonstrated in the variability of their organic material culture, a supposed homogeneity of the Late Dorset period should not be uncritically accepted. In particular, LeMoine (2005) clearly demonstrates that Late Dorset technological choices and manufacturing techniques were dependent on the material available in any given region. Ultimately, the Late Dorset did not exist in a vacuum. The variables encountered by any Late Dorset group would have been different in terms of both cultural and environmental resources available. Throughout their existence in the Arctic, the Late Dorset also potentially met two other cultural groups not encountered by their Dorset ancestors: the

Inuit and the Norse. The implications of these potential cultural contacts will be discussed in the next section.

2.5 Late Dorset Interaction with Inuit and Norse

One of the most contentious issues in Arctic archaeology currently is the potential interactions of the Late Dorset with the early Inuit and Norse. In terms of Dorset-Inuit interaction, the debate has largely focused on dating evidence (e.g. Friesen 2004; Park 1993; 2000; 2016; Pinard and Gendron 2009), material from one group in a context associated with the other (e.g. Appelt and Gulløv 1999; McGhee 1984b), potential material culture or architectural forms "transmitted" from one to the other (Jordan 1979; Hickey 1986:93; Wenzel 1979:127), genetics (Raghavan et al. 2014), and Inuit oral histories (Rowley 1994). Complicating the issue, early Inuit frequently built on top of Late Dorset sites and, in many cases, incorporated Late Dorset material directly into the building fabric of their winter houses when they cut the sod (Maxwell 1984:241). This has resulted in Inuit objects being found in Late Dorset contexts as much stronger evidence of direct contact than the reverse (e.g. Appelt and Gulløv 1999:66). Recent, broad-scale DNA analysis has demonstrated that there was no genetic admixture between the Late Dorset, Inuit, and Norse individuals included in the study (Raghavan et al. 2014). This overturns previous genetic analysis that suggested a link between one Inuit group who died from diseases contracted from later European contact, known as the Sadlermiut, and Dorset DNA (Hayes et al. 2005). Importantly, both Ragahavan et al. (2014) and Hayes et al. (2005) generated mitochondrial DNA (mtDNA) which is only inherited through the maternal line. Interestingly, the Raghavan et al. (2014) study also showed no genetic admixture between Inuit and Norse populations despite there being relatively undebated contact (in terms of presence not intensity) (e.g. Golding et al. 2011; Gulløv 2008; McGhee 2009; Schledermann and McCullough 2003).

Originally, the first Inuit were thought to have migrated east from Alaska into the Canadian Arctic around the 11th century arriving in the easternmost regions of the Canadian Arctic and Greenland only a few centuries later, leaving potentially hundreds of years where they may have overlapped with Late Dorset presence. More recent analysis that excluded uncorrected dates taken from problematic materials (e.g. sea mammal remains or caribou antler) has demonstrated that the earliest Inuit likely arrived at some point in the late 12th or 13th century (e.g. Friesen 2004; Friesen and Arnold 2008:534;

McGhee 2009). This later arrival time and subsequent very rapid migration across the Canadian Arctic has drastically reduced the amount of potential interaction between the two groups. The most recent dates for Late Dorset presence in the Arctic against the oldest dates of supposedly contemporaneous Inuit populations are the key points of debate in determining the extent of Dorset-Inuit interaction.

Park (1993; 2000; 2014; 2016) and Pinard and Gendron (2009) present evidence that suggests the Late Dorset disappeared prior to Inuit arrival while Appelt and Gulløv (1999;2009), Friesen (2000;2004), Fitzhugh (1994), Labrèche (2015), and Savelle et al. (2012:178) have largely presented evidence that suggests at least Dorset-Inuit contemporaneity in the Arctic. Bolstered by recent genetic research, the Late Dorset isolationists have most simply argued that no contact whatsoever occurred simply because the two groups lived in the Arctic centuries apart.

Park (1993; 2016) asserts that the most recent dates that have been argued to be Late Dorset are actually a “phantom” early Inuit presence. The predominantly organic material culture of the early Inuit, Park (1993:213) argues, is less archaeologically visible and therefore there is a chance that the first Inuit to reoccupy a site after Late Dorset disappearance might be confused for a longer continuation of Late Dorset presence than what actually existed. Park (1993:209; 2000:196; 2016:812) contends that the radiocarbon dates for most well-dated Late Dorset sites, if they are assumed to be the result of Late Dorset activity, demonstrate a supposed pan-Arctic “hiatus” starting around the 9th century and then a sudden re-emergence of Late Dorset in the 11th century at the same time when other radiocarbon dates from those sites or regions are assumed to be early Inuit. This general concept follows similar logic that supporters of the Foxe Basin “Core Area” hypothesis touted back in the 1970s. In essence, the lack of radiocarbon dates assigned to certain time periods in any given region, according to Park’s hiatus theory, means that Late Dorset must have depopulated that region. Then, around the 11th century, Late Dorset people from a demographically stable region repopulated those regions. Therefore rather than assume a “refugium” Late Dorset population repopulating the Arctic in the 11th century, Park (1993:210; 2000:196; 2016) argues that these post-11th century dates are more parsimoniously related to early Inuit activity. The relatively slow soil development in many Arctic regions may mean that an early Inuit presence might itself not be separated stratigraphically Late Dorset occupation centuries earlier (Park 2016:814). Park (2016:811) cites sites in the High Arctic, Foxe Basin, and Baffin Island as demonstrating this phenomenon. Although, presumably, since most now agree that the earliest Inuit migration into the Arctic is at some point in the late 12th or 13th century (e.g. Friesen and Arnold 2008; McGhee 2009), these early 11th century dates relate to some other phenomenon or unknown contamination of the radiocarbon dates if they are not Late Dorset in origin.

Conversely, those that present evidence in support of contact all have slightly different visions for what Dorset-Inuit contact entails. For example, Staffe Island 1 has 15, likely not all contemporaneous, Inuit winter houses that have a number of underlying Late Dorset components with some of the most recent Dorset dates in one feature overlapping with the earliest Inuit dates in another (Fitzhugh 1994:253). However, beyond the potential temporal overlap, Fitzhugh (1994:259) presents an optimistic if conservative interpretation of Dorset-Inuit interaction in that it was likely fairly limited. Appelt and Gulløv (1999; 2009) and Gulløv and McGhee (2006:57) present not only radiocarbon dates that place Dorset and early Inuit presence in the 14th century but also Inuit material in sealed Late Dorset contexts and therefore argue for slightly more intense interaction than what is seen elsewhere. Friesen (2000) summarises the possible scenarios of Dorset-Inuit interaction but states that regional contemporaneity occurred but active avoidance of the incoming Inuit likely occurred on part of the Late Dorset. This would ultimately leave the archaeological footprint that exists: overlapping radiocarbon dates in some regions with little to no material or technological exchange. This model of contact is similar to the evidence for Pre-Dorset-Maritime Archaic interaction evidence briefly touched upon previously in that there is little material evidence for the contact despite wide-spread settlement evidence (Hood 2008). In saying that, the number of regions that show evidence for both Late Dorset and early Inuit settlement have not been studied (or published) in the same amount of detail as Hood (2008).

Plumet (1994:138) strongly disagrees with Park (1993) based on his work in Nunavik and argues that Dorset-Inuit interaction was almost certain based on the radiocarbon dates, but subsequent excavation there by Pinard and Gendron (2009) has shown that, at least in some cases, Park (1993) may be correct about incorrectly associated dates. Labrèche (2015:215) comprehensively reviews the data for Dorset-Inuit contact in northern Quebec and demonstrates that while in some regions there is clear stratigraphic superposition (i.e. demonstrating different times of occupation and no contact) other regions show evidence of early Inuit sites and nearby Dorset sites with similar dates, suggesting active avoidance. Labrèche (2015:220) ultimately demonstrates that Dorset-Inuit contact is a regional enterprise with perhaps stronger instances of contact in some regions (Nunavik, in his argument's case) than others.

Outside of the dating evidence, there are a handful of theories that attempt to show Dorset-Inuit contact through their material culture remains. Park (1993:213-219) summarises all the examples past researchers have used to support a model of Dorset-Inuit contact. However, most are site-specific observations and few, if any, are unproblematic. Most researchers have rejected the concept of widespread technological acculturation or exchange between the two groups (e.g. Savelle et al. 2009:225; Schledermann 1996:101). One of the most compelling strands involves Eastern Arctic early Inuit harpoon heads that have no obvious links to Alaskan or Bering Strait predecessors but resemble Dorset Parallel harpoon heads in the Eastern Arctic (e.g. Park 2016:816). Gulløv (1997:456) argues that a number of early Inuit harpoon heads find their origins in common Late Dorset harpoon heads. While there are remarkable similarities between Thule Type 5 harpoon heads and Late Dorset harpoon heads, the high frequency of early Inuit sites being located literally on top of Late Dorset sites indicates that early Inuit may have been inspired from scavenged harpoon heads from Late Dorset ruins rather than through face-to-face contact.

The other strand of evidence used to support Dorset-Inuit interaction is the presence of an older population in Inuit oral histories, known as the *Tuniit*. Rowley (1994:370) interviewed five Inuit elders from Baffin Island communities specifically about their knowledge of the *Tuniit.* All accounts describe the *Tuniit* as people who occupied the land before the Inuit arrived. However, details about *Tuniit* material culture, dwellings, and physical stature are variable depending on who is telling the oral history. For example, while Rowley (1994:370) describes a number of friendly or casual observations about the *Tuniit,* Wheeler (1953) in recording Labrador Inuit place-names around Nain, identified two examples named after the local *Tuniit.* Those place-names have associated histories and depict a relatively antagonistic (and very separate) relationship between the Inuit and *Tuniit* (Wheeler 1953:90, 99). The mobility of early Inuit might suggest that the oral histories that have been largely uncritically associated with Late Dorset may derive not from a meeting between peoples but rather early Inuit engagement with visible archaeological remains as a way of "place making" (see similar discussion in Fitzhugh

2017:154). As what can be seen, the two most compelling pieces of evidence for Dorset-Inuit contact other than overlapping radiocarbon dates (i.e. harpoon head styles and oral histories) are themselves not without critique. Clearly, given the state of the evidence and radiocarbon dates available, it seems best to understand any potential Dorset-Inuit contact as being regional and manifesting itself in the historical and archaeological record in potentially different ways. Therefore, taking lack of evidence in one region (e.g. non-overlapping radiocarbon dates in Nunguvik) should not be generalised for the rest of the Arctic. Likewise, taking oral histories from one region regarding *Tuniit*-Inuit contact should not be generalised to others.

The Norse are the other group that potentially had contact with Late Dorset. The Norse established their first colonies in southern Greenland in likely the late 10th century, more than a millennium after it was abandoned by Early Dorset (sometimes referred to as Greenlandic Dorset) peoples (Arneborg et al. 2012; Dugmore et al. 2005:22; Jensen 2016:739). Sutherland (2000; 2002; 2009) argues that the presence of certain objects found in what were thought to be Dorset sites demonstrate substantial contact between Dorset and the Norse. Twisted cordage, supposedly anomalous wooden objects, strange architecture, Dorset facial carvings that resemble European faces, and whetstones purportedly with traces of smelted metal are the key lines of evidence Sutherland (2000; 2002; 2009) has used to make this argument. Sutherland (2009) identifies such evidence from a number of sites from northern Labrador, southern and northern Baffin Island: JaDb-10 (Avayalik 1), KdDq-9 (Nanook), KeDe-14 (Willows Island 4), PgHb-1 (Nunguvik). While each site does not contain a full suite of the evidence, almost all sites had identifiable twisted cordage (mostly made from muskox), whetstones, or anomalous wooden objects. Fitzhugh et al. (2006) reanalyse twisted cordage and wood objects from JaDb-10 (Avayalik 1) in northern Labrador and find that they are all consistent with other examples of cordage found in Dorset sites as well as circumpolar woodworking techniques. Significantly, twisted cordage in Dorset sites is found from as far south as Cape Ray Light in Newfoundland (Linnamae 1975). Animal fibres from a the Norse site the Farm Beneath the Sand (GUS) were originally identified by Rogers (1998) as being bison, bear, and muskox were more recently identified with DNA analysis as being goat and horse, two common animals on Norse farmsteads (Sinding et al. 2015). Overturning the GUS material is significant as few Norse sites contain direct evidence for Norse contact with Arctic peoples but especially the Dorset (e.g. Gulløv 2008; McGhee 1984c).

Importantly, all the cordage is found in Middle Dorset sites (before AD 500) and would all predate Norse settlement in Greenland (Fitzhugh et al. 2006:157; Maxwell 1985:201; Odess 1998:425; Park 2008:195; Sutherland 2002:118). While Sutherland (2002:118) has noted the difficulties of radiocarbon dating certain materials, difficulties in dating Arctic materials has been known for some time (e.g. Arundale 1981; McGhee and Tuck 1976). This issue has long been identified with the Marine Reservoir Effect which, if uncorrected, produces dates potentially centuries older than they actually are (Ascough et al. 2005). Given that a large portion of organic material in Arctic sites is derived from sea mammal remains, this issue becomes harder to avoid. It becomes harder still when the effect of sea mammal oil or fat saturating the soil matrix of Arctic sites and contaminating even material not associated with the marine environment (Morrison 1989:61; Park 1994:31). Recent analysis by Hayeur Smith et al. (2018) has shown that when re-dating the twisted cordage from Dorset sites with a protocol specifically aimed at reducing the impact of sea mammal oil on radiocarbon dating, all dates from the cordage are securely placed in the Early/Middle Dorset period and centuries before the arrival of the Norse in Greenland. Moreover, Hayeur Smith et al. (2018:170) found that Dorset cordage examples are different in both spinning technique and function than examples found in Norse Greenland sites.

Hayeur Smith et al. (2018) also analysed textiles from early Inuit contexts from southern Baffin Island which had produced what was thought as an Inuit-carved depiction of a Norse person (Sabo and Sabo 1978). However, the re-dating found that those textiles were not produced during the 12th or 13th century but rather the 15th or 16th century (Hayeur Smith et al. 2018). This means that, if there are stratigraphic subtleties not expressed in the original excavation report (Sabo 1991), the carving previously thought to be a Norse person may actually be someone from the Frobisher voyages of the 16th century (Fitzhugh and Olin 1993). The important outcome of this finding for understanding potential evidence for Norse-Dorset contact is that caution should be levied when attempting to interpret carvings when additional supporting evidence does not exist.

Outside of this, there are a small number of smelted metal objects found in Late Dorset contexts (e.g. Appelt and Gulløv 1999; Harp 1974; Plumet 1989; Sutherland 2008:613). Recently, a small stone vessel that was originally excavated by Moreaux Maxwell in the 1960s from KdDq-9 (Nanook) on southern Baffin Island was re-examined by Sutherland et al. (2014:76) with a Scanning Electron Microscope who found that it likely contained copper-alloy particles and glass spherules that form at high enough temperatures to melt metal-bearing rock. Soil samples were also examined with the same methods and similar metal particles were found (Sutherland et al. 2014:77). This led to the interpretation that this object was a crucible likely used by Norse (or other Europeans) at the site. Unfortunately, there are two major aspects of the stone vessel that question its association with the Norse. First, the stratigraphic information of the vessel's context was not published (or not known) and the only information that was mentioned is that it is from an unconsolidated matrix associated with some abnormal architectural remains at the site (Sutherland et al. 2014:75-76). This effectively means it is impossible at present to assess if this find is actually associated with the Dorset (or contemporaneous) settlement at the site or if it relates to later, post-15th century European exploration activities. Second, all radiocarbon dates from the site pre-date Norse settlements in Greenland and the Late Dorset period (Maxwell 1985:201). Therefore, if the vessel can be associated with the other known archaeology at the site, it could not be associated with the Norse. Although it is almost impossible to prove the negative (i.e. that the vessel is *not* associated with Norse presence in southern Baffin Island), it seems unlikely that if it is associated with Norse presence and that it is intrusive at the site, it cannot be associated with their potential contacts with the Late Dorset as there is no evidence for this at KdDq-9. Disentangling these issues are key to moving forward a number of debates in Arctic archaeology such as the reasons for early Inuit migration (e.g. Gulløv and McGhee 2006; McGhee 1984c; 2009) and understanding why the Late Dorset disappeared.

2.6 Arctic Metal Use

While the Late Dorset were the first Eastern Arctic peoples to widely use and exchange metal, there is a small collection of metal objects found in pre-Late Dorset contexts. Native copper likely from diverse sources was exploited by a number of ancestral Subarctic Indigenous groups from primarily Alaska and the Yukon that pre-dated Late Dorset (e.g. Clark 1975a; Cooper 2011; 2012). In Arctic contexts, Harp (1958:223) reports one copper "perforator" among Palaeo-Inuit material excavated from Dismal 1 (MhPn-1) on the western edge of Dismal Lake near the Coppermine River. However, it is not clear if this copper object is the intrusive in the collection and the result of more recent Inuit activity in the area (Harp 1958:225). Two other fragments of copper were recovered from Dismal 2 but, again, cannot be convincingly associated with the Palaeo-Inuit component of the site

(Harp 1958:228). Clark (1975b) reports three Early Palaeo-Inuit sites around Horton Lake (near Great Bear Lake) contained four copper pieces total (1 from MiRi-1, 2 from MiRi-2, and 1 from MiRi-3). Taylor (1967:223) reports a single piece of copper found in Pre-Dorset contexts from NiNg-1 (Buchanan) on Victoria Island.

Curiously, there is a copper leaf-shaped amulet with two suspension holes found in a Middle/Newfoundland Dorset context from EeBi-1 (Phillip's Garden) in northern Newfoundland (Hardenberg 2013:218). While it is possible that this object came from Dorset trade networks from the Arctic or exchange with contemporaneous groups on mainland Subarctic North America, it may have been sourced from an unknown local source or may be intrusive and come from a much more recent period or, most likely, be the result of Dorset scavenging of Maritime Archaic sites that occasionally contain copper objects (e.g. Fitzhugh 1978:85).

Arnold (1980:416) suggests bone "engravers" from the Lagoon site on Banks Island potentially had metal tips (which did not survive) due to their similarity to later Ipiutak (ca. AD 200-900) examples from Point Hope in Alaska (Larsen and Rainey 1948:15-24). In Alaska itself, metal exchange, likely sourced across the Bering Strait in Asia, began at the start of the first millennium AD with Ipiutak and Old Bering Sea sites containing low levels of wrought iron (Larsen and Rainey 1948; Mason 1998). However, there are some indications that metal was exploited by Norton groups in the first millennium BC by the presence of thin blade slots in side-hafted composite knife handles which, in Ipiutak contexts, would have held an iron blade (e.g. Giddings 1964:145; Larsen and Rainey 1948:pl. 81.15; McCartney 1988:110). While the first millennium AD Alaskan metal exchange is, much like all metal in Arctic contexts, underrepresented due to taphonomic bias (McCartney 1988), the lack of evidence for movement of other materials and technologies from Asia to Bering Strait sites may indicate informal trade networks with many intermediaries (Mason 1998:299). Significantly, Mason (1998:299) emphasises that despite its rarity in first millennium AD sites in the Bering Strait, the social importance of the material may have outweighed its economic value. The extent of this early Bering Strait metal exchange making its way into the Eastern Arctic has not been adequately studied nor does the presently known data demonstrate it occurred in any sort of frequency. Given the long-term and cross-cultural nature of Alaskan metal exchange (e.g. Cooper et al. 2016) and the potential for reassessment of earlier excavations in detailing this phenomenon (e.g. Fitzhugh 2016:174), the value of metal is likely greater than the overall amount existing in the published archaeological record.

The lack of metal in Arctic contexts, regardless of their time period, was most explicitly discussed by McCartney (1988:92, 103). He identified five key reasons for the paucity of metal in Eastern Arctic early Inuit contexts. However, when adapted, many of these reasons are relevant to Late Dorset or other Arctic contexts. First, non-local metal sources would have required extensive trade networks or even direct procurement. Given the discrete source locations for metal (discussed next) this is plausible for Late Dorset contexts. Second, metal objects collected from native sources or through trade would have likely been small, limiting the chance of them being recovered during excavation. Third, metal is potentially limited and would have likely been reused and resharpened frequently and would thus increase the size of its use life. Fourth, terrestrial, low-nickel iron (as opposed to high nickel iron found in meteoric samples) more easily corrode and limit its archaeological visibility. Fifth, the curation of metal objects may mean that the already smaller metal fragments become even smaller when they are finally deposited in the archaeological record, thus decreasing again their chance of being recovered or surviving the various taphonomic processes that exist. Ultimately, these reasons can be condensed into three major categories: (1) Lack of survival in Arctic soils, (2) lack of recovery during excavation, and (3) curation and reuse by past peoples. Morrison (1987:5) argues that the durability of copper compared to iron means that physical preservation in the archaeological record is likely not a problem for non-iron types of metal. Therefore, the analysis of proxy indicators, such as those presented in this thesis, is an important step for overcoming all of these biases without the need for additional excavation with more excavation.

Late Dorset likely exploited three different sources for iron and copper but there are three additional sources that could have been exploited but have yet to have been identified in the existing Late Dorset metal assemblage (Figure 2.5). First, they would have acquired native copper from the Coppermine River area, Bathurst Inlet to the west, and Victoria Island (Franklin et al. 1981:4-5; Jenness 1923:540; Rapp et al. 1990). This was the same region where later Inuit would gather native copper and is almost certainly the source for the few copper objects from pre-Late Dorset contexts (e.g. Taylor 1967:223; McGhee 1996:202). Workable portions of native copper here come in the form of nuggets, sheets, slabs, and kidney-shaped aggregates and is frequently recovered as “float copper” (i.e. transported by glacial or fluvial processes from their original formation) (Franklin et al. 1981:5).

Second, meteoric iron could be gathered from the Cape York meteorite spread in High Arctic Greenland. Ten known specimens of significant size (totally just over 58 tonnes) of this meteorite have been recovered but small fragments are found throughout northwest Greenland, spreading over an area greater than one hundred kilometres (Appelt et al. 2014:61). The timing of its impact has not been sufficiently determined but geologists assessing abnormally high amounts of platinum in the Greenland Ice Sheet Project 2 core and a newly identified impact crater northeast of the Cape York meteorite spread suggest the impact that caused these meteoric iron deposits may have occurred towards the end of the Pleistocene (ca. 12,000 years ago), thousands of years before the first traces of humans in the Eastern Arctic (Boslough 2013; Kjær et al. 2018:9). This is significant since it is likely meteoric iron was present during pre-Late Dorset periods but was not exploited. Much like native copper, this same source was utilised by later Inuit groups but no evidence suggests it was used by Early Palaeo-Inuit or Early Dorset groups.

Third, smelted metals (e.g. wrought iron and copper alloys) may have also been acquired through interaction with the Norse, although, there is considerable debate regarding the magnitude of metal acquired through Dorset-Norse interaction (e.g. Park 2014; Sutherland and Thompson 2016; Sutherland et al. 2014). Much like both native copper and meteoric iron, later Inuit groups also acquired smelted metals through both direct and indirect interaction with the Norse (e.g. Buchwald 2001; Gulløv 2008; McGhee 1984c; Schledermann and McCullough 2003).

Finally, there are three sources that may have been exploited but have yet to be positively identified in the Late Dorset archaeological record. Smelted metals could have been acquired through trans-Bering Strait trade which recent evidence has been found that indicates this may have been an underappreciated source of metal for Alaskan Indigenous groups (e.g. Cooper and Bowen 2013; Cooper et al. 2016). Second, early Inuit acquired “telluric” iron from deposits in Disko Bay in western Greenland. Workable telluric iron comes in the form of small, pea-size grains found in basaltic rocks that, when released from the surrounding matrix, can be cold-hammered into shape (Buchwald 2005:36).

There is little evidence that shows that this source of metal was both exploited prior to Inuit arrival on the island, which is far to the south of Late Dorset presence in Greenland, and that this metal was even exchanged in any sort of quantity into the Canadian Arctic (Appelt et al. 2014:20; Buchwald 2001). Third, native copper deposits exist in various forms throughout Newfoundland, Labrador, and Quebec (Levine 1999:189). However, the reported instances of native copper remain far to the south of known the Late Dorset geographic range. Ultimately, the lack of comparative compositional analysis with archaeological specimens limits the discussion regarding their impact on Late Dorset metal use especially given the distances of these sources from known Late Dorset sites. As a result, this thesis will consider the first three sources discussed as probable while the remaining three as just possible.

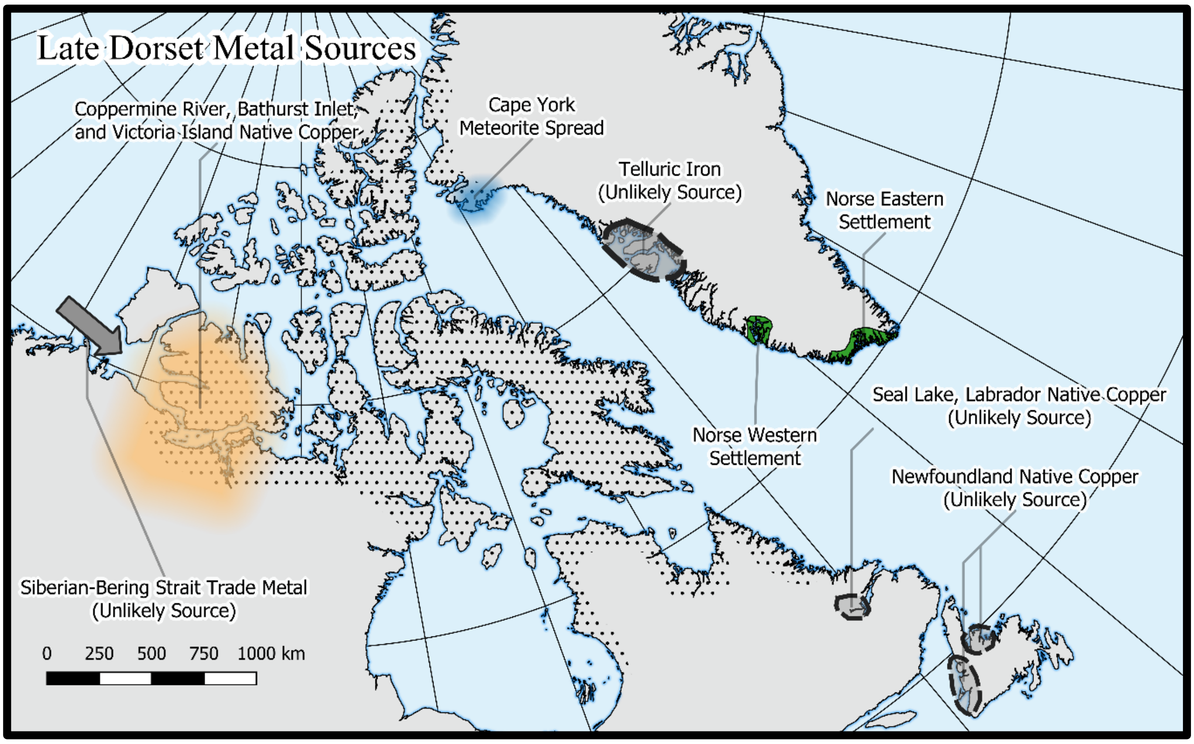

Figure 2.5: Likely and unlikely sources of Late Dorset metal. Late Dorset settlement noted in dotted area.

The ways Late Dorset utilised these metals remains poorly understood and current knowledge on the subject relies largely on qualitative assessment and infrequently are these observations ever published. On the other hand, Inuit metal use and the ways it changed through time and in context of European exploration of the Arctic is a relatively well-studied, at least compared to Late Dorset. This extends from the nature of Inuit metal trade (e.g. Stefansson 1914; McCartney 1988; 1991; McCartney and Mack 1973; Morrison 1987) and the potential source of the metal (e.g. Buchwald and Mosdal 1985; Buchwald 1992; 2001; Franklin et al. 1981; Wayman 1988), and the way metal was used (e.g. Franklin et al. 1981; McCartney 1988; McCartney and Mack 1973). Despite not examining directly Late Dorset material, Franklin et al. (1981:36) presents five different techniques for metal working from five different cultural groups (Chipewyan, Athapaskan, Copper Inuit, Mackenzie Delta Inuit, and early/prehistoric Inuit). While Dorset may have incorporated different techniques, these offer good potential analogues. Cutting, grooving, riveting, grinding, and perforating were all different techniques identified in early Inuit copper technology. Furthermore, Franklin et al. (1981) identify four "morpho-technological" categories from which all objects they observed could be classified: bars, sheets, tanged forms, and blanks. While these cannot be divided further, they may be combined in a finished tool (Franklin et al. 1981:37).

Known Late Dorset objects range from fully formed and likely functional tools to partially worked pieces of raw material. Rowley (1940) was one of the first researchers to associate metal use with the Late Dorset. His excavation at Abverdjar recovered "two small pieces of native copper, one a tiny point and the other a short length of wire used as binding…" (Rowley 1940:495) as well as a composite side-hafted handle with a small iron blade given to him (without provenance) by a local Inuit collector. The collection of sites on Little Cornwallis Island (e.g. QjJx-1, QjJx-10, QiLa-3) produced the largest collection of Late Dorset metal tools and contain both native copper and meteoric iron (LeMoine et al. 2003). Friesen (2004:689) has reported a number of copper objects from NiNg-8 (Freezer) and NiNg-2 (Bell) on Victoria Island. Additionally, a relatively large collection of metal objects has been recovered from Late Dorset sites from Ellesmere Island (e.g. SgFm-5, SiFi-4) by Schledermann (1990). While the collection has never been fully published, the iron tools from SiFi-4 (Franklin Pierce) exhibit a range of different tool types and manufacturing stages. These will form the basis of discussion in Chapter 7. Smaller concentrations of metal are found at a number of other Late Dorset sites in slight lower quantities. NiHf-4 in the Foxe Basin and a collection of sites in High Arctic Greenland both contain a number of metal objects (e.g. Holtved 1944). In particular, Qeqertaaraq in High Arctic Greenland contained a fragment of a copper-alloy pot that would have likely been the result of exchange with the Norse (Appelt and Gulløv 1999:66). Likewise, a piece of smelted copper metal is found at Longhouse B in the Diana Bay region of Ungava Bay

(Plumet 1985) and a smelted copper amulet in the shape of a Late Dorset harpoon endblade was recovered at Gulf Hazard 1 on the east coast of Hudson Bay (Harp 1974). Franklin et al. (1981:10) also report two stray finds of native copper objects without context that were given to them from Somerset Island and the Boothia Peninsula. One slightly anomalous find was a piece of wood with a rust residue around a perforation that contained both lead and iron found at PgHb-1 (Nunguvik) in northern Baffin Island, suggesting a nail was once in place (Mary-Rousselière 2002:105). Whether this was the result of Norse exchange to the Late Dorset at the site or actual Norse presence at the site is unclear. Buchwald (2001:57) argues that, despite primarily focusing on early Inuit metal use, the amounts of raw material found in many Late Dorset dwellings in Greenland is for both local use and future trade.

Secondary evidence of metal use has been demonstrated by LeMoine (2005) by observing use-wear and manufacturing traces left on organic tools and raw material. She argued that of the material that had visible manufacturing marks as many were shaped by metal as by stone (LeMoine 2005:140). Schledermann (1975:300) hypothesises that some Late Dorset harpoon heads, especially those with securing or rivet holes, likely held metal but this observation is not formally quantified or tested. McCartney (1988:96) reports that Meldgaard measured thirty-five composite side-hafted handles from the sites he excavated at sites near Igloolik and found that twenty-four (68.6%) either had blade slots less than 1.0mm or had “rust stains”, suggesting they contained iron blades. While this analysis has not been published or the specific sites listed, this represents the only published reference of such quantitative research undertaken on Late Dorset material. Conversely, such analyses on Inuit harpoon heads and blade slots has been shown to produce significant results (e.g. Gullason 1999; Whitridge 2002). Other than the analysis by LeMoine (2005) and Meldgaard metal use is a widely discussed if rarely investigated in detail (e.g. Friesen 2007; Gulløv and McGhee 2006:56; LeMoine and Darwent 1998:81; McGhee 1996:202; Schledermann 1975:300).

Interestingly, McCartney (1988:90; 1991:28) classifies Inuit metal use as a form of “epi-metallurgy” whereby they did not cast or alloy metals but they were regular consumers of it. Rather than have specific individuals who would craft these objects, individual Inuit may manipulate the metal they have to fit their desired purpose (McCartney 1991:29). Moreover, epi-metallurgy specifically refers to “… metal being manipulated through exchange systems of ranked or stratified societies, where metal is a status/prestige/wealth material." (McCartney 1991:30). While undoubtedly this may fit an early Inuit context, social stratification is something that is not expressly seen in the Late Dorset archaeological record, although that does not mean it did not exist (e.g. Friesen 2007). Instead this social dynamic of epi-metallurgy within a Late Dorset sphere may relate to the value of the material and of the social associations it may have. Therefore, an epi-metallurgical culture is not simply one that manipulates metal but rather one which has an interaction network through which the material flows. The skill expressed by Franklin et al. (1981) through both production and annealing of metal objects across Arctic sites demonstrate the complex knowledge of the material that Arctic peoples had. While this concept of epi-metallurgy has not been tested in a Late Dorset context, broadening the extent and intensity of their metal use, through the use of blade slot measurements or microscopy (as discussed in this thesis), is key for fully assessing epi-metallurgy in this earlier context.

The extent and intensity of Late Dorset metal use is a key component part of understanding not only the way different Late Dorset groups interacted with each other but also how they potentially interacted with both Norse and Inuit incomers in the last centuries of their existence. While the evidence for Late Dorset contact with both Inuit and Norse people remains contentious and far from settled, metal remains a keystone in both contexts. The strongest evidence presented for Norse contact is, by far, the evidence of whetstones or lithic objects in Dorset contexts having traces of smelted metal (Sutherland 2009; Sutherland and Thompson 2016; Sutherland et al. 2014). Likewise, McGhee (1984:5; 2009) and Gulløv and McGhee (2006) have argued that one of the main attractions of early Inuit migration east from Alaska into the Canadian Arctic in the 12th-13th century AD would have been the opportunity to exploit new copper and iron sources (cf. Friesen and Arnold 2008). However, this premise almost requires some form of Inuit contact with the Late Dorset or at least some amount of information being exchanged between the two groups. Given the recent Late Dorset dates from Victoria Island (Friesen 2004), the Central High Arctic (LeMoine et al. 2003:278), the High Arctic (Appelt and Gulløv 1999:71; Gulløv and McGhee 2006:57; Schledermann 1990:267), and Labrador (Fitzhugh 1994:253; Jordan 1980:616; Thomson 1988:71), it is entirely possible that, barring being incorrectly associated with early Inuit presence, Late Dorset would have been present around the same time early Inuit would have migrated into the same region. Understanding Late Dorset metal use would therefore be integral to understanding how these interactions may have been mediated. Even if interaction with Norse and Inuit never happened, the presently known distribution of Late Dorset metal suggests wide-reaching exchange networks. But the intensity of this interaction is only speculated. Given that Arctic metal, unlike other trade materials, such as soapstone, antler, amber, or toolstone, has relatively few and geographically constrained source regions it becomes a productive means for better understanding how and even why Late Dorset interacted with each other.

Chapter 3

Theoretical Framework: Object Itineraries, Memory, and the Materiality of Social Relations

3.1 Introduction and Overview

Wheeler (1954:v) states that archaeologists dig up people not things. While this statement is ultimately something that this thesis will follow, it will be argued that people are not people without their things; to forget one is to forget the other. Thought provokingly, Schiffer (1999:2-3) offers a scenario where a group of chimpanzees observe human behaviour and conclude that there is not a moment throughout life when the human experience is not enmeshed with our things. Moreover, Schiffer's simian researchers conclude, there is an expanding entanglement of relationships between humans and things, as well as things and things. This concept of human-thing co-dependence or entanglement was later expanded on by Hodder (2012) and will ultimately be a guiding principle for this thesis.

This chapter outlines the theoretical framework used throughout this thesis. Materiality, object biography and itinerary, and how they can enchain social relations are the core pillars of this theoretical framework. Throughout the following chapter each one of those concepts will be unpacked and critically discussed. Interaction, exchange, personhood, memory, and even forgetting are are common threads seen in different theoretical concepts employed. Metal, as a raw material, is the broadest analytical category discussed in this research but it is not discussed in a vacuum. Ethnographic data as well as the ways other raw materials affect the lifeworld of other Arctic peoples will be incorporated into the theoretical framework. Seemingly paradoxically, the body of data gathered and presented in the following chapter does not actually deal with the metal objects themselves but rather the potential traces of those objects. Interestingly, the term "trace" is used in both the way described by Ingold (2007a:43) as an enduring mark left behind (e.g. the physical blade slot carved into the harpoon head) but also, critically, the trace of the biography of an object can reveal about past human social networks (Joyce 2015:186). Therefore, potential proxy indicators act not only as a physical trace perhaps indicating where metal once was but also as a cultural indicator of interaction and exchange. Understanding the traces of metal use becomes a powerful tool for understanding the way people order their social networks in addition to illuminating the networks themselves.

Ultimately, by incorporating the empirically-grounded methods of this study through a theoretical lens of object materiality, object itinerary, and enchainment this thesis will demonstrate how metal-use, whether explicit or not, linked Late Dorset people through space and time and what that can tell us about past human social networks in the eastern Arctic. The goals of this thesis are not only to demonstrate what metal might reveal about the exchange networks of the Late Dorset in the Canadian Arctic but also the way in which a novel, or at least relatively novel, material may actively shape, amplify, or supress those exchange networks. And, ultimately, what studying this material can help us understand about the social relations that underpin those networks. By taking this symmetrical approach to both materiality, object itinerary, and prehistoric interaction, this thesis will demonstrate an enriched way of interpreting artefacts as not merely signs of ethnicity, gender, or power but as continually evolving information-dense tapestries of human activity. As such, disentangling the scope of metal-use is not simply an end in and of itself but rather a gateway to understanding broader cultural processes of Arctic lifeways perhaps not revealed solely by other analytical categories of archaeological investigation.

Using theories surrounding the umbrella, and often contradictory, term of “materiality” (Section 3.2) this study will show the importance of metal not simply as a material with physical properties but how those physical properties were perhaps specifically selected and mobilised by the Late Dorset. Secondly, object itinerary (as used by Joyce and Gillespie 2015) will enhance our understanding of metal objects (or at least the organic objects that once held a metal component) as dynamic and ever changing traces of human activity. By conceptualising metal-use and exchange in this way, it is hoped to elevate the conclusions of this thesis from the common source-deposition dichotomy frequently resulting from raw material-focused works to one that looks at object movement and itinerary as a multi-phase process (Pollard et al. 2014). Lastly, Chapman’s (2000) use of “enchainment” will be employed as a way of connecting the meaningfulness of object materiality, the complex life history of those objects, and how those two concepts are mobilised by the Late Dorset. As such, this thesis seeks to emphasise the importance of using complex object itineraries and “enchainment” as mechanisms that were mobilised by the Late Dorset not only to connect themselves through space but also time. In this regard, this thesis will contribute to recasting object biography and enchainment as processes that operate in both spatial and temporal networks concurrently.

3.2 Materiality: an Ontology of Matter

Broadly speaking the theoretical framework surrounding “materiality” has been one that has seen resurgence in the past few decades of archaeological thought but it has also been one of immense debate. This debate frequently involves both what archaeologists actually mean by “materiality” (as seen in the contrasting opinions of Ingold 2007, Knappett 2007, and Tilley 2007) and what exactly the symmetrical (or asymmetrical) relationship humans have with their things (Shanks 2007; see the debate by Hodder 2014, Ingold 2014, and Witmore 2014). In particular the latter concerns an emerging transdisciplinary perspective called “New Materialism” (e.g. Lettow 2017). While the debate surrounding exactly how New Materialism intersects with archaeology is ongoing (see Ingold 2014 for a critique), it is a thought-provoking view on the many relationships constructed by humans and “things”. In brief, the emergence of New Materialism has put a focus on symmetrical archaeology and the way in which humans and their things interact with each other.

At this juncture, it is important to define what is meant by “things” and indeed what is meant by “materiality” in context of this thesis. Witmore (2014:4) argues that when using the term “things” it is not relegated to only made things but can also constitute unmade things. In common archaeological terms, this would constitute portable and non-portable artefacts and ecofacts. In direct relevance to this thesis, when encountering the term “things”, it will specifically refer to non-human and non-living actors. This might include portable artefacts and ecofacts but also architecture. While defining the term as such cannot be without debate, understanding things as non-human, non-living actors grounds the discourse in the available published literature and does not confuse the term for animals (or other living organisms) or humans, a notion that can be a critique of some of researching taking a symmetrical approach. Moreover, by applying equal importance between the humans and their things, material culture can be seen not simply as a passive receivers of human agency but rather active mediators that transform it (Latour 2005: 39).

The role of non-human actors in shaping human lifeways is an aspect that is becoming more common in archaeological discourse (Finlay 2014; Olsen 2010) and one which will be a revised theme in this chapter. Importantly, Meskell (2005:6) argues that non-human actors can also undermine and challenge social relations. In this sense, objects are shaped by humans but they themselves partially shape human history. This refers to the symmetrical part of symmetrical archaeology. A similar approach is seen in what has been called Amerindian Perspectivism (Viveiros de Castro 1998). This is a relational worldview whereby humans, their things, and the nonhuman animals around them are all considered persons. This has recently been used in anthropological and archaeological research in the Arctic for understanding human and nonhuman interaction and will be more deeply discussed in Chapter 10 (Betts et al. 2015; Lund 2015:32 Willerslev 2007:88). Materiality, despite its many uses in existing literature across a number of disciplines, will be understood as a combination of the raw material source and the human relationship and perception of that material (Hurcombe 2007:109). Materiality is therefore the ontology of matter.

The concept of humans and objects having equal agency is perhaps not as new of a concept as it would seem given the recent resurgence in employing symmetrical or materiality perspectives. In fact, Pitt-Rivers (1875:35) questioned if the "… principle causation lay in the flint or flint-worker". Clarke (1978:150) argues that artefacts have behavioural characteristics above and beyond any human agency imposed on them. Placing this amount of agency on things and concluding that it is not solely human intervention that creates and moulds things is a concept that was originally developed by Gibson (1986) and then further explored by Hodder (2012). These object "affordances" are effectively the potential for a set of actions (Hodder 2012:49). For example, a chair may afford a person to sit or stand upon it. Additionally, these potentionalties of an object for a set of actions can ultimately constrict or at the very least influence the object's biography or itinerary (Joy 2009:545). Understanding the totality of affordances offered from a thing is not possible by a single person or perceiver as the very nature of understanding certain affordances sends others into the background (Edgeworth 2016:96). Taken in another way, Gosden and Malafouris (2015) place emphasis on the process of materiality or the many events that are related not only to an object being created but also its biography or itinerary. Understanding object affordances not only through the process of making and the constraints (or potentionalities) of raw material places on the making process (Malafouris 2008), the constraints on potential biographies by the object itself (Joy 2009; Knappett 2005:142), but also the constraints placed upon an object based on specific events in its biography (e.g. the way one event of creating a pot leads to another in Gosden and Malafouris (2015:705)) ultimately creates a series of entanglements whereby a number of human and non-human actors and their actions each compile onto an object which ultimately results in the location where it is recovered by an archaeologist. Unpacking and understanding this complex series of events and dependencies is a powerful tool for augmenting an object-focused dataset (such as the one presented in this thesis) above simply an end in of itself. Much like the objects themselves, materiality and, as discussed later below, object itinerary/biography is entangled with each other, making them ideal companions for understanding the ways in which potentionalities of metal in enchaining social relations just as it affords certain functional aspects.

Understanding materiality as combination of physical and metaphysical realities of human-nonhuman interaction has some important implications. Bourdieu (1977) argues that repetition or repeated contact with an object can guide behaviour and thought. While Late Dorset art has been used as a tool for understanding Late Dorset society and social relations (e.g. Betts et al. 2015; Fitzhugh and Engelstad 2017; MacRae 2013; Rast and Wolff 2016; Taçon 1983), this thesis will argue that everyday objects can be equally telling in this regard. Hubert (2016) has put this concept into practice in a very different cultural setting by studying the way widespread use of common figurines, mostly found in private household contexts, perhaps reflected and guided Moche people, a people living in northern Peru around AD 200-800, in their beliefs of identity and gender. In particular it is crucial that the vast majority of these figures have been recovered in domestic contexts; that is to say common but private spaces (Hubert 2016:8). In this case, the figurines were not public displays of status, power, or identity but rather were reserved for the private sphere of the household. In the case of the Moche, Hubert (2016:5) argues that previous work for understanding the unifying beliefs of the culture has been biased towards elite material culture. From this, a male-centric “warrior narrative” was constructed as a unifying concept of the Moche people (Donnan 2010). However, when taking a perspective of the more common, everyday Moche clay figurines, it can be seen that women and especially their role in ritual cannot be understated. Hubert (2016) demonstrates that there are multiple narratives being constructed for the Moche: one created through elite material culture and the other through the ubiquitous use of everyday objects such as clay figurines.

While certainly metal objects that were mostly used for utilitarian purposes do not explicitly carry the same type of direct artistic expression as a clay figurine, there are some important similarities between the materiality of the Moche figurines and Late Dorset metal use. Primarily, both objects are not overt displays but rather potentially more pedestrian in character. Second, it is assumed that both are widespread among their respective cultures. Third, while Late Dorset metal objects do not contain any sort of iconography and are rarely used in non-utilitarian roles (e.g. Harp 1974), the explicit choice to selectively choose metal over other, more locally available raw materials has important implications towards not only the potential material benefits of copper or iron over stone but, more importantly, implications for the materiality of metal among the Late Dorset and perhaps the powerful (and connective) message attached to possessing and using the material. Despite the vast cultural and geographic differences between these two examples, the repeated and perhaps widespread interaction with metal may have acted in a similar manner of guiding Late Dorset society as the Moche figurines did for the Moche people when understanding things, in this case metal blades or figurines, through the lens of materiality. The purpose of this brief case study is to illustrate how common, everyday objects can potentially mould and reflect cultural concepts among different groups of a similar culture (at least “culture” as defined by archaeologists) and how repeated human and non-human interaction can be mutually influencing.

3.3 Object Itinerary

Throughout the previous section, the concept of an object biography or itinerary was briefly discussed. Forming an important theoretical link to the previously discussed concepts of materiality and affordance, object biography and itinerary will be used throughout this thesis for understanding the life history of not only metal objects and the organic objects that once held metal but also of the Late Dorset themselves. Object itineraries was formulated by Hahn and Weiss (2013:7) as a concept similar but not the same as object biographies. Throughout this thesis, the term “itinerary” will be used primarily instead of the more common term “biography” for a number of reasons. Schiffer (1972:157) was one of the first archaeologists to theorise on the life cycle of an object. He argued that much like humans, things have life histories, going from birth to death (or creation to deposition). Since that initial formulation on the concept, object biography has become a commonly used theoretical construct for understanding the many and evolving histories of objects (e.g. Appadurai 1986; Cooper 2011; Gosden and Marshall 1999:169; Holtorf 1998, 2002; Joy 2009; Joyce and Gillespie 2015; Knappett 2011; Kopytoff 1986). Joy (2009) demonstrates that by focusing on the complex histories of a single object and the various entanglements associated with the creation and use of the object, a greater understanding about the social histories of the people who used that object can be understood. There is an inherent implication in using the term "object biography" in that it is possible to single out specific events or keystone moments, such as birth or death, of an artefact (Joyce and Gillespie 2015:11). This metaphor of objects with a biographical history is challenged by its own practitioners when it is stated that objects can "die" or be forgotten and be reborn or remembered a number of times throughout their history (e.g. Joy 2009: 543; Knappett 2011:202). Holtorf (2002:63) argues that these "afterlives" of objects are just as crucial in understanding their past biography as that biography itself. Most crucially of all, however, understanding the historical entanglements of an object by using a purely biographical metaphor anchors it to a single person or place (Hahn and Weiss 2013:9). While undoubtedly, this perspective can be valuable, understanding the history of an object from the perspective of not only the events that went into its creation, use, and final deposition, this thesis will aim to explore how objects can have historical itineraries that connect different peoples, places, and times.

Therefore, the concept of an object itinerary will be favoured. Joyce and Gillespie (2015:13) state that object itineraries have a certain amount of dynamism that is lost in the biography metaphor. Things can have multiple itineraries that can connect objects and people through time and space (Joyce and Gillespie 2015:12; Knappett 2011:192). Things, in this sense, are "historicized traces of practice" (Joyce 2012:121). Ultimately, understanding the object's history as an itinerary highlights the "… motion and interaction, the fragmentation and accumulation, of objects moving through time and space" (Blair 2015:81). Additionally, while objects flow through human social networks, objects themselves afford certain amounts of mobility and transferability (Van Oyen 2017:60). In the context of Late Dorset interaction networks, metal objects are easily transported, making them easily exchanged in seasonal/mobile networks. Moreover, their geographically discrete sources make metal objects potentially highly valuable. An object's material characteristics (and its relational value), rarity or accessibility, sensory appeal, specific biography (or itinerary), and fungibility are all principles that have been argued to raise the “desirability” of an object (Harris 2017:683). Having specific material properties, complex object itineraries, high transportability, and having discrete sources are all different criteria, within the framework described by Harris (2017), which would potentially heighten the “value” and desirability of metal objects in Late Dorset contexts. Therefore, it is not simply Late Dorset agency alone that is creating meaning but rather the specific affordances of metal objects which co-creates meaning. Significantly, engaging with the meaningfulness of exchanged objects and understanding the life history of an object from the perspective of a dynamic itinerary and the specific affordances of the objects will more accurately capture the ways objects themselves can connect people, place, and time.

A core concept, discussed in more detail below, with object itineraries are the memories associated with them. While the itinerary of an object is effectively inalienable, the way that itinerary is mobilised (or not) by an individual profoundly affects the outcome, especially if considering exchange of a material or object. Knappett (2011:192) argues that inherent in object itinerary and in human exchange networks is an important aspect of inter-generationality. The complexity of the dialectic between the individual and the community and their associated memories is what shapes how social relations may be enchained to each other. Figure 3.1 demonstrates how individual, household and community memory all contribute and exchange with each other. The fluid navigation around creating, remembering, maintaining and even forgetting object itineraries is ultimately, through the concept of partible personhood (e.g. Fowler 2004:25 Strathern 1988; Wagner 1991:165), observable in the archaeological record. This concept (discussed in the next section) is key into understanding how social networks can enchain themselves together through both known and unknown ways to different groups or even individuals.

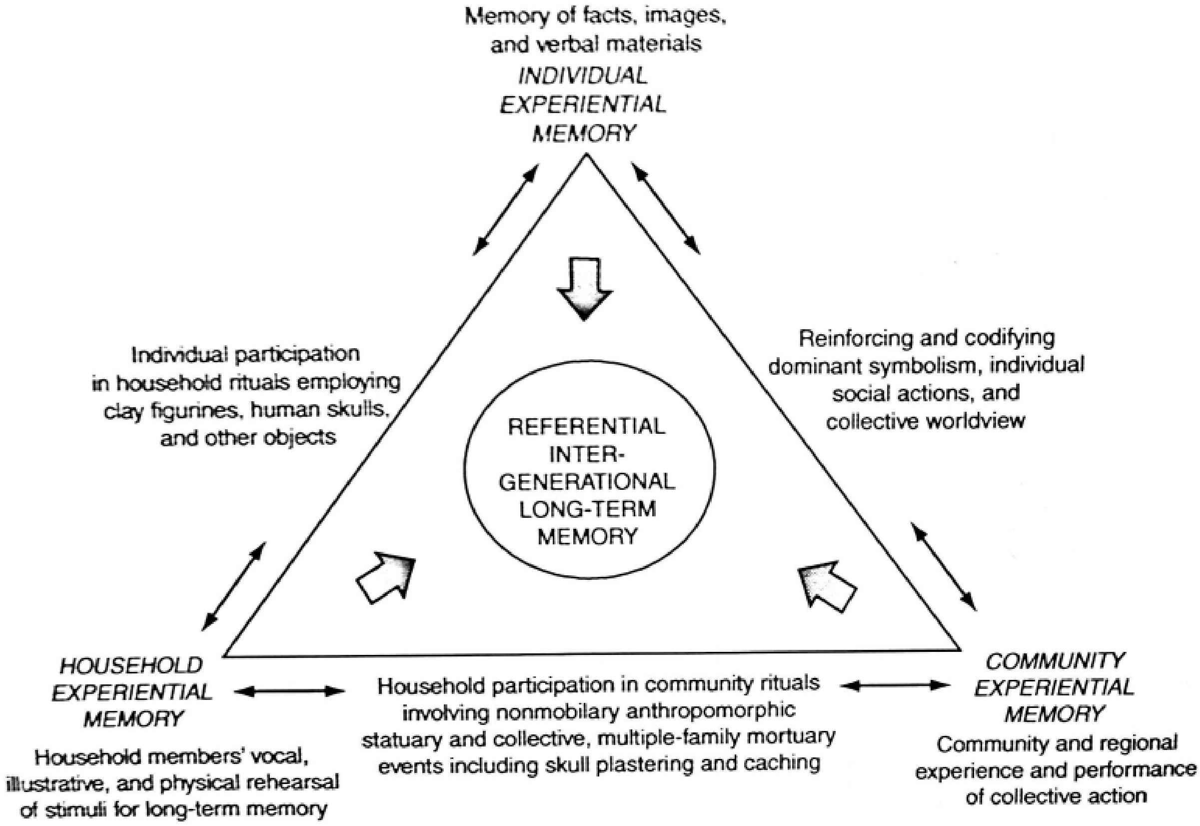

Figure 3.1: The scales and dialectic of memory (after Knappett 2011:196, Figure 9.3)

3.4 Enchaining of Social Relations

The active role material culture and their itineraries and how this intersects with the social network of Arctic peoples one thousand years ago is productively illustrated through the concept of "enchainment". In its most basic form enchainment is the linking of people, place, and time through the exchange of materials. In effect, it is a social process which is the result of interaction and exchange and through which a relational personhood is created. The history of enchainment as a theoretical framework in archaeology and its anthropological roots are discussed below. The foundational assumption of enchainment, however, can be understood as the owner of an object being inalienably linked (or enchained) to the object itself. When that object is exchanged to another person, that new owner then becomes a part of this ongoing compounding itinerary (or itineraries) of the enchained object (or, another link in the chain). Ultimately, it will be argued that within the context of the Late Dorset of the eastern Arctic, objects can enchain diverse groups and, in turn, can cement links (whether explicitly actioned or not) between peoples separated by vast distances and even time. While undoubtedly there are subtleties in the Arctic archaeological record that distance it from the case studies that brought about the concept of enchainment, as will be discussed below, the utility of enchainment is a core theoretical tool that can help augment the data presented in this thesis beyond its explicit conclusions. Viewing the Late Dorset world as a series of enchained social relations and how this is expressed through the acquisition, use, and exchange of metal can help disentangle the ways in which past Arctic peoples interacted beyond only economic reasons. Importantly, it will be argued that metal as a raw material in the North American Arctic one thousand years ago specifically affords its users one way to enchain their social relations. Whether metal was the only medium for enchainment or whether groups chose to interact with metal in this way is a point of discussion in subsequent chapters.

In its most basic form, enchainment is an explicit relationship between humans, things, and other humans. The concept was first conceptualised by Strathern (1988) in her anthropological study of Mount Hagen people of New Guinea. In brief, she argued that persons are inalienably associated with their things and the relationships they have with others. Ultimately, through an extended network of interaction, an individual becomes dividual (Strathern 1988:15). In other terms, individual personhood is created through their relationship with people, place, and things. While her work focused on a gift-economy, Wagner (1991:165) elaborates this concept to persons fragmenting themselves and their histories and imbuing such a connection onto an exchanged object. Wagner (1991) argues that this effectively creates a fractal person, effectively meaning humans embody their things with parts of themselves and through the exchange of these objects they also create themselves (Wagner 1975). Personhood and the way it is conceptualised can therefore be seen as partible, exchangeable, and, ultimately, relational. Objects, their makers, and the manufacturing process to create those objects can be linked through this process, each influencing the other and each taking on characteristics of the other (Chapman 2000:30). Weiner (1985; 1992) used the term “keeping-while-giving” to describe the action of an embodied object being exchanged representing far more than the material value of the object itself but rather as an object that is “… pregnant with the whole history of these persons and their relationship” (Bourdieu and Wacquant 1992:124 cited in Chapman 2000:31).

This separates inalienable objects (or objects whose relationship with their owner as inseparable regardless if that object is exchanged) with alienable objects, such as commodities, who do not actively create enchained relations. Importantly, as will be shown with enchainment examples, primarily in North and Central America but also elsewhere, objects we could potentially classify as "commodities" such as ceramic vessels or raw materials, may also enchain social relations as powerfully as any other object. However, the enchained objects are not static in the relations they contain. In particular, especially with potentially less symbolically-imbued objects, such as commodities, Humphrey (1992) states that barter or exchange within a long-term system may result in an object being alienated from their past owners. However, this may not necessarily result in those commodities being disassociated from a specific region or group from which they originated. Once they enter a new system the itinerary of those objects may then be incorporated into a whole new set of inalienable associations (Chapman 2000:32). In either case of the original inalienable attributes of an object (be it a commodity or not) can enchain peoples across space and time. Importantly, this process of continual recreation can create a series of local and exotic enchained relations. The act of remembering or forgetting those histories amplifies how personhood is relational. The detail in which these inalienable qualities are remembered or forgotten between groups, cultures, or generations is a key factor in how enchainment is understood at the individual level and what makes enchainment a fluid practice (e.g. Hoffman 1991 and Helms 1988). Weiner (1992:152) states that the process of keeping-while-giving places political potential among each exchange. Significantly, the ways in which diverse groups navigated this arena of keeping-while-giving and how this manifests in the archaeological record must be carefully unpicked before this theoretical construct is applied to a novel context.

As discussed above, the debates surrounding symmetrical archaeology and the ways in which humans are as much affected by the things they make as the things themselves forms the foundation for enchainment. What will be seen below, the strength and ultimately the validity of enchainment as a theoretical framework for unpacking prehistoric social networks is attested in the range of cases it has been applied throughout anthropology and archaeology across the world. While undoubtedly modifications have to be made for each context, the overall theme of enchaining social relations through the exchange of materials is a powerful theoretical tool for framing Late Dorset society. Understanding the archaeological contexts for enchainment is an important package to carefully unpack in order to demonstrate how a broad theoretical framework can be mobilised in a number of very specific (and diverse) contexts, although not without modifications.

Placing enchainment and the manifold potentials of the concept into an archaeological framework was first introduced by Chapman (2000). His work focused on the Mesolithic-Neolithic Copper Age (MNCA) in the Balkans. In particular, Chapman (2000:37) paired the concepts of enchained social relations with fragmentation of objects. Five possible explanations were given for the fragmentation of objects: accidental breakage, discarding broken objects, ritually "killing" an object, dispersing objects to promote fertility, and deliberate breakage to specifically use in enchaining social relations (Chapman 2000:23-27). These deliberately fragmented objects constituted a range of artefact types such as clay figurines, ceramic vessels, tools, or even human bodies. These fragmented objects are then found in a variety of domestic and mortuary contexts. He argues that deliberately fragmented objects carry the same enchained qualities as the whole object. By fitting some of these deliberately fragmented objects across different contexts and sites, Chapman (2000) ultimately demonstrates one method the Mesolithic and Neolithic people of central and eastern Europe created and maintained specific social relations to each other. The deliberate fragmentation of an object and its distribution across space not only enchains people with other people (and place) but by depositing these objects in deliberately burnt houses, pits, or even as grave goods connects the people across time. The purpose of enchaining people, place, thing, and time can be understood as a way for creating lasting bonds, although the reasons for enchainment are diverse. Chapman and Gaydarska (2007:7) extend the theory of enchainment as a process that mobilises a trifecta of reflexive concepts that are used to construct a person's identity (Figure 3.2). They termed this an "identity triangle". The identity triangle can be something therefore that is moulded and changed by the individual's fractal identity, a direct outcome from the manner in which people understand their things and how they enchain their social relations with others. Importantly, however, the process of enchaining social relations through the exchange of fragmented objects is not consistent through time and space and the practice can have a large amount of variety and local differentiation (Chapman 2000:228-229).

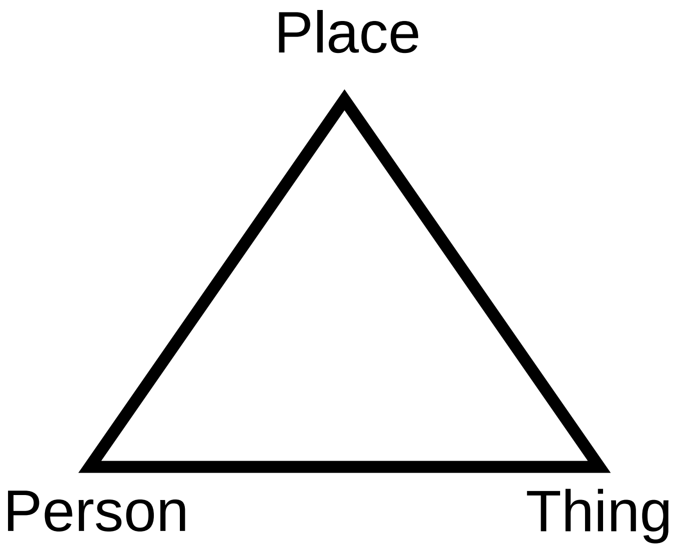

Figure 3.2: The identity triangle (after Chapman and Gaydarska 2007:7).

Chapman (2000:105) identified a second practice to fragment enchainment which he termed set accumulation. This alternative form of relation was underpinned in the control of complete objects. The rise in use of metal objects were fundamental in the practice of accumulation as they are not easily fragmented or, at least, are materially distinct from the deliberately fragmented clay objects (Chapman 2000:44). Initially, metal along with other materials not easily fragmented act as another form of enchaining people through the accumulation of sets rather than the dispersal of fragments of a single object. Later, however, Chapman (2000:47) argues that accumulation may have been a way to increase power or control since the whole object became more significant than the process of exchange itself. In essence, while accumulation and fragmentation can be used to mobilise enchainment, accumulation itself can also lead (or be the result of) new, perhaps more stratified, social practices. Accumulation can therefore be seen as a practice that might remove degree of social connection that is engendered by enchainment although a process that still carries social importance.

Associating metal with accumulation and not necessarily fragmentation is perhaps a point where Chapman’s work in central and eastern Europe will diverge most heavily with understanding Arctic enchainment. Specifically, the metal objects used in Chapman’s work are entirely different in character, composition, and manufacturing than what is seen in the Arctic. Since the range of manufacturing techniques in the Arctic mostly concentrated on cold-hammering and, in some cases, annealing (see Cooper 2016:187) and early European metallurgy consisted of more heat-intensive casting techniques, the association of metal objects not being easily fragmented (and thus their association with accumulation as opposed to fragmentation) is not the case in Arctic contexts. In fact, it will be argued later that it is exactly the opposite. The discrete and seemingly limited source locations of Arctic metal lend itself to a different form of fragmentation whereby metal objects, regardless of their itinerary, ultimately derive from a specific place within a vast landscape. In essence, all Arctic metal objects are fragments of these source locations and in the case of the meteoric iron, specific fragments of a meteorite. Since smelting and recasting are not practices used in the Arctic, these discrete origins of the metal are clearly demonstrated in all metal that was used. Even in cases where Norse metal was exchanged into the Arctic system, the source of those objects is still discrete being that they are from an exotic source to the Arctic. While Chapman's (2000) thesis is extensive in its unpacking of Balkan MNCA social relations, the development of how enchainment in an archaeological context can be detected and how fragmentation may enhance this practice is ultimately the underlying framework for the theoretical approach taken in this thesis, although not without modification to fit a new geographical, cultural, and temporal milieu.

The process of enchainment and the associated practices of deliberate fragmentation and accumulation have sparked widespread debate since Chapman (2000) used the theory in an archaeological context. Even in his initial treatment, Chapman (2000:39) concedes that enchainment as a practice specifically enacted through deliberate object fragmentation is a practice that does not have a clear ethnographic correlate, despite object fragmentation and exchange being prevalent. In particular, this is because, Chapman argues, enchained relations were not dominant in the historical period. Bailey (2001) in reviewing the theory of enchainment and deliberate fragmentation quite rightly points out that the objects Chapman (2000) mainly uses are not everyday objects. In essence, if enchainment is as pervasive as Chapman states, then how does this intersect with daily life? While Chapman and Gaydarska (2007) later go on to demonstrate the utility of the theory with everyday material culture, this thesis will further assess the utility of enchainment theory on everyday objects. Especially since, as argued previously, interaction with everyday objects can be just as powerful as less prevalent material. The vast majority of the material discussed in this thesis can be considered as implements used in daily activities. Although, that does not mean that these objects held no special meaning or could not convey the intricacies of Late Dorset social life. At the same time, the material used specifically examines its intersection with metal, a raw material that is almost always exotic and seemingly not "everyday". However, what will be argued, the extent of metal use certainly makes the material much more ubiquitous than what the present corpus of metal objects demonstrates. Interestingly, enchainment theory has also been applied to Palaeolithic stone tool use and exchange (Gamble 2004:22). In particular, Gamble (2004) demonstrates how everyday tools, and especially those that are made with exotic materials, were exchanged over large distances indicate enchained social relations between different groups and regions. Arctic metal exchange parallels Gamble's (2004) research in that the raw material is used for everyday purposes but is potentially considered an exotic raw material. While the extraordinary should not be disregarded for the ordinary (or vice versa), this thesis will attempt to apply enchainment theory to contexts that further deconstruct this key criticism.

Significantly, while enchainment theory as it applies to archaeological contexts was borne from Strathern's (1988) treatment of enchainment and gift-giving in Melanesia, Fowler (2004:39) demonstrates the differences between the shell-beads exchanged in New Guinea and the ceramic sherds and figurines in central Europe both in terms of how they were valued by their respective societies and the function that they played. This criticism shows that enchainment and ultimately personhood comes in many different forms and can function differently in different societies. Fowler (2004, 2008, 2010) subsequently develops this concept further and demonstrates personhood may be permeable or partible. Permeable personhood is created through flows of substances. Partible personhood, the concept that agrees most closely with enchainment, stems from Strathern's (1988) work in New Guinea where dividuality is created through exchange networks where parts of people can be externalised and exchanged with others (Fowler 2004:25). Importantly, deliberate fragmentation does not necessarily lead to enchainment and enchainment is not necessarily expressed only through deliberate fragmentation (Brittain and Harris 2010). Moreover, the contexts for applying enchainment or understanding how partible personhood has been enacted are diverse with no checklist of required features. As such, the way enchainment and, potentially, partible personhood may apply to Late Dorset society is potentially different not only from the other published treatments of enchainment and partible personhood but also, as alluded to above, diverse to how different groups or individuals living in the Arctic one thousand years ago may have understood it. In this regard, the fluidity of memory and relational personhoods at different scales illustrates Fowler's

(2004) criticism in that different contexts create different ontologies of all these concepts. Certainly, it must be emphasised that partible personhood as seen with Strathern (1988) and Fowler (2004:25) is simply a framework for understanding how Late Dorset social relations and exchange networks may have functioned beyond their economic benefits. While overall patterns surely exist, especially within a cultural, temporal, and geographic milieu, creating a grand narrative of enchainment both across people, place, and time is not possible.

Brittain and Harris (2010) offer perhaps the most extensive critical thoughts about enchainment theory and how it has been applied by Chapman and others. Significantly, they rightly demonstrate, as briefly discussed above, that personhood is much more diverse than what Chapman (2000) uses. Moreover, Brittain and Harris (2010:590) emphasise that deliberate fragmentation does not necessarily lead to enchainment which in turn does not necessarily lead to a partible (or dividual) personhood. These concepts are independent of each other. Crucially, these concepts will be used independently in this thesis. Indication of one in a Late Dorset context should not be evidence for the other (although the other may exist).

With the above criticisms in mind, enchainment has been applied to a multitude of areas around the world and at a variety of time periods. Chapman (2000), Chapman and Gaydarska (2007), Jones (2005), Gamble (2005, 2007), Pollard (2008) and Rebay-Salisbury et al. (2010) apply it to European prehistory and Croxford (2003) uses enchainment in a Roman Britain context. However, there are a multitude of authors who have applied it to American archaeology as well (Lucero 2008; Gillespie 2008; Joyce 2008; Mills 2008; Pauketat 2008; Wallis 2013). In many ways, these diverse applications of enchainment have expanded it in a direction not explicitly discussed by Chapman or Strathern. Gillespie (2008:128) and Pollard (2008:47) explicitly discuss how enchainment and specifically how the itineraries of an object not only connect people, place, and thing, but also with time. Gell (1998:222) argues people are a sum total of the biographical events before and after their life. In this sense, Gell (1998:222) argues a personhood or memory may prolong itself after its "biographical death". Therefore the intrinsic act of remembering and forgetting specific portions of an object's itinerary found within the concept of enchainment forces agents within an enchained social network to confront questions of "… memories, forgettings, and re-memberings…" that occur throughout time

(Joyce 2008:38). This explicit discussion of memory and its influence on enchained social relations enhances what the theory means and adds effectively a fourth dimension. While this was certainly present in Chapman’s (2000) discussion of the theory, the expanded focus of it by the authors discussed here is an important perspective. As will be discussed in the chapters that follow, cultural memory and, ultimately, forgetting may have played a very significant role in Late Dorset society and certainly something that has played an important role in other Arctic contexts.

3.5 Past Approaches to Materiality in the Arctic

While enchainment and object itinerary theories have not been widely applied to Arctic contexts, there is a strong material culture focus in past research about Arctic peoples. Moreover, while Arctic materiality and its connection to wider archaeological theory has not been explicitly discussed by Arctic archaeologists and anthropologists, the themes of it are found throughout past literature on the subject of Arctic material culture (e.g. Betts et al. 2015; Grønnow 2012, 2017; Hinnerson-Berglund 2009; McGhee 1980; Qu 2017a; 2017b). The deep connection between Arctic peoples and their material culture is an ongoing theme seen in much of the literature (e.g. Maxwell 1985:278).

In his late 19th century anthropological observations, Nelson (1899) noted instances where Bering Strait Inuit had specific beliefs regarding the materiality of their tools. Specifically, Nelson (1899:143) stated that there were two types of lances, one with a lithic blade and another with metal, with the latter not being used for sea mammals. Additionally, he also observed that metal implements could not be used for even non-subsistence activities (such as chopping wood) if the activity was near the place where a sea animal had died or been butchered (in the specific cases he observed, a beluga and salmon) for fear of death for all those involved (Nelson 1899:439-440). Finally, during a multi-day festival (termed a bladder festival/feast), Nelson (1899:390), while in a village near the mouth of the Yukon River in western Alaska, argued that iron axes were forbidden during the extent of the festival. In its place, bone wedges were used to split wood. Nelson (1899) is not clear if the restriction of using metal during the bladder festival, which involves hunters handling the bladders of all their sea mammal kills from the previous year, is related to the other instances of where metal is used around recently dead sea animals.

McGhee (1977) demonstrates that raw material selection during the manufacturing process of any given organic object among the early Inuit of the eastern Canadian Arctic was not based only on the physical characteristics of the raw material (in the case of McGhee's research antler vs. ivory) but rather on a culturally-rooted set of beliefs surrounding gender binaries and a land:sea dichotomy. Qu (2017a) reassessed McGhee's (1977) conclusions and determined although there is not sufficient evidence to suggest a connection between gender roles and specific materials there may have been symbolic associations between humans and nonhuman animals. In either case, this symbolic association between certain types of raw material for certain classes of objects extends beyond the any obvious functional reasoning but rather demonstrates that the raw material carried additional meaning (McGhee 1977:145; Qu 2017a:106).

A connection between Arctic peoples, their things, and the materiality of those things extends nearly throughout Arctic history around the circumpolar north (Farrell and Jordan 2016). Specific raw materials have either been designated cultural "markers" or have, at the very least, been argued to have been culturally important. For example, Mugford chert found in Labrador has been associated with Pre-Dorset activity (Hood 2008), killiaq is argued to be an important raw material to Saqqaq of Disko Bay throughout time (Grønnow 2017:276; Kramer 1996), fine-grained chert originating from Cow Head Peninsula in western Newfoundland is frequently associated with Central-South Labrador and Newfoundland Groswater sites above other raw materials (Fitzhugh 1972; LeBlanc 1996:3; Pintal 1994:151; Ryan 2011:94; Tuck 1978). Most significantly, however, is the long range exchange of Ramah chert found across Newfoundland, Labrador, Nunavik, and the Quebec Lower North Shore in precontact sites across time (Loring 2002). The exchange of Ramah chert, as will be discussed in more detail below (Chapter 10.3), among Dorset groups has been argued as carrying much more socio-cultural importance than for purely functional purposes (e.g. Anstey and Renouf 2011; Farrell and Jordan 2016:9; Loring 2002). While metal use has received much less attention in Arctic studies, research has demonstrated the importance of selecting and using specifically metal for its properties beyond functionality has been an important factor in Subarctic and other North American groups that used the material (e.g. Franklin et al. 1981; Cooper 2012; Leader 1988). What these material-centric studies demonstrate is that raw material selection especially in the Arctic and Subarctic is not based purely on functional characteristics of the material but also on other socio-cultural factors that may relate to prestige (e.g. Cooper 2012) or for even strengthening socio-cultural ties between groups (e.g. Anstey and Renouf 2011).

Grønnow (2012) takes an explicit materiality-focused approach. Specifically, he argues that the markedly consistent material culture found throughout his analysis of Saqqaq material from Qeqertasussuk and Qajaa in Disko Bay demonstrates a close relationship between Arctic peoples and their finished artefacts. While symbolic representation or artistic artefacts are rare in Saqqaq assemblages the consistent material culture in both its manufacturing technique and finished product, Grønnow (2012:61) argues, acted as a reminder to its users of “sameness” or having a cultural connection with others. Although not explicitly stated, the association of Saqqaq material culture being synchronically consistent in raw material and diachronically consistent in its finished form enchained Saqqaq groups not only with each other but also with the different generations of Saqqaq people.

Specifically, in regards to the way metal as a material was understood in the Arctic, past research has focused on late precontact and early postcontact Inuit sites. Both Gullason (1999) and Whitridge (2002) examine metal use as a way of understanding gender roles in Inuit society. In both these studies the raw material component is used almost exclusively as a reflection of the human social landscape, similarly the way organic raw material was examined by McGhee (1977). By attempting to quantify how much metal was being used and how it was being used both Gullason (1999) and Whitridge (2002) demonstrate that the raw material was potentially used differently by Inuit men and women. Moreover, Gullason (1999) argues that metal use was chronologically specific. In general, Gullasson’s (1999) data indicates that, surprisingly, more metal was used among precontact Inuit than those in the early contact period of the 16th century. As seen from this summary of previous work, other raw material studies agree that raw material selection is clearly influenced by people, place, and time.

3.6 Conclusion

This overview of approaches to Arctic materiality demonstrate that there is justified scope to examine Late Dorset metal use. Specifically, it has demonstrated that the role material culture and the matter from which it is made is a culturally important aspect that transcends location and time. Moreover, viewing metal as a raw material that not only carries functional benefits but also socio-cultural purposes will augment the data presented in this thesis beyond its most explicit conclusions. Importantly, the time period discussed in this thesis (AD 500-1300) is a period of great cultural change in the Arctic. Using a materiality-focused theoretical framework with data concerning raw material use can open up discussions not only about how metal was understood by the Late Dorset but also how the Late Dorset perhaps structured their own social relations in the face of incoming groups such as the Inuit and the Norse. It was felt that a combination of materiality-focused theories regarding enchaining social relations and the inherent components of object itinerary and memory encapsulated within offer a unique perspective on Arctic material culture and exchange. In addition to examining the extent of metal use and exchange by the Late Dorset, the theoretical framework laid out in this chapter will engage with the socio-cultural components of this exchange both between Late Dorset groups and the Inuit and Norse. By incorporating the data presented in this thesis along with previous research about Arctic exchange networks and the inclusion of relevant ethnographic data, this thesis will thoroughly test the extent and validity of using enchainment theory in an Arctic context. Moreover, this thesis will recast enchainment and its implicit object itineraries as mechanisms that sought not only to connect people with other people through space but also through time.

Chapter 4

Methodology: Metric and Microscopic Analyses

4.1 Introduction and Overview

This thesis samples a large number of lithic, metallic, and organic Dorset tools and uses metric and qualitative analysis in order to gauge the value of using potential proxy indicators of metal use among a Late Dorset collection of material. In essence, this tested both the validity of using blade slot sizes as means of assessing metal use as well as using microscopy to detect any visible residues left around the blade slot. As with any quantitative and qualitative study, the methodology can undoubtedly influence the results. As such, the following chapter is dedicated to explicitly describing the two above approaches in as much detail as possible. Additionally, since this study was not able to include every Late Dorset object from every known site, the site and artefact selection processes as well as their potential biases on the results are discussed below.

While the focus of the present research is to engage with metal exploitation and exchange of the Late Dorset, Early and Middle Dorset sites are included. The purpose of including material that predates the time period in question is important for various reasons. First, including earlier Dorset sites in the analysed sample should, in theory, provide a good "control" sample for assessing the proxy indicators of metal use on Late Dorset material. If the hypothesis that the Late Dorset were the first to widely exploit metal, we should see little to no evidence of metal exploitation in earlier Dorset contexts. If similar results are produced for both Early/Middle and Late Dorset contexts a few conclusions could be proposed: the methodology itself could be flawed or the Early/Middle and Late Dorset used similar amounts of metal (regardless of the actual quantity). Any evidence of such use from the metric analysis must be an indication of trade of native or Siberian copper since there are presently no known Middle Dorset sites (and very few early Dorset sites) near the Cape York meteorite spread in the High Arctic (but that does not preclude short-term visits to the location by the Middle Dorset). Last, including earlier Dorset material reduces the chance of excluding material that was perhaps incorrectly radiocarbon dated or typologically assigned to a pre-Late Dorset period. For simplification, this thesis will use the term “pre-Late Dorset” to refer to Early and Middle Dorset material but will discuss each Dorset period if it is relevant to the results. This chapter will first describe the site and artefact selection criteria and then detail the metric and microscopy methodology.

4.2 Site Selection

Collections from three main repositories in Canada were accessed for this project: the Rooms Museum (St. John’s, Newfoundland and Labrador), the Canadian Museum of History (Gatineau, Quebec), and the Prince of Wales Northern Heritage Centre (Yellowknife, Northwest Territories. A small collection of material from the Foxe Basin was analysed at McGill University. Analysed material came entirely from sampled sites either from Newfoundland and Labrador (held at the Rooms Museum) or Nunavut (held at either the Canadian Museum of History, Prince of Wales Northern Heritage Centre or McGill). Initially, site data was obtained from the Newfoundland and Labrador Provincial Archaeology Office (PAO) and the Culture and Heritage branch of the Nunavut Government (NG) for each jurisdiction respectively. The site data requests from both the PAO and NG contained sites that were designated either “Middle Dorset” or “Late Dorset”. Importantly, these designations were not always based on radiometric dating results but occasionally determined on stylistic grounds. In most cases, sites contained multiple components (ranging from Pre-Dorset to post-contact Inuit) of which only a portion is relevant to this study. The site data provided by the PAO were, in some ways, more detailed than that received for the Nunavut sites. This means that sites which were only questionably associated with either Middle or Late Dorset or, indeed, sites that did not recover Middle or Late Dorset material from a radiocarbon dated context were immediately excluded. The Nunavut site data was not as informative. Moreover, many of the unpublished site reports for Nunavut sites have not been digitised, making engaging with these sites much more difficult than those in Newfoundland and Labrador. Ultimately, these sites were separated by repository.

Published and unpublished sources (when available) on Nunavut sites were consulted. Once the broad list of sites (and the location of their collections) was finalised, catalogue data from each repository was sought. When available, the digital catalogue data were consulted and certain sites were excluded based on the lack of relevant artefacts (see below for a detailed description of the artefact selection criteria). In certain cases, digital catalogues were not available for some sites. These sites were consulted in-person at each repository and either included or excluded from the analysis during the museum visit.

In total, material from 53 sites were analysed. This four-letter (representing a latitude and longitude grid location) and digit code (representing the specific site found within that four-letter locality) is a unique designation for each site located in Canada. All sites have a Borden number but not all sites have a proper name. For this reason and the fact some proper names for sites have changed since they were first excavated, the Borden designation will be the primary way sites are referred to in this thesis. In saying that, the proper names of the sites discussed will be mentioned when relevant. A complete list of proper names for each site as well as a map showing their locations is found in Appendix I.

4.3 Artefact Selection

In total, the artefacts analysed represent a number of different classes and material types. The type of artefact analysed was dependent on which methodology (metric or microscopic analysis) was conducted on the artefact. In some cases, both analyses were conducted on the same organic object but this is not always the case.

Since the metric analysis was concerned with attempting to understand potential indicators of metal use on organic material, stone and metal blades as well as the organic supports of those blades were included. For the purposes of this study and in hopes of minimizing any potential bias one single artefact class may contribute to the results, a wide range of Dorset lithic tool classes were measured. These include artefacts that were originally classified as endblades, points, knives, bifaces, unifaces, blades, burins, burin-like tools, microblades, and scrapers. Since this broad range of artefact classes literally encompasses almost the entirety of known types of Dorset lithic tools and, naturally, would be an untenable sample size given the geographic and methodological scope of this project, only complete or near-complete artefacts were included. In certain cases, such as for endblades and stemmed tools (including bifaces, unifaces, microblades, scrapers, burins, and burin-like tools), incomplete tools were included only if the proximal portion of the tool survived (that is to say the part of the tool that is slotted into an organic support). This means that tools with only distally surviving portions were excluded entirely from the morphometric analysis. Additionally, in cases where there is a large number of objects per artefact class (e.g.

microblades and scrapers), a semi-random selection of complete objects was made. This meant that a representative sample from as many sites as well as raw materials (e.g. Ramah chert vs. nephrite vs. quartz crystal) as possible was included.

For the purposes of this study, "organic support" refers to any organic object that has evidence for holding a lithic or metal tool. Generally speaking, this includes harpoon heads and handles. All miniature, toy, or unfinished (i.e. blank or preform) objects of any artefact class, self-bladed harpoon heads, and organic handles without an obvious or surviving blade slot were excluded.

Metal material was also sampled. However, while there is a low level of metal objects found at a number of Late Dorset sites, the bulk of the material included in this study come from a single site (SiFi-4, Franklin Pierce). Despite the small sample size when compared to other sites, the metal assemblage from SiFi-4 displays a number of tool categories and, importantly, a large proportion of complete tools. Other sites, such as QjJx-1 (Arvik) and NiHf-4, have metal material (in the case of QjJx-1, it has much more) but the number of those objects that could be hafted in a harpoon head or knife handle is relatively low and the bulk of the material is fragmentary. Moreover, due to circumstances outside the control of this thesis, the material was largely unavailable. A complete list of all objects included in this study is included in Appendix II along with their relevant metric data.

4.4 Potential Biases of Sample Selection

Echoing the sentiments of Arundale (1980:475), who was also dealing with a large assemblage of Arctic material, despite the methodological decisions made potentially imposing biases on the results, they were made in hopes of making the analysis as practical and efficient as possible. Although there are undoubtedly other sample selection methodologies that could have been used for this study, the size of the sample as well as the distribution of sampled sites across space should give relatively representative results. Unfortunately, putting this fact aside, there were two major sources of potential bias in the results presented herein. First, the nature of past excavation of Arctic sites (and the preservation of each context) is inconsistent for both environmental and past methodological reasons. This means that while this study attempted to include as many sites as possible, the most completely and thoroughly excavated sites dominate the results. For example, of the sites sampled from Labrador, JaDb-10 (Avayalik 1) and IdCq-22

(Shuldham Island 9) contain the majority of all the analysed objects. Moreover, despite both sites being well-excavated, there are a number of potential Middle or Late Dorset contexts left unexcavated at each site. Consequently, despite some of the results seemingly representing an individual site or, indeed, a whole region, they are actually all derived from the excavation of a single house or midden feature. Undoubtedly, future excavation at both existing and new sites will have the potential of changing the results of this project (as with any archaeological endeavour).

Second, the pre-Late Dorset and Late Dorset sites sampled come only from Newfoundland and Labrador and Nunavut. While these two jurisdictions contain some of the highest resolution data about the Arctic human landscape at the relevant time period, they are only a portion of the total range of Dorset inhabitation. In particular, Greenland, Nunavik (northern Quebec), and, to a lesser extent, Northwest Territories Dorset sites are not included. Given the relatively few fully excavated Late Dorset sites in northern Greenland and the even fewer sites in Nunavik that have good organic preservation, the impact of these sites on shifting the overall conclusions of this thesis are likely minimal. However, the Late Dorset occupation is significant since the main source of meteoric iron, the Cape York meteorite spread, is found in northern Greenland and this region also holds some of the most recent Late Dorset sites (e.g. Appelt and Gulløv 1999). Likewise, Nunavik, despite generally having poor organic preservation, contains some of the latest sites with a Late Dorset component (cf. Pinard and Gendron 2009). Finally, the land that currently makes up the Northwest Territories were only sparsely inhabited during the Middle and Late Dorset time period. These regions were excluded from the study purely for logistical reasons. With these potential sources of bias in mind, this study has been undertaken with two main goals at the forefront: First, the results presented represent a comprehensive attempt at understanding metal exploitation in the Late Dorset period in Nunavut and Labrador using presently available archaeological data. While some artefacts were left unanalysed for solely logistical reasons, the scope and scale of the included data should overcome this obstacle. Second, the data presented can be easily added to in the future should one want to add the remaining Greenlandic or Canadian material. While new data may change the ultimate conclusions of this research, the transparency of methodology and included appendices should make the process relatively straightforward.

4.5 Metric Analysis Methodology

In general, the metric analysis consisted of taking a variety of measurements from each object. These measurements were taken with a stainless steel set of callipers with a digital display. In some cases of fragile organic objects, plastic callipers with a digital display were used. The resolution for both callipers is 0.01mm with an instrument accuracy of +/- 0.02mm for measurements smaller than 100mm and +/- 0.03mm for measurements greater than 100mm. In general, throughout the analysis, it was noted that human error is a potentially larger source of error than the instrument itself. Secondly, when possible, all artefacts were photographed.

Maximum length, width, and thickness was recorded for each object. In the case of the organic objects, their blade slot length was also recorded. Several qualitative traits were also recorded, such as the raw material of the organic object, visible evidence for endblade securing techniques (e.g. rivet holes or lashing grooves), any visible decoration (which ranges from simple line-incised decoration to fully decorated facial features), and any visible damage. However, the metric portion of this analysis is mainly concerned with the blade slot thickness measurements for the organic objects. Following the methodology employed by Gullason (1999) and Whitridge (2002), the initial hope of this methodology was to see if there is any correlation between the thickness of a blade slot in an organic support and the type of raw material for the blade that it supported.

Gullason (1999) and Whitridge (2002) use the term “blade slot width” to refer to the linear distance between two blade beds. Conversely, Grønnow (2017) recorded “blade slot width” but is measuring the transverse width of each blade bed. To avoid confusion, throughout this thesis “blade slot thickness” will be used to describe the linear distance between two blade beds. The term “thickness” was preferred over “width” to avoid any confusion since, as demonstrated by Grønnow (2017), the width of the blade slot (i.e. the transverse width) is a valuable measurement in and of itself.

As demonstrated by Gullason (1999) on Inuit material, measuring blade slot thickness in isolation is potentially misleading as thinner blades can be fitted into thicker blade slots. In saying that, the inverse is not true: thin blade slots cannot hold a thicker blade. Initially, McCartney (1988:71) argued that any blade slot 2mm or greater likely supported a slate blade. Whitridge (1999) later found that, again on Inuit material, through measuring blade slots (from a variety of tool types) from PaJs-2 (Qariaraqyuk), located on southeastern Somerset Island, there was a bimodal distribution of blade slot thicknesses, one around 1.1mm and another around 1.9mm. However, Gullason (1999:502) convincingly argues that this bimodal distribution can potentially reflect two blade sizes rather than simply different raw materials. To further this point, she incorporated blade thickness measurements from both metal and lithic endblades into her study. She measured blades and blade slots from four sites. There were three from Frobisher Bay (Baffin Island), Crystal II (Pre-contact Inuit), Kamaiyuk (16th century Inuit), and Qamaarviit (17th century Inuit) and one from Creswell Bay (Somerset Island), Cape Gary (PcJq-5, pre-contact Inuit). In the end she proposed a new rule: blade slots measuring less than or equal to 4mm likely held a metal blade with blade slots measuring greater than or equal to 3mm likely held a slate (or stone) blade. This means that blade slots between 3-4mm could have held either a metal or stone blade.

The work by Gullason (1999) and Whitridge (2002) progressed the understanding of pre-contact Inuit metal use by their analysis from the initial hypotheses of McCartney (1988; 1991) but both effectively summarised the blade slot thickness in one measurement. Whitridge (1999:260) took maximum and minimum measurements but only reported the mean of those two measurements while Gullason (1999) reports a single measurement but does not describe her methodology. In hopes of capturing any variance in individual blade slot thicknesses and to combat any potential human error, measurements were taken from three points. Frequently organic blade slots, especially in Late Dorset contexts and particularly with harpoon heads, are v-shaped. To fully represent this, measurements were taken from the proximal, medial, and distal portions of the blade slot, effectively reflecting the thinnest, mid-point, and widest portions of the blade slot (Figure 4.1). This higher resolution helps overcome some limitations of taking solely “maximum” or “minimum” measurements as it explicitly locates the measurement on the object and, therefore, represents more accurately where the blade would have actually made contact with the organic support. Furthermore, a “mean” measurement can still be calculated should that be required. For harpoon heads and end-hafted handles, the measurement locations were effectively the same. However, a number of side-hafted handles were also analysed. Rather than measure the blade bed in the same manner, effectively measuring the “depth” of the blade bed, measurements were taken from the outer-most (and most accessible) portion of the blade slot at three different locations. These represented the proximal-most portion of the slot, another measurement one quarter of the total length of the slot and then finally a measurement on the exact mid-point of the slot (Figure 4.2). Despite the slightly modified approach with side-hafted handles means the data is not exactly comparable, it offers equally robust measurements while reducing the increased human error that would have undoubtedly arose when trying to measure the slot in the "depth" axis.

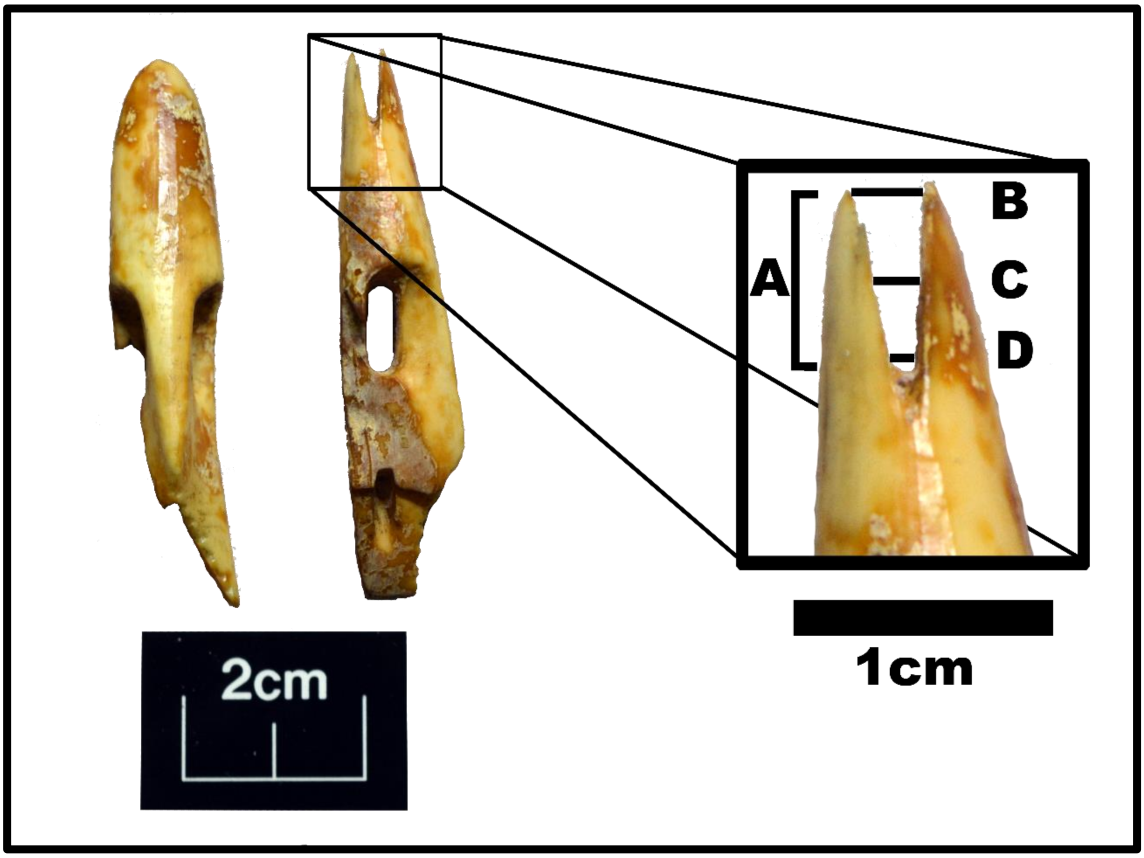

Figure 4.1: A bladed Dorset harpoon head (Dorset Parallel Type), PgHb-1:5927, depicting a ventral view, lateral view, and a magnified inset of the blade slot. A. Blade slot length measurement. B. Distal blade slot thickness measurement. C. Medial blade slot thickness measurement. D. Proximal blade slot thickness measurement Note the different scales. Photo permission courtesy of the Government of Nunavut and the Canadian Museum of History.

Whitridge (2002:177) notes that some amount of warping or shrinking may occur to Inuit harpoon head blade or knife handle slots as they desiccate after being deposited. Taking measurements from multiple locations should help correct for the possibility of slot being warped unequally in the same artefact. Should this process affect the slot evenly and be pervasive across the sample, comparing the blade slot measurements with lithic endblade thicknesses should help assess its impact. Specifically, if the blade slots are shrinking after deposition, it should be expected to have a large sample of lithic artefacts that are thicker than the blade slot sizes. If there is a relatively small amount of endblades that are thicker than the thickest harpoon head blade slots then it is likely that post-deposition shrinking has a minor impact, at least based on what can be revealed by the data collected here.

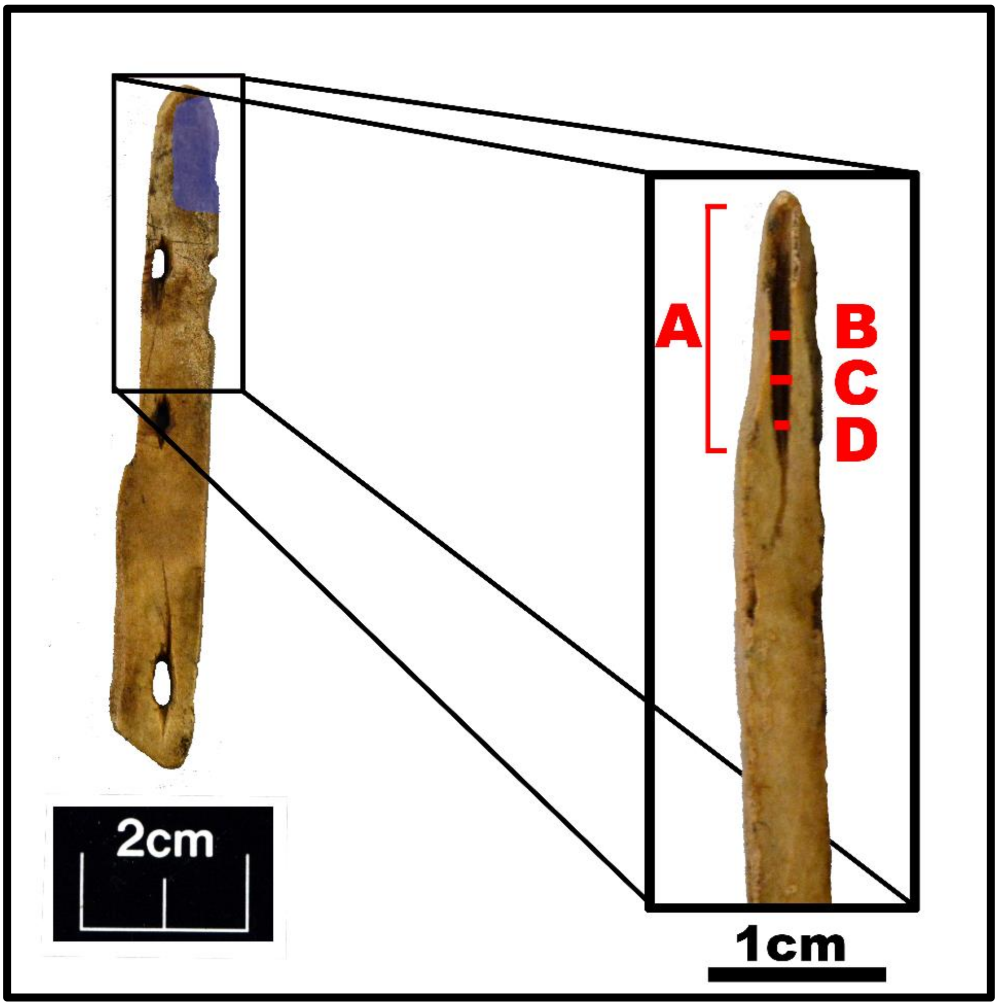

Figure 4.2: A side-hafted handle, NiHf-4:4363, depicting a lateral view on the left (the blue area represents approximate blade slot) and an inset showing the cutting edge (or front face) of the handle looking into the blade slot. A. Blade slot length measurement, B. "Distal" measurement (located at the halfway point of the blade slot), C. "Medial" measurement (located one quarter of the blade slot length up from the proximal-most portion), D. "Proximal" measurement (located at the proximal-most portion of the blade slot). Note the difference in scales. Photo permission courtesy of the Government of Nunavut and the Prince of Wales Northern Heritage Centre.

For lithic and metal objects, a similar approach was adopted. In addition to basic overall length, width, and maximum thickness being recorded, three thickness measurements were taken along the proximal-most portion of the object. In many cases, there is visible basal thinning in Dorset lithic material and the three measurements corresponded with this effectively being recorded at the proximal-most edge, another in the mid-point of the visible basal thinning, and then another at the distal-most portion of the basal thinning. The length of the basal thinning was also recorded (in order to compare with blade slot length) (Figure 4.3). Qualitative attributes were also recorded for the lithic and metal material depending on its tool type and are more fully considered in Chapter 6 and 7. Given the variability of the lithic assemblage included in this thesis, the measurements were occasionally adapted when some objects lacked certain features (e.g. basal thinning).

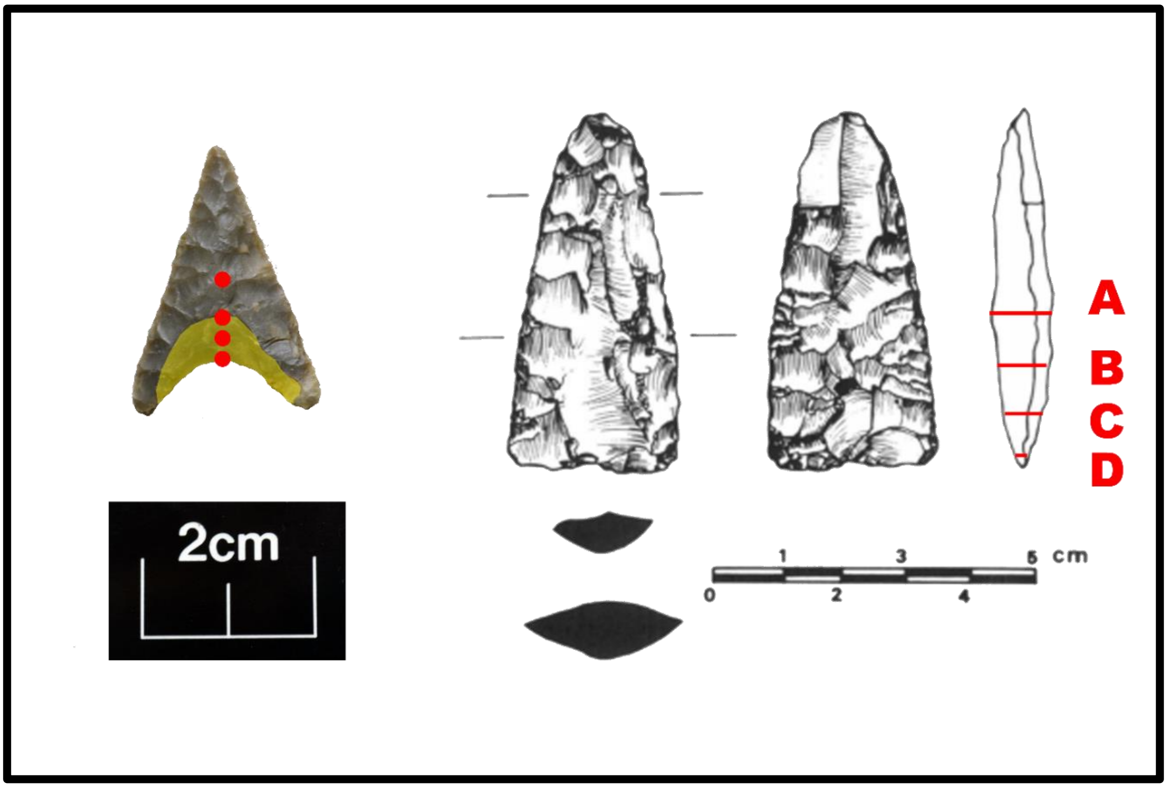

Figure 4.3: Left: Ventral surface of a typical Dorset triangular endblade with locations of thickness measurement locations (red dots) and presence of visible basal thinning (yellow area). Right: Illustration of endblade preform from the Quebec-Labrador peninsula (JcDf-1) showing thickness measurement locations in cross-section. A. Maximum thickness, B. "Distal" thickness, C. "Medial" thickness, D. "proximal" thickness (after Plumet and Lebel 1997:145, Fig. 10). The length of basal thinning is effectively the distance between the distal and proximal measurement locations. Note the different scales. Photo permission courtesy of the Government of Nunavut and the Canadian Museum of History.

The collected quantitative data from all the organic, lithic, and metal objects was analysed in Microsoft Excel and R. All statistical operations (e.g. t-tests, correlation coefficient, descriptive statistics) were conducted in Excel with the exception of Hartigan's Dip Test of unimodality (Hartigan and Hartigan 1985) which was done in R (version 3.5.2). The dip test package for R was created by Maechler (2016). In brief, descriptive statistics were used to summarise the datasets, correlation coefficients (Pearson's r) were calculated to understand the statistical correlation between two variables in the same dataset, two-sample t-tests (Welch's t-test) were used to compare the relationship between two subsets of the data, and the dip test was used to help determine statistical significance of the apparent distributions of the data. Importantly, this is not an exhaustive list of statistical calculations that could have been used. Much of the patterning in the data can be assessed visually at the resolutions presented and the statistical operations were simply ways of confirming or challenging those initial interpretations.

Histogram bin sizes are set to 0.1mm although most graphs will not have a label for each bin. This resolution was found to be well above the human and instrument error of the methodology while providing meaningful divisions to visualise the data. Given the majority of the datasets are within a handful of millimetres from each other, creating larger bins (e.g. 0.5mm) obscured some of the statistically significant divisions in the data and smaller bins (e.g. 0.05mm) was too close to the identified error ranges for the methodology which may in turn create qualitative patterns that are not actually meaningful. In cases with very small sample sizes the resolution frequently has bins with only a single count. This made describing distributions difficult but is preferred over having histograms with inconsistent or variable x-axes. In any case, the most important relationships in regard to the research questions were tested with the statistical methods mentioned above which do not consider how the histograms are visualised.

Therefore, since all data are recorded to two decimal places and all histograms are presented to only one decimal place, the data are rounded to the nearest value that is greater than the measurement. This does not affect the overall profile and a shift of 0.05mm is the estimated margin of error for these measurements. However, when observing a histogram that reads 5 observations at 1.5mm, that should be understood as 5 observations between 1.41mm and 1.50mm. Taking this strategy means that there are not any single measurements that are greater in size than the bin they have been sorted into.

This approach is common in other statistical presentations in archaeology (Drennan 2009:11).

Bivariate plots (i.e. scatter plots) below have variable x- and y-axis resolutions. Since the data points for these graphs are not rounded and represent their values as they were recorded, it was decided that the resolution for each plot is slightly different depending on the presentation. However, no bivariate plots have a resolution of less than 0.1mm. Plots comparing similar measurements (e.g. medial vs. distal blade slot thickness) had the same resolutions for both axes. In almost all cases, the relationships of the data visualised in bivariate plots are statistically described as well, decreasing any interpretation bias on part of the author.

4.6 Portable Digital Microscopy

The microscopy portion of the analysis only engaged with organic material. The main purpose of this analysis is to visually identify any possible residues left on organic tools, especially around their blade slot, which might reflect the raw material of its blade. While all objects included in the metric analysis were observed with a microscope, additional material that could not be included in the metric analysis (i.e. organic supports that do not have complete blade slots) were included here. Unlike the metric analysis, microscopy of Late Dorset or Inuit organic material to identify metallic or organic residues has never been conducted, or at the very least, published. However, LeMoine (1994; 1997; 2005) has observed both Late Dorset and Inuit organic material under a microscope but sought to identify use-wear patterns rather than the presence or absence of residues located around the blade slot. While her analysis engaged with the possible use of metal tools, it was focused on the use of those tools to shape the organic matter she observed.

For this analysis a Dino-Lite Edge UV (AM4115T-FVW) digital microscope was used with both white and ultraviolet light illumination. It was found that while most residues could be identified with the white light, ultraviolet illumination helped in some cases at differentiating potential iron oxide from organic residues. The microscope has the ability to magnify up to 120x but for the vast majority of the analysis 40-60x magnification was sufficient. When a potential residue was located, photographs were taken. In the case where a potential residue was unclear, other portions of the object were observed to identify similar discolouration located elsewhere. While no experimental work was carried out to create reference samples, objects that have clearly identifiable residues were used as references for other objects. With these limitations in mind, and as will be discussed later, the microscopy results should be considered preliminary and experimental recreation and quantitative compositional analysis would be a productive avenue for future research in order to confirm these results.

Chapter 5

Results: Organic Artefacts

5.1 Introduction and Overview

The results of the metric and microscopic analyses will be detailed in this chapter (bone, ivory, and antler). However, major interpretations of the dataset will take place in Chapters 9 and 10. Since one of the major goals of assembling this dataset is to assess potential proxy indicators for metal use, in particular the thickness of a blade slot in an organic object, a broad approach was taken. Ultimately, a number of broad artefact classes which were used in order to test the data as much as possible and to rule out any other factors that may affect the results. For the purposes of this study, seven artefact categories were created: Harpoon heads, handles, endblades, knives, scrapers, burin-like-tools (BLT), and microblades. The two categories made from organic raw material, harpoon heads and handles, represent the objects that had an identifiable and measurable blade slot. It is this category that will be the focus of this chapter. The five categories made of lithic or metal material, endblades, knives, scrapers, BLTs, and microblades represent the possible artefact classes that may have been used as a blade in an organic support. These will be discussed in Chapter 6. Finally, there is a small collection of metal objects which will be discussed in Chapter 7. A selection of organic material detailed in this chapter was observed under a microscope to record evidence of any sort of iron oxide or copper carbonate (commonly called verdigris). Taken together, these artefact categories represent the most common tool types that either supported a blade or was a blade that could be hafted. The number of sites sampled range from southern Labrador to Ellesmere Island to Victoria Island. While a representative sample was sought for each category demonstrating the possible variability between individual objects but also between different sites, a number of factors specific to each category affected this. Significantly, material that was not locatable within a museum or that was on loan to another institution could not be included in the dataset for this study. Moreover, while as many harpoon heads and handles were analysed, representative samples had to be taken for the lithic artefacts. While, undoubtedly, further excavation or investigating Greenlandic, Nunavik, or Newfoundland material might shift the ultimate results, the size of the dataset and the range of sites investigated offer a representative sample of the majority of Late Dorset sites. In spite of these potential shortcomings, the dataset is comprehensive in both demonstrating the variability of the Dorset toolkit but also with capturing any differences due to regional variations.

Each class of organic and lithic artefact is presented in a standardised manner separated by artefact category. For this chapter has been separated into two sub-chapters: harpoon heads and handles. However, each sub-chapter is separated into a number of different sections representing the different types of each artefact category. Overall statistics and spatial distribution are presented followed by analysis of particular features of each category.
For ease of future comparisons and research, when individual artefacts are referenced, the standard labelling system employed by Canadian repositories will be used. This means that each artefact number will have the Borden number (representing the site where it was recovered) followed by a unique artefact number for that site (e.g. RaJu-1:95). Finally, a complete list of sites sampled and full metric data is included in the appendices.

5.2 Harpoon Heads

Harpoon heads represent one of the main categories of bladed organic objects found in Late Dorset assemblages. In saying this, those without a surviving blade slot were not included in the analysis. Moreover, harpoon heads that were clearly miniatures or “toys” are not included in the analysis. Park and Mousseau (2003) demonstrate the problematic nature of classifying harpoon heads as either “normal size” or “miniature” but for the purposes of this dataset, miniature or non-functional harpoon heads were considered to be small harpoon heads (e.g. less than 40mm in length) that were missing one or more key functional attributes (e.g. foreshaft socket, line holes, blade slot). As stated previously, while others have demonstrated that measuring harpoon head blade slot thicknesses (i.e. the linear distance between both blade beds) to be an effective, although imperfect, vector for understanding the extent of metal use among early Inuit (Gullason 1999; Whitridge 2002), similar analysis has not been undertaken for Dorset harpoon heads. It is this metric that will be the core attribute investigated both within this chapter and the following discussion chapters (Chapter 6, 7, and 8). A number of other attributes on the harpoon heads were measured and will be presented below in the interest of testing whether blade slot size is correlated with the raw material of the blade that it supported or if another factor may affect it (e.g. overall size of the object or length of the blade slot) (Figure 5.1).

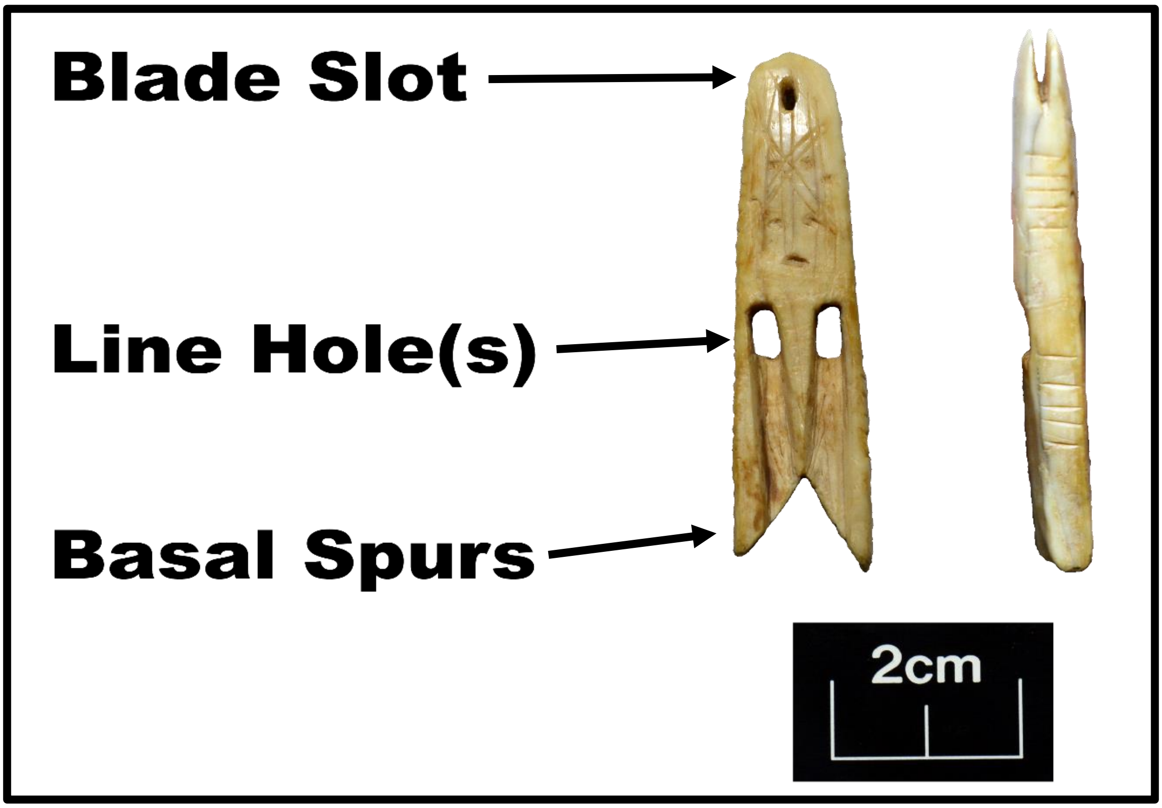

Figure 5.1: The basic anatomy of a harpoon head (front and lateral view of SgFm-5:165). They can be bladed (i.e. requiring an endblade) or self-bladed (no endblade or blade slot), have single, paired/double, or transverse line holes, and have single or double asymmetrical or symmetrical basal spurs. The cases discussed in this thesis will have all three types of line holes but will be bladed and almost exclusively have two symmetrical basal spurs (although some have no spurs at all). The foreshaft slot is found in the proximal portion of the harpoon head near the basal spurs. A "sliced" foreshaft slot is a small, frequently triangular opening on the front (i.e. ventral) face of the foreshaft slot. Photo permission courtesy of the Government of Nunavut and the Canadian Museum of History.

In total, 194 Dorset harpoon heads were analysed from 27 sites across Nunavut and Labrador (Figure 5.2), representing the majority of known Dorset sites in the Eastern Arctic that have harpoon heads. Importantly, not all 27 sites are represented equally within the dataset. For example, Brooman Point (QiLd-1), a site of significant Dorset presence (and with very good organic preservation), contributed 46 harpoon heads (23.7%) to the overall dataset. While much of this site-specific bias was unavoidable, the effect it has on the overall conclusions will be discussed later in this chapter. Additionally, the analysis only included bladed harpoon head types. This means that the harpoon heads included in this dataset can be divided into three broad types or categories. As such, this section will be divided into three parts, each focusing on the discrete harpoon head categories that were analysed. There are 81 Dorset Parallel specimens (e.g. Park and Stenton 1999:35), 74 Dorset "Type G" specimens (e.g. Park and Stenton 1999:36), and 39 "pre-Late Dorset" specimens.

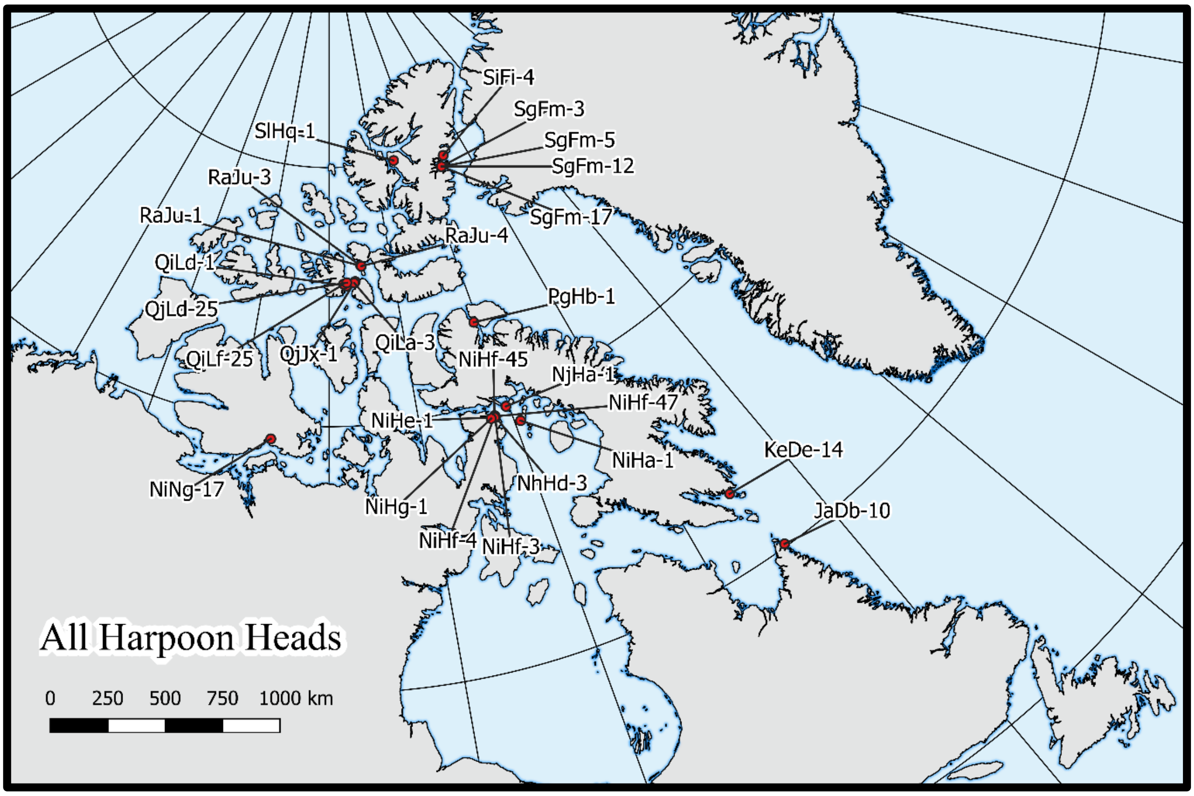

Figure 5.2: Sites containing harpoon heads included in this study.

The pre-Late Dorset group consists of single line hole bladed harpoon heads that are either typologically assigned to Pre-Dorset or Early/Middle Dorset or came from pre-Late Dorset contexts (Figure 5.3). Furthermore, while there are some single line hole bladed harpoon heads associated with Late Dorset (e.g. Type A or Type D) (Damkjar 2005; Park and Mousseau 2003:265), these are in the vast minority of all Late Dorset bladed harpoon heads. Those included in the "pre-Late Dorset" category are types that have not yet been conclusively associated with a Late Dorset context (e.g. Maxwell 1985:221). The most common types included in this group are Tyara Sliced (Park and Stenton 1999:32) and

Kingait Closed (Park and Stenton 1999:33) as well as the other single line hole types identified by Maxwell from his work in southern Baffin Island (e.g. Maxwell 1976:66). The main reason for not dividing this category further and simply referring to it as "pre-Late Dorset" is because the distinction between Early and Middle Dorset harpoon head typology is not fully understood (if a distinction even exists) and that there seems to be typological continuity between the two periods (see Desrosiers et al. 2006; Maxwell 1985:198; Odess 1998; 2005; Ryan 2016). Ultimately, grouping these relatively diverse (at least compared to the other two categories) harpoon heads into one category is because they act as an analytical control for any conclusions made about Late Dorset harpoon heads, the main analytical subject of this thesis.

Figure 5.3: A selection of pre-Late Dorset harpoon heads. Note the examples on the right have sliced foreshaft slots. From left to right: PgHb-1:4039, NiHa-1:60, NjHa-1:1265, NiHf-3:279. Photo permission courtesy of the Government of Nunavut, the Canadian Museum of History, and the Prince of Wales Northern Heritage Centre.

"Type G" harpoons are frequently cited as harpoon heads found in Late Dorset contexts with many authors assigning the type exclusively to the Late Dorset (e.g. Park and Stenton 1999:36; Maxwell 1985:221). The name for Type G harpoon heads derives from Jorgen

Meldgaard's original typology for Dorset harpoon heads. Since no other common name is used for Late Dorset Type G, it was decided that Meldgaard's original name should be used. Generally speaking, Type G harpoon heads are relatively thin with symmetrical basal spurs and a double (or paired) line holes that run perpendicular to the blade slot and foreshaft slot (Figure 5.4). While all Type G harpoon heads conform to that description, there are a few attributes that are present on only a portion of known examples. These include lashing grooves or a securing hole (discussed below) near the blade slot (some specimens have both) or a groove that runs from one of the line holes upwards towards the blade slot. This linear groove feature is sometimes seen on both ventral and dorsal surfaces of the harpoon head. Occasionally, Type G harpoon heads are decorated (sometimes elaborately so) when compared to pre-Late Dorset specimens.

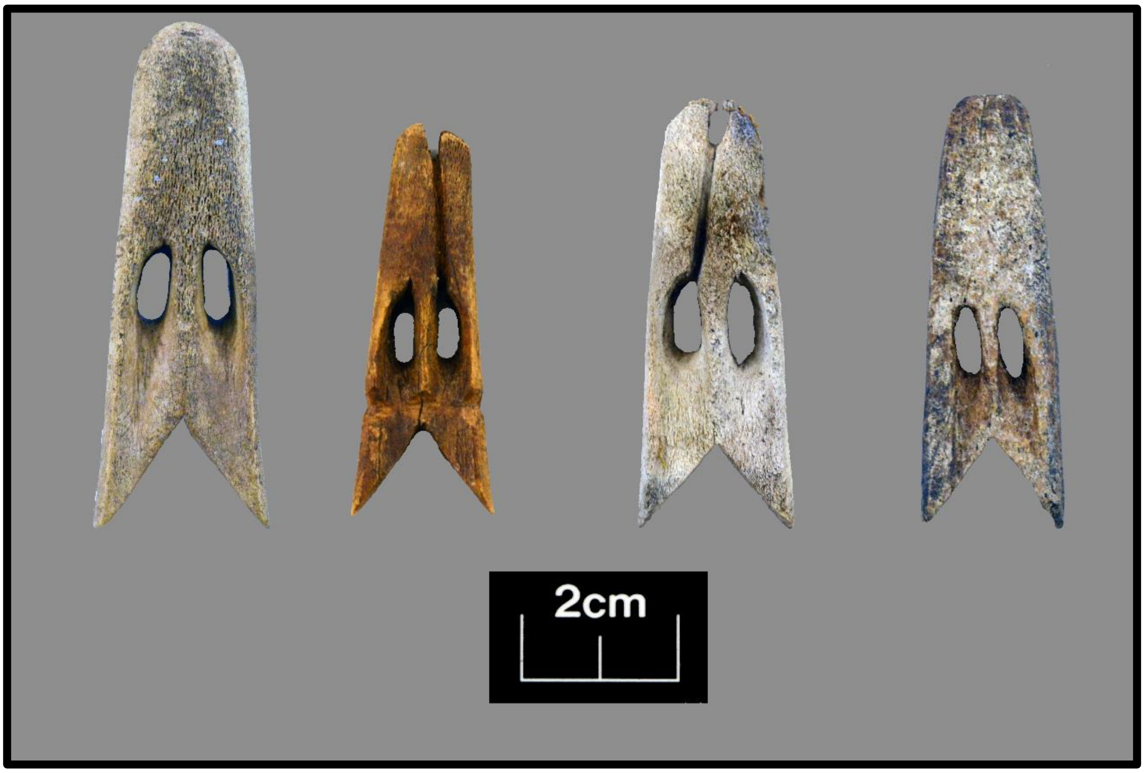

Figure 5.4: A selection of Type G harpoon heads. While there is some variation all have double line holes, a blade slot, and a triangular cut-out at the base. From left to right: NiHf-4:4339, NiHf-4:2078, QjJx-1:100, SlHq-1:30. Photo permission courtesy of the Government of Nunavut and the Prince of Wales Northern Heritage Centre.

Dorset Parallel specimens (Meldgaard's Type E) were first described by Taylor (1968) (which is where the name is derived) and are less easily assigned to a temporal period as they were manufactured throughout the Dorset period (Houmard 2011:441). Broadly speaking, Dorset Parallel harpoon heads are long with a deeply notched base (creating symmetrical spurs) and a transverse line hole (Figure 5.5). All known examples are closed socket with some, potentially earlier, examples being sliced. The line hole, blade slot, and foreshaft socket are parallel to each other. Some Dorset Parallels have incised line decoration ranging from singular incised lines above the line hole to fully decorated human faces (similar to the types of decoration on Type G). Due to the temporal continuity for the Dorset Parallel, an attempt will be made to further divide this category below.

Figure 5.5: A selection of Dorset Parallel harpoon heads. Note the "elongated" versions on the left and the sliced foreshaft slots on the right. From left to right: SgFm-5:1, QiLd-1:608, QiLd-1:455, NiHf-3:811. Photo permission courtesy of the Government of Nunavut, the Canadian Museum of History, and the Prince of Wales Northern Heritage Centre.

The core hypothesis that will be investigated with these data is that the blade slot size can be used as a proxy indicator for the raw material of the blade it once held. While, as will be seen, there are some exceptions, the data generated generally support this hypothesis and, as such, have important implications for understanding the extent of Late Dorset metal use. As detailed in Chapter 4, each blade slot was measured in three different locations. Unlike many early Inuit harpoon heads, Dorset harpoon head blade slots are frequently v-shaped in profile. While there are some exceptions, this generally means that any given linear distance between the two blade beds will be different even if human or instrument error was not a factor. When possible measurements were taken at three distinct areas of the blade slot: the proximal-most, medial, and distal-most. Effectively, these three measurements record the thinnest (proximal) and widest (distal) locations on the blade slot with the medial measurement representing a mid-point in the distance between the two blade beds. Importantly, the medial measurement is likely to be also the closest measurement to the endblade that was fitted into the slot while the proximal would seem to be the least likely. For example, the proximal measurement is frequently quite small as only the very tip of the endblade would have touched it. Given the nature of chipped stone and the Dorset manufacturing process of endblades, we can assume that the proximal measurement on either harpoon head slots or endblades would be more uniform than medial on distal measurements. The distal measurement may or may not have touched the endblade depending on the how it was fastened to the harpoon head. Additionally, the distal-most portion of the blade slot is the most flexible point and is victim to a certain amount of expansion when an endblade is fitted and contraction when it is removed. Therefore, the medial measurement will be the primary focus of this analysis with secondly the distal and thirdly the proximal measurements being considered when relevant. All of these statements are observable in the collected data and will be briefly discussed below.

Respectively, Figure 5.6, Figure 5.7, and Figure 5.8 all show the proximal, medial, and distal measurements taken for all 195 harpoon heads that were analysed. For the distal measurements only 182 harpoon heads had a sufficient amount of the blade bed surviving for an accurate measurement. Interestingly, both the medial measurements (Figure 5.7) and distal measurements (Figure 5.8) appear to have trimodal distributions while the proximal measurements have unimodal distribution. The similarity between the medial and distal distributions supports the hypothesis above that states primarily the medial measurement and secondly the distal measurements would be in contact most with the endblade and therefore likely represent the size of endblade that it once held. When plotted against each other there is a strong correlation between the size of the distal and medial blade slot measurements (Figure 5.9). Conversely, there is a much weaker correlation between the blade slot (at any of the three measurement locations) and the length of the blade slot itself (Figure 5.10), a pattern that is repeated when dividing the harpoon heads by type. This would suggest that the overall length of the blade slot and, seemingly, the overall length of the endblade's hafting region has less impact on the distance between the two blade beds. In other words, this dataset shows that a harpoon head blade slot with a slot length of roughly 6mm can have a medial thickness of 0.89mm up to nearly 3.6mm. A similar range of variation is not seen when comparing blade slot distances between the three measurement locations, although, variation between types can be seen.

In saying this, Hartigan's Dip Test demonstrates that the qualitative appearance of that multimodality in both the medial and distal blade slot thicknesses for all harpoon heads is not statistically significant (i.e. $p > 0.05$) (Table 5.1). The patterning seen in the data and the value of the dip test in this regard will be clarified once the harpoon heads are separated based on their typology below.

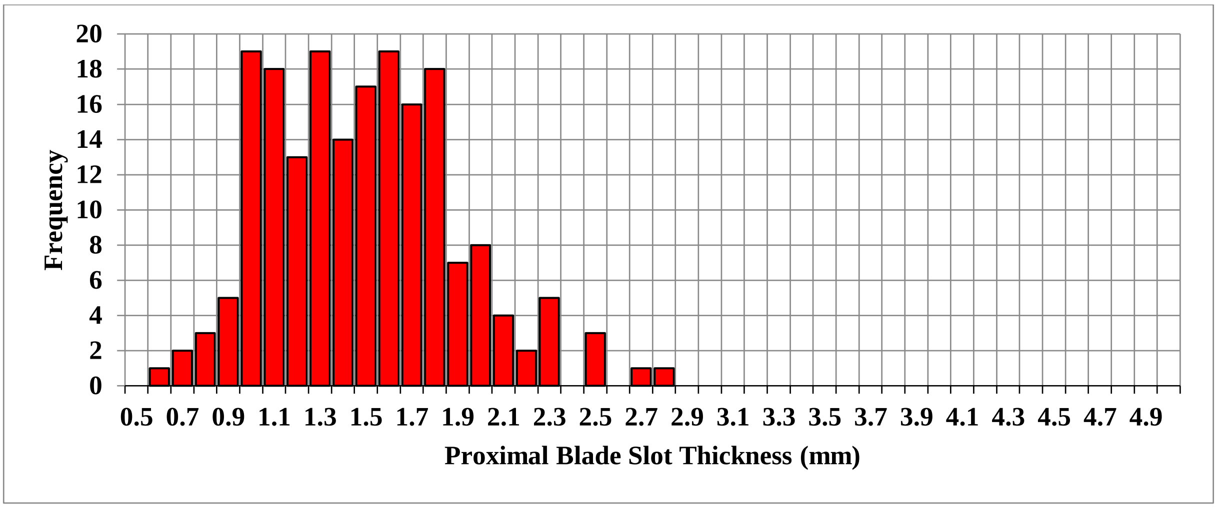

Figure 5.6: Proximal blade slot measurements for all harpoon heads (n=194).

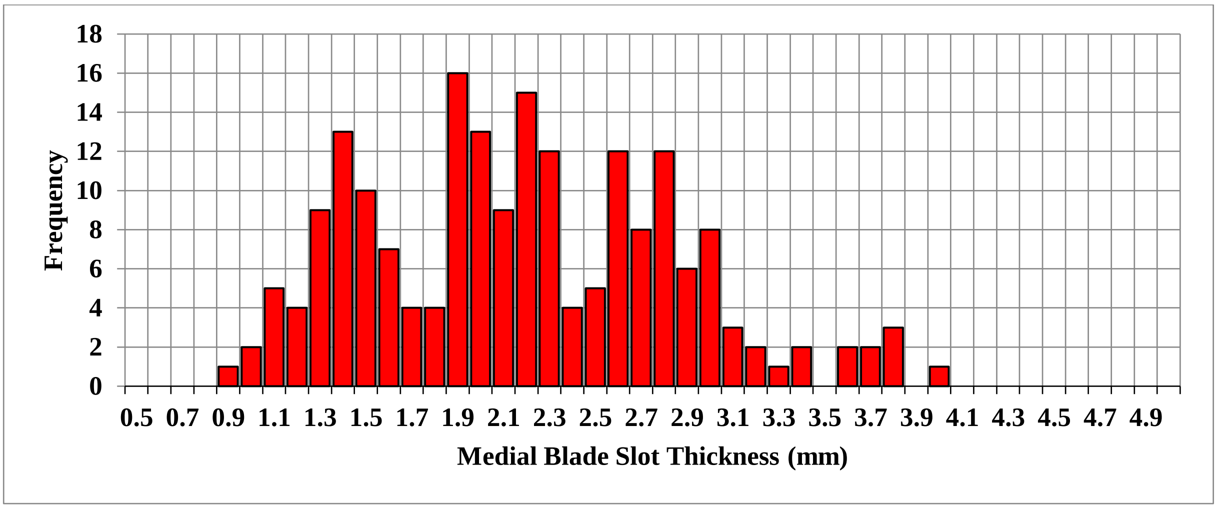

Figure 5.7: Medial blade slot measurements for all harpoon heads (n=194).

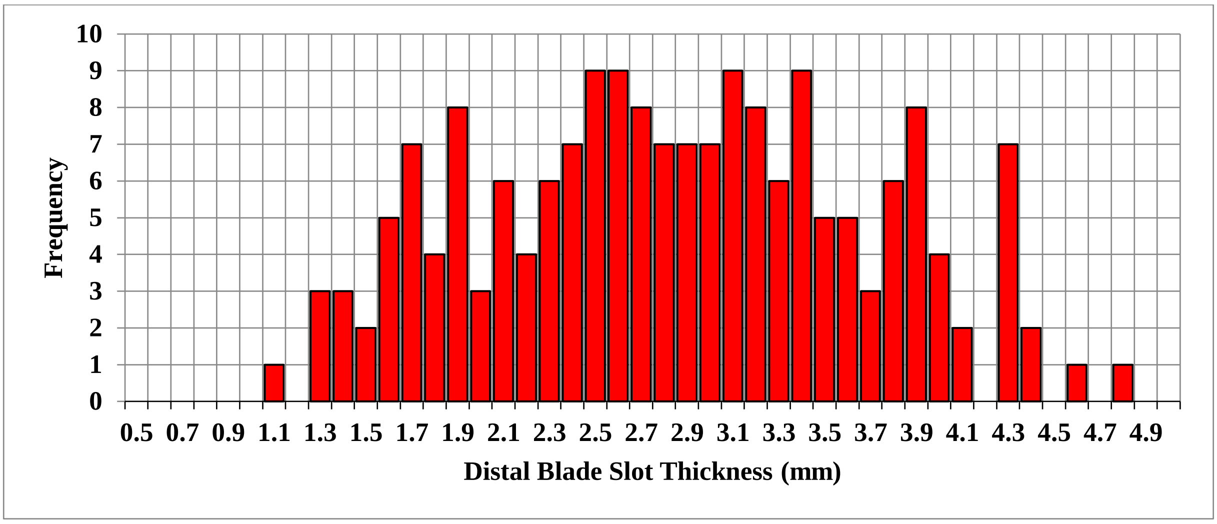

Figure 5.8: Distal blade slot measurements for all harpoon heads (n=182).

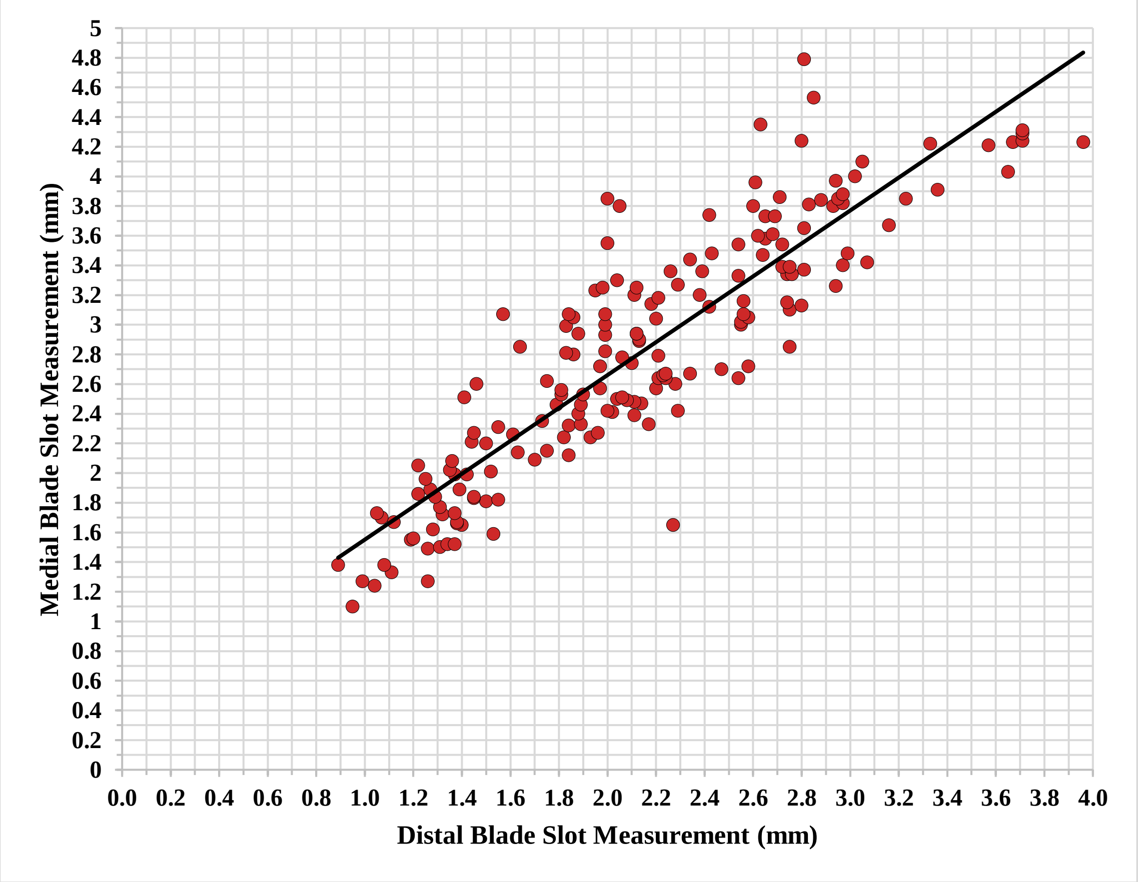

Figure 5.9: The relationship between medial and distal blade slot thickness measurements for all harpoon heads (n=182). Note: harpoon heads where a distal measurement was not possible are not included.

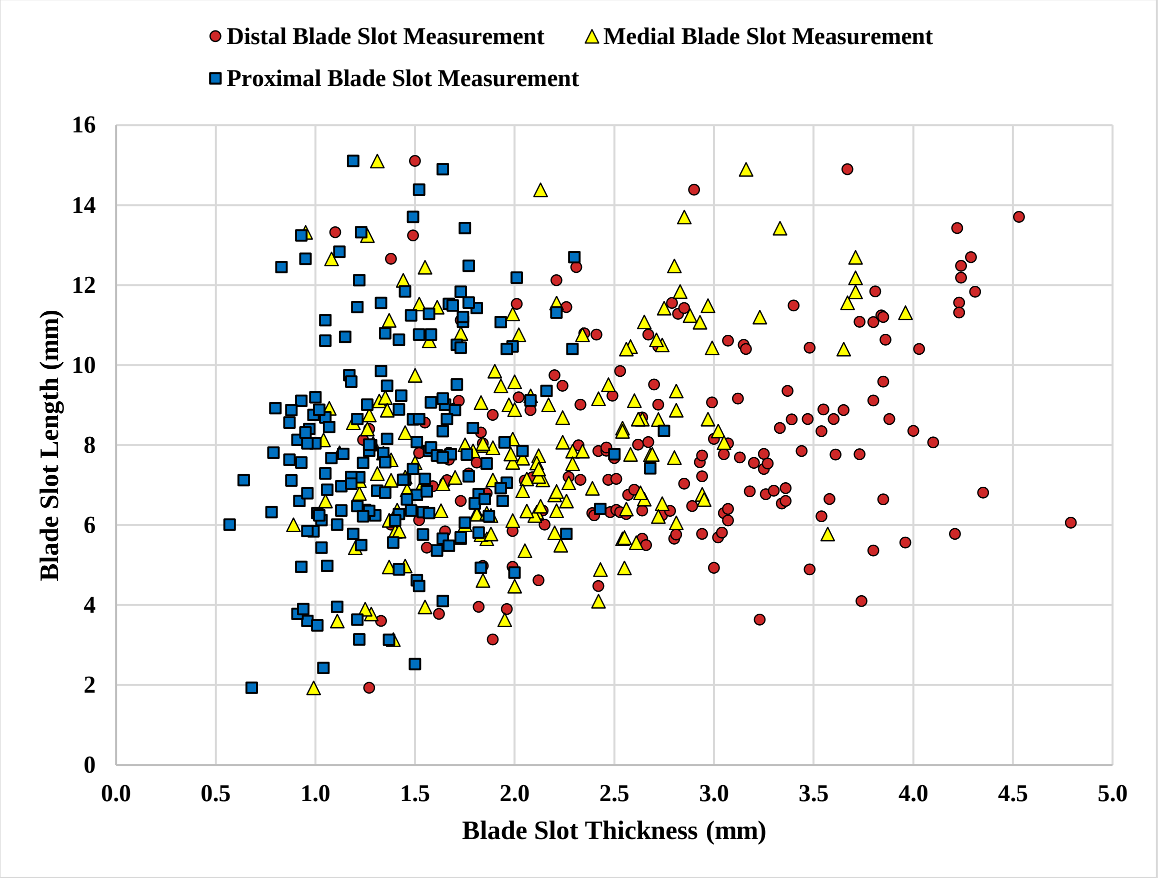

Figure 5.10: The relationship between proximal (n=178), medial (n=176), and distal (n=166) blade slot thickness and blade slot length for all harpoon heads.

Hartigan's Dip Test	D-Value	p-Value
Proximal	0.0264	0.447
Medial	0.0310	0.204
Distal	0.0182	0.974

Table 5.1: Hartigan's Dip Test of unimodality for all harpoon head blade slot thicknesses at each measurement location. A p-value of <0.05 is considered statistically significant. In the case of the calculations here, all distributions are unimodal.

5.2.1 Dorset Parallel Harpoon Heads

Blade slot thickness varies significantly depending on the type of the harpoon head with Dorset Parallel harpoon heads tending to have the largest blade slots of any of the three harpoon head categories used in this study. Although, there is a large amount of variability. There are 85 Dorset Parallel harpoon heads in the dataset from 21 different sites across the Arctic (Figure 5.11). Major concentrations of Dorset Parallel specimens included in this dataset effectively derive from four key regions (Central Arctic, High Arctic, northwest Foxe Basin, and Hudson Strait) with the PgHb-4 (Nunguvik) specimens being the major outlier. The majority of the Dorset Parallel specimens come from the Foxe Basin and the Central Arctic (Table 5.2).

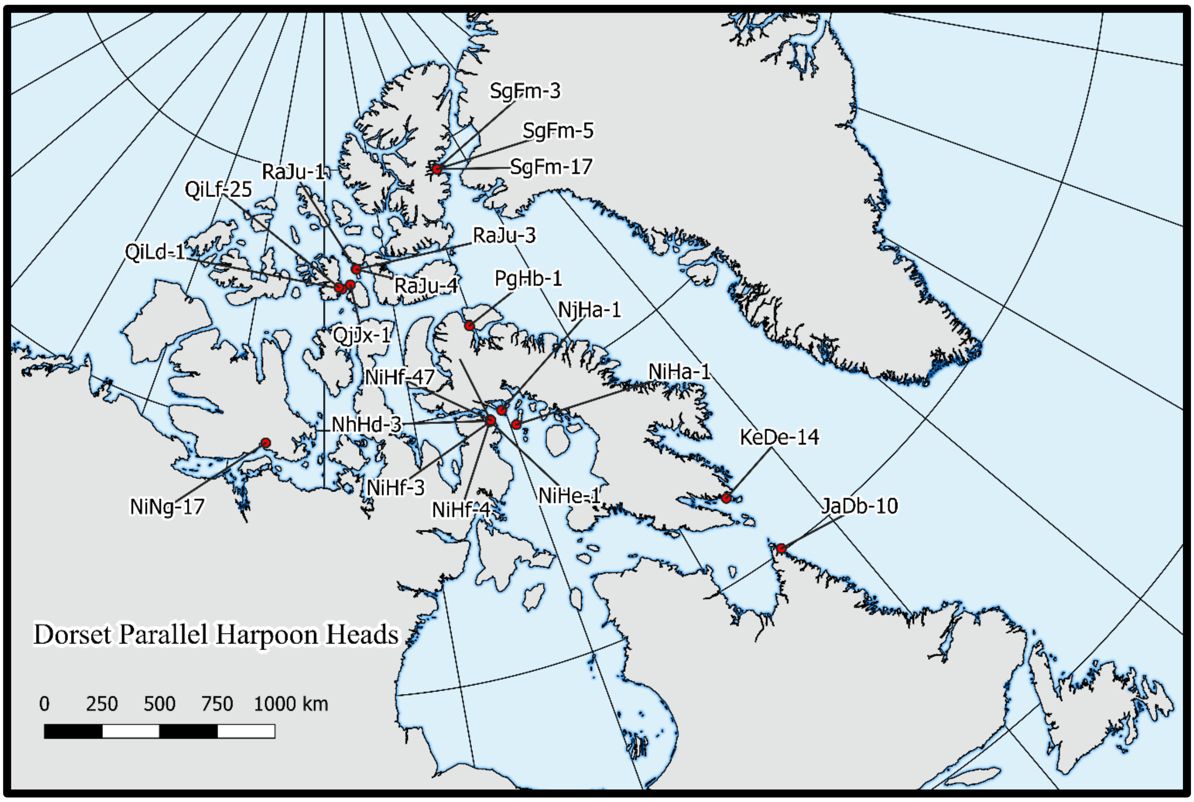

Figure 5.11: Distribution of Dorset Parallel harpoon heads included in the dataset.

Some have suggested that Dorset Parallel heads were used primarily to hunt walrus compared to other, smaller Dorset harpoon heads (Mary-Rousselière 1976:50; Maxwell 1976:63; Murray 1999:474). This is corroborated not only by the overall length and width of the head itself but, as seen in this dataset, the blade slot size. The mean medial blade slot thickness is 2.56mm and the mean distal blade slot thickness is 3.38mm. The distribution of Dorset Parallel blade slot thicknesses for both medial and distal measurements in Figure 5.12 corresponds well with the thickest distribution peaks seen in Figure 5.7 and Figure 5.8. There is a weak positive correlation between the slot thickness at any given measurement location and the length of the blade slot itself for Dorset Parallel harpoon heads but less so with the proximal measurements (Table 5.3). In other words, as the blade slot gets longer it will generally get thicker in the medial and distal regions as well (Figure 5.13).

Region/Site	Number of Specimens
Hudson Strait	
JaDb-10	2
KeDe-14	2
Sub-Total	*4*
Northwest Foxe Basin	
NjHa-1	12
NiHf-4	10
NiHf-3	4
NiHf-45	4
NiHa-1	3
NiHf-47	3
NhHd-3	1
NiHe-1	1
Sub-Total	*38*
Central Arctic	
QiLd-1	9
QjJx-1	4
RaJu-1	3
QiLf-25	2
RaJu-3	2
RaJu-4	1
Sub-Total	*22*
High Arctic	
SgFm-3	7
SgFm-5	3
SgFm-17	1
Sub-Total	11
Other Sites	
PgHb-1	6
NiNg-17	1
Sub-Total	*7*
Total (all regions)	**81**

Table 5.2: Number of Dorset Parallel specimens included in the dataset separated by site and region.

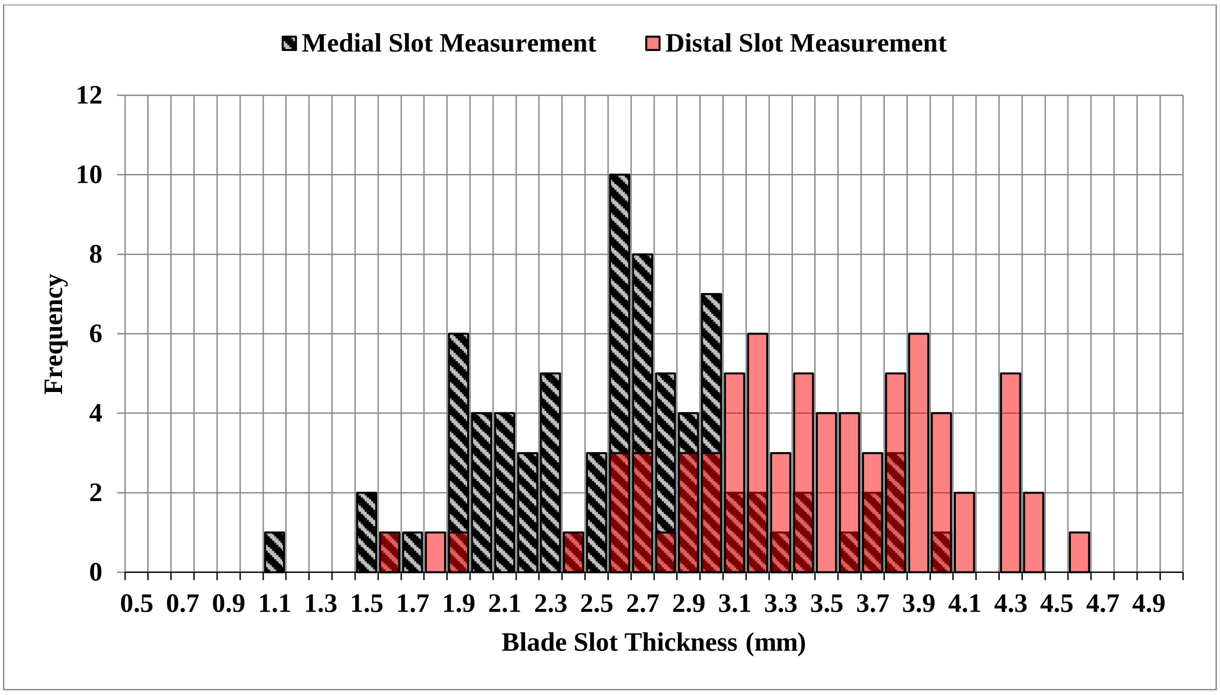

Figure 5.12: Medial (n=79) and distal (n=72) blade slot measurements for Dorset Parallel harpoon heads.

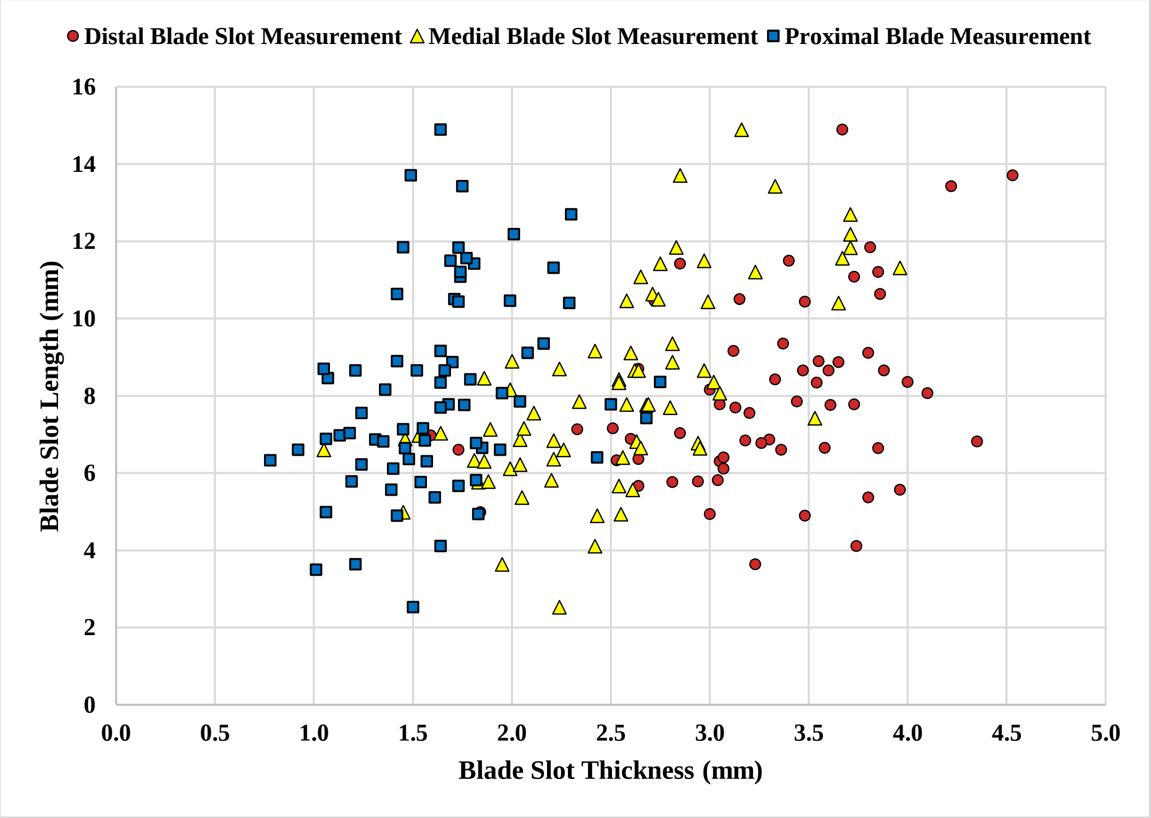

Figure 5.13: The relationship between proximal (n=81), medial (n=79), distal (n=72) blade thickness and blade slot length for Dorset Parallel harpoon heads.

Dorset Parallel	Pearson's Correlation Coefficient
Proximal	0.319
Medial	0.644
Distal	0.500

Table 5.3: Pearson's correlation coefficient values for Dorset Parallel blade slot thicknesses (at the three different measurement locations) and blade slot length.

The overall length, width, and thickness of each harpoon head was also recorded. Excluding the specimens that were either broken or incomplete, a rough overall volume (expressed in cm^3) was calculated. There is a weak positive correlation between the rough overall size of the harpoon head and the thickness of the blade slot (Figure 5.14). Calculating Pearson's r for this relationship produces a similar, albeit weaker correlation between blade slot thickness and overall size as that for blade slot length (Table 5.4). However, it must be emphasised that the volumes calculated for the harpoon heads represent a maximum volume. Since no harpoon head is a perfect rectangle and has a variable length, width, and thickness, the volume estimations do not necessarily represent reality. In saying that, this method does offer some indication of the relationship between the rough size of the harpoon head itself and its blade slot. Much like the conclusions for the blade slot length comparison, it seems that as the harpoon head gets larger, the blade slot does as well. However, the weaker Pearson's r values demonstrate that there may be more that affects the slot thickness than simply the object's size and the slot length.

In addition to having the widest range of blade slot thicknesses of all the harpoon head categories for both proximal and medial measurements (Table 5.5), Dorset Parallel harpoon heads have the widest temporal range, having been identified in Early, Middle, and Late Dorset contexts. This makes it difficult to specifically discuss this harpoon head type in specific regards to the Late Dorset. In saying that, while there is some typological consistency for Dorset Parallel heads through time, there are some key differences. In particular, Late Dorset examples of the Dorset Parallel are considered to be elongated in comparison to earlier examples (Maxwell 1985:135).

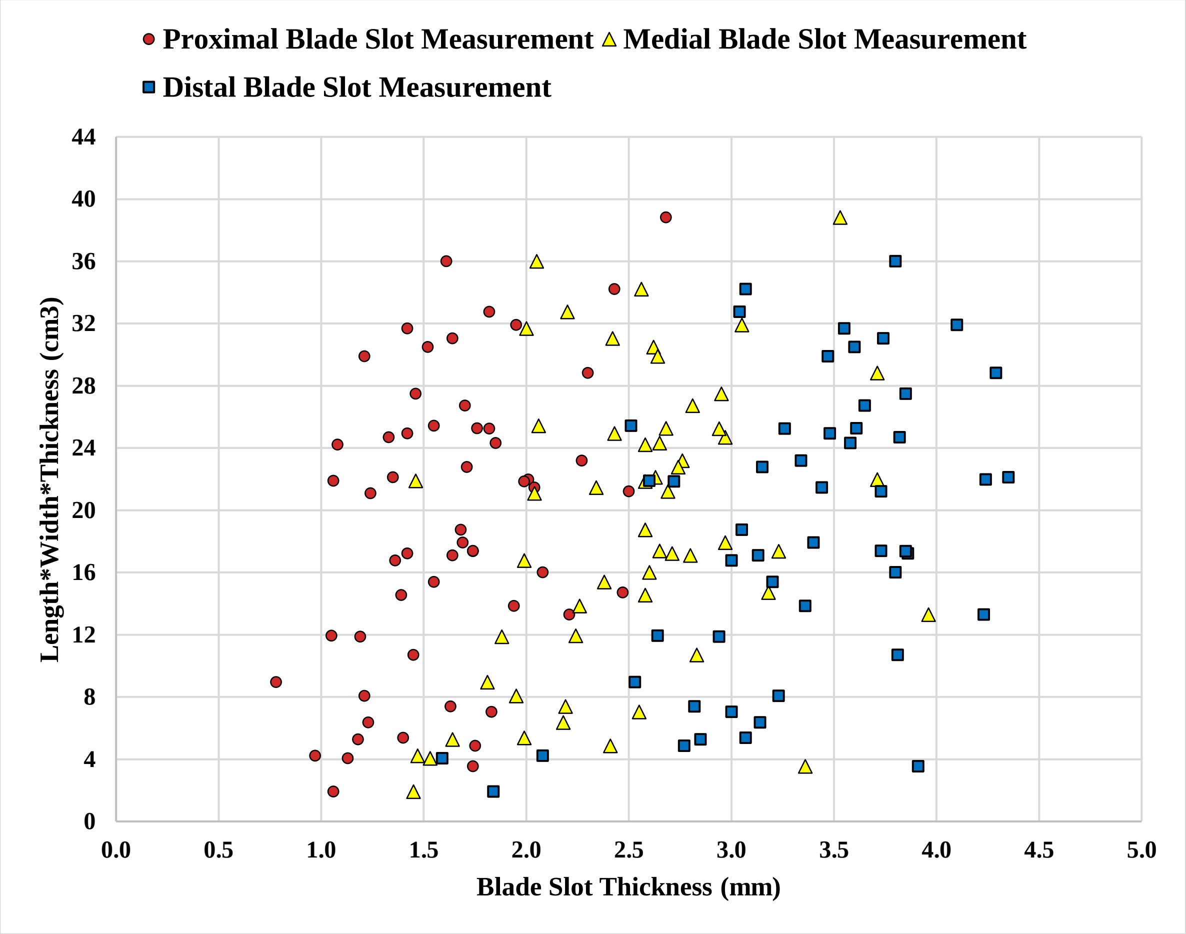

Figure 5.14: The relationship between Dorset Parallel blade slot thickness at the proximal (n=56), medial (n=56), and distal (n=51) measurement locations and a rough overall volume of the harpoon head (LxWxT).

Dorset Parallel	Pearson's Correlation Coefficient
Proximal	0.400
Medial	0.351
Distal	0.487

Table 5.4: Pearson's correlation coefficient values for Dorset Parallel blade slot thickness (at all three locations) and overall harpoon head size (calculated to cm^3).

Range	Pre-Late Dorset	Dorset Parallel	Type G
Proximal	1.24	1.97	1.69
Medial	1.65	2.91	2.68
Distal	2.15	2.94	3.69

Table 5.5: The ranges between the widest and thinnest blade slot measurements (for all three measurement locations) of each harpoon head category. Note: all values expressed as millimetres.

Table 5.6 isolates Dorset Parallel specimens that come from specifically Late Dorset contexts or sites without clear indication of Early/Middle Dorset settlement that have been radiocarbon dated to the Late Dorset period, and that all exhibit the characteristic "elongated" feature. Furthermore, Dorset Parallel examples with sliced sockets were also included in the pre-Late Dorset "Dorset Parallel" dataset, which are attributes assigned to pre-Late Dorset harpoon heads (e.g. Maxwell 1985:135). While there were 5 sliced specimens that come from predominantly Late Dorset contexts (NiHf-4, QiLd-1, QiLf-25), they were either overwhelmingly stylistically similar to pre-Late Dorset examples or were from contexts that could have incorporated pre-Late Dorset material into a Late Dorset site (e.g. roof fall).

Despite these arguably crude (and arbitrary) criteria, the pre-Late Dorset examples have a thicker mean and median medial blade slot measurements than the Late Dorset examples yet both have broadly similar amounts of variation (Table 5.7). While there appears to be significant qualitative overlap between the blade slot thicknesses (Figure 5.15), there are quantitative differences within the Dorset Parallel dataset when separating the specimens by their chronological or cultural contexts (as seen in Table 5.7). Computing Welch's t-test (i.e. two-sample, assuming unequal variance, two-tailed) for both the medial and distal blade slot thicknesses for both periods demonstrates a very strong statistically significant difference (p-value <0.05) between blade slot sizes (in both cases) of Dorset Parallel harpoon heads from Late Dorset and pre-Late Dorset sites (Table 5.8).

Moreover, there appears to be a bimodal distribution in the Late Dorset specimens (modes at 1.9mm and 2.7mm) but not in the pre-Late Dorset specimens which might indicate two different types of raw material being used (or at least two different blade sizes). Running Hartigan's Dip Test of unimodality (Hartigan and Hartigan 1985) on the medial blade slot thicknesses shows a statistically significant outcome for Late Dorset specimens having a multimodal distribution (the test is not able to differentiate between bi- or multimodal distributions). Pre-Late Dorset specimens, however, have a unimodal distribution. The dip test shows that both chronological categories have a unimodal distribution in terms of distal blade slot thicknesses, however (Table 5.9). Notice as well that the coefficient of variation is greater for Late Dorset than pre-Late Dorset specimens. When Dorset Parallel harpoon heads from Late Dorset contexts are isolated and separated by region, the statistically significant multimodal distribution does not represent different regions styles or strategies (or different lithic raw materials from different regions) (Figure 5.16). Roughly half of Foxe Basin (50%) and Central Arctic (44%) examples are represented in the thinner group while there are more High Arctic (67%) examples in the thinner group. Despite the overall blade slot thickness of Dorset Parallel harpoon heads being greater (on average) than the other two harpoon head categories discussed below, the "Late Dorset" Dorset Parallel blade slots are (on average) thinner than the "pre-Late Dorset" examples. Ultimately, this may be a factor of a changing lithic endblade technology or, as will be debated, additional evidence of a shift towards incorporating more metal endblades by the Late Dorset. This pattern of the Late Dorset examples being slightly thinner than the pre-Late Dorset specimens is paralleled when observing the Late Dorset Type G and other pre-Late Dorset harpoon heads.

Dorset Parallel (Pre-Late Dorset)		**Dorset Parallel (Late Dorset)**	
Site	**n**	**Site**	**n**
JaDb-10	2	NiHf-4	8
KeDe-14	2	NiHf-45	4
NhHd-3	1	QiLd-1	8
NiHa-1	3	QjJx-1	4
NiHe-1	1	RaJu-1	3
NiHf-3	4	RaJu-3	2
NiHf-4	2	RaJu-4	1
NiHf-47	3	SgFm-3	7
NjHa-1	12	SgFm-5	3
NiNg-17	1	SgFm-17	1
PgHb-1	6		
QiLd-1	1		
QiLf-25	2		
Total	**40**		**41**

Table 5.6: Number and location of Dorset Parallel specimens separated into two rough chronological groups (Pre-Late Dorset and Late Dorset).

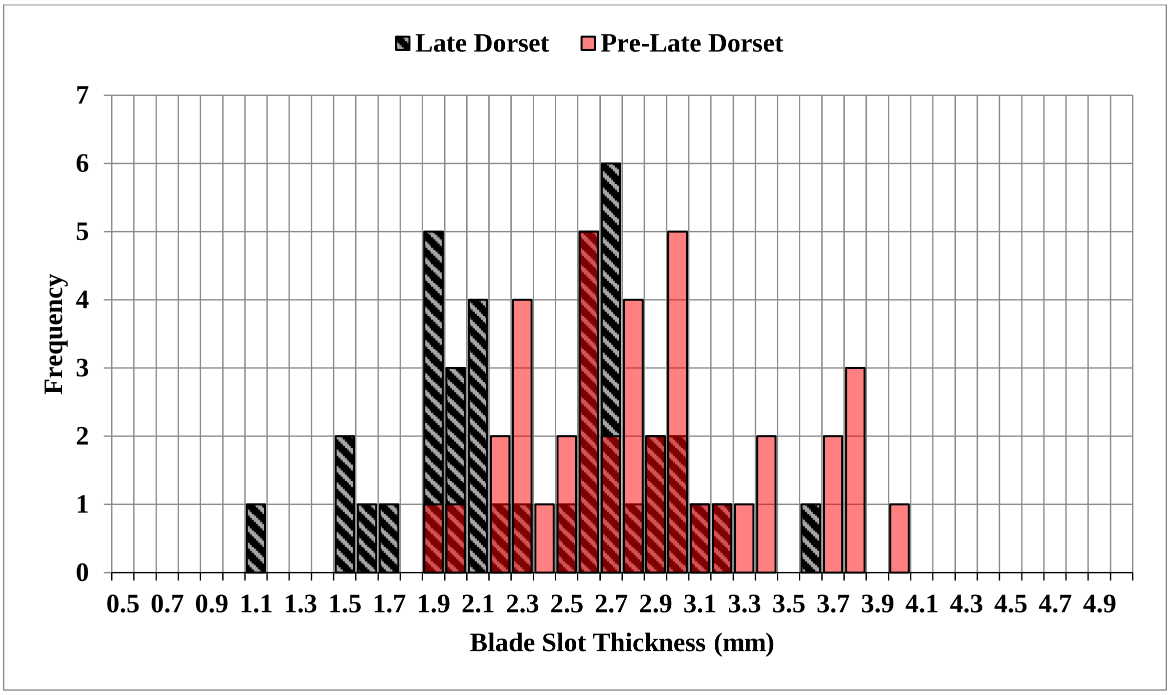

Figure 5.15:Medial blade slot thickness for Dorset Parallel harpoon heads separated by pre-Late Dorset (n=40) and Late Dorset (n=39) contexts. N.B. Differences between sample number between this chart and Table 5.6 is due to some harpoon heads not having a suitable medial slot measurement.

Medial	**Pre-Late Dorset**	**Late Dorset**	**Both**
n	40	39	79
Mean	2.81	2.31	2.56
Median	2.75	2.42	2.58
Maximum	3.96	3.53	3.96
Minimum	1.81	1.05	1.05
Range	2.15	2.48	2.91
Standard Deviation	0.53	0.54	0.59
Coefficient of Variation	18.86	23.38	23.05

Distal	**Pre-Late Dorset**	**Late Dorset**	**Both**
n	38	34	72
Mean	3.57	3.18	3.38
Median	3.55	3.15	3.42
Maximum	4.35	4.53	4.53
Minimum	2.53	1.59	1.59
Range	1.82	2.94	2.94
Standard Deviation	0.50	0.69	0.62
Coefficient of Variation	14.01	21.70	18.34

Table 5.7: Descriptive statistics for Dorset Parallel medial blade slot thicknesses separated by chronological/cultural context. All values expressed in millimetres.

Welch’s t-Test	Medial Blade Slot Thickness	Distal Blade Slot Thickness
t-Stat	4.12	2.99
t Critical (two-tail)	1.99	2.00
p-Value	0.000096	0.0040

Table 5.8: Two sample Welch’s t-test results for Dorset Parallel medial and distal blade slot thicknesses from Late Dorset and pre-Late Dorset sites. The t-stat being greater than the critical value and the p-value being less than 0.05 indicates there is a significant statistical difference between Dorset Parallel harpoon heads from Late Dorset and pre-Late Dorset sites.

Hartigan’s Dip Test	Medial Blade Slot D-Value	Medial Blade Slot p-Value	Distal Blade Slot D-Value	Distal Blade Slot p-Value
Late Dorset	0.0915	0.0086	0.0615	0.393
Pre-Late Dorset	0.0527	0.543	0.0547	0.517

Table 5.9: Hartigan’s Dip Test of unimodality for Dorset Parallel harpoon head medial and distal blade slot thicknesses separated by chronological category. A p-value of <0.05 is considered statistically significant. In the case of the calculations here, the medial blade slot thicknesses of Late Dorset specimens are non-unimodal (i.e. at least bimodal).

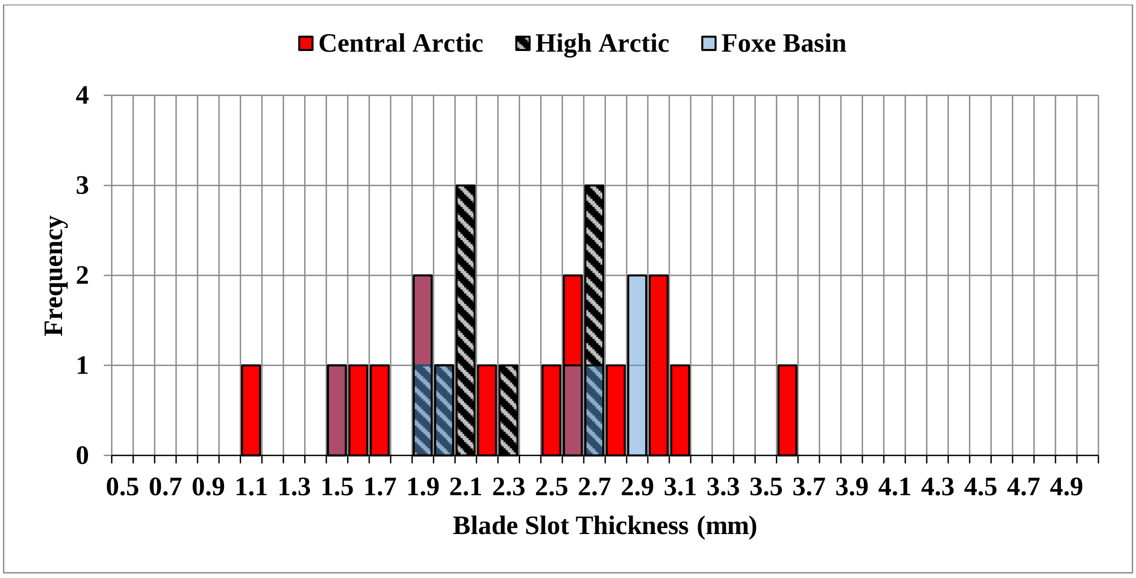

Figure 5.16: Medial blade slot thickness for Late Dorset Dorset Parallel harpoon heads from the Central Arctic (n=18), High Arctic (n=9), and Foxe Basin (n=8).

5.2.2 Type G Harpoon Heads

Type G harpoon heads, which are overall smaller harpoon heads than the Dorset Parallel type, also tend to have a thinner blade slot. The dataset contains 74 Type G harpoon heads from 17 different sites (Figure 5.17). The mean medial slot measurement is 1.63mm and the mean distal slot measurement is 2.23mm. The overall distribution of the medial and distal blade slot thickness measurements for Type G harpoon heads (Figure 5.18) corresponds well with the thinnest distribution peaks in Figure 5.7 and Figure 5.8. Significantly, the majority of the distal slot measurements (excluding the handful of outliers) for Type G harpoon heads (2.23mm) are thinner than the mean medial slot measurements for the Dorset Parallel harpoons (2.56mm). Also in contrast to Dorset Parallel harpoons, Type G harpoon blade thickness is very weakly correlated with blade slot length (Figure 5.19 and Table 5.10). This means that blade slot length cannot reliably be used as an "explanation" for blade slot size in the case of Type G harpoon heads. This contrasts with the correlation coefficient values when comparing blade slot thickness with the overall size of the harpoon head (Table 5.11). Using only the complete specimens that allow for accurate overall length, width, and thickness measurements, it seems there is weak positive correlation between the overall size of the blade slot and the harpoon head itself (Figure 5.20) which is very similar to the data for Dorset Parallel harpoon heads. In summary, the data indicate that not only are Type G blade slots amongst the thinnest in the dataset but there is generally a weak correlation (if any) between the size of the blade slot itself and the physical size of the harpoon head or the length of its blade slot.

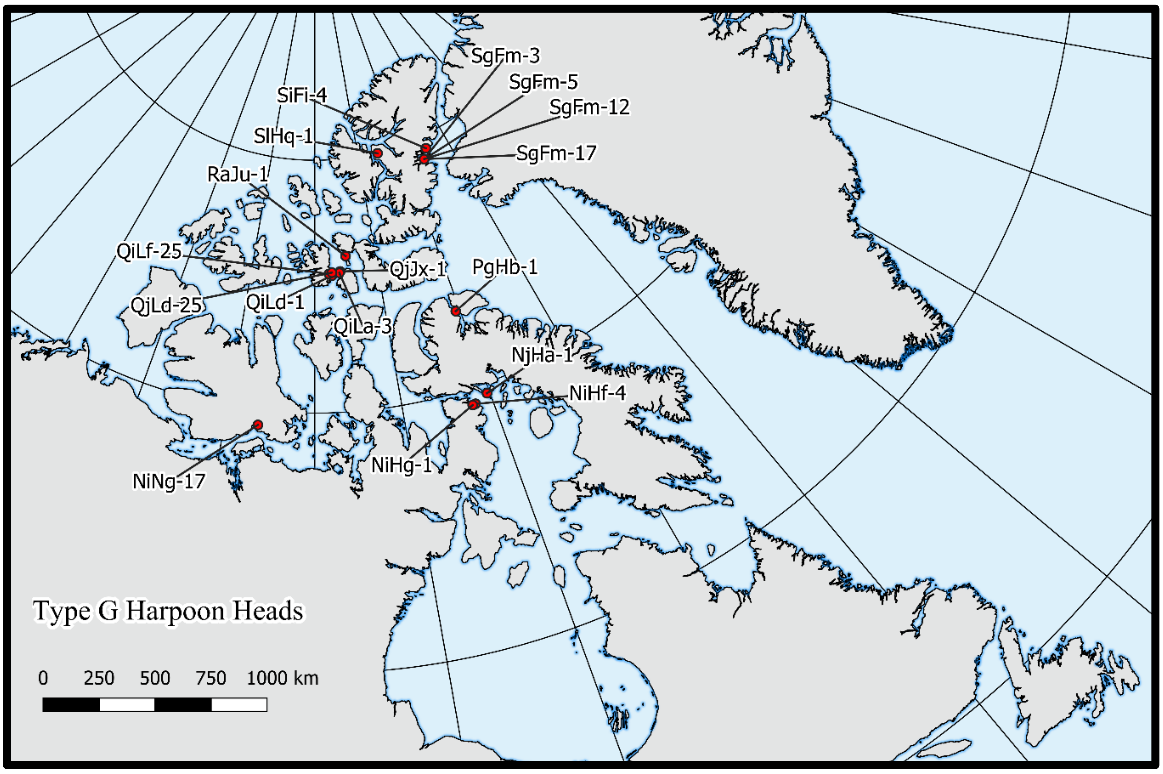

Figure 5.17: Distribution of Type G harpoon heads included in the dataset.

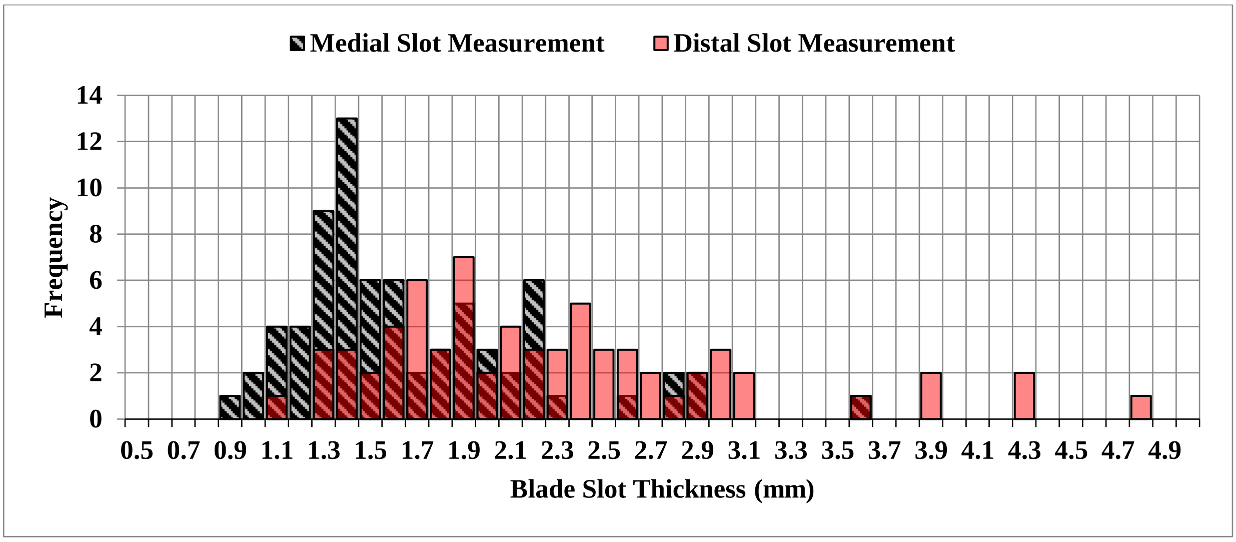

Figure 5.18: Medial (n=73) and distal (n=68) blade slot measurements for Type G harpoon heads.

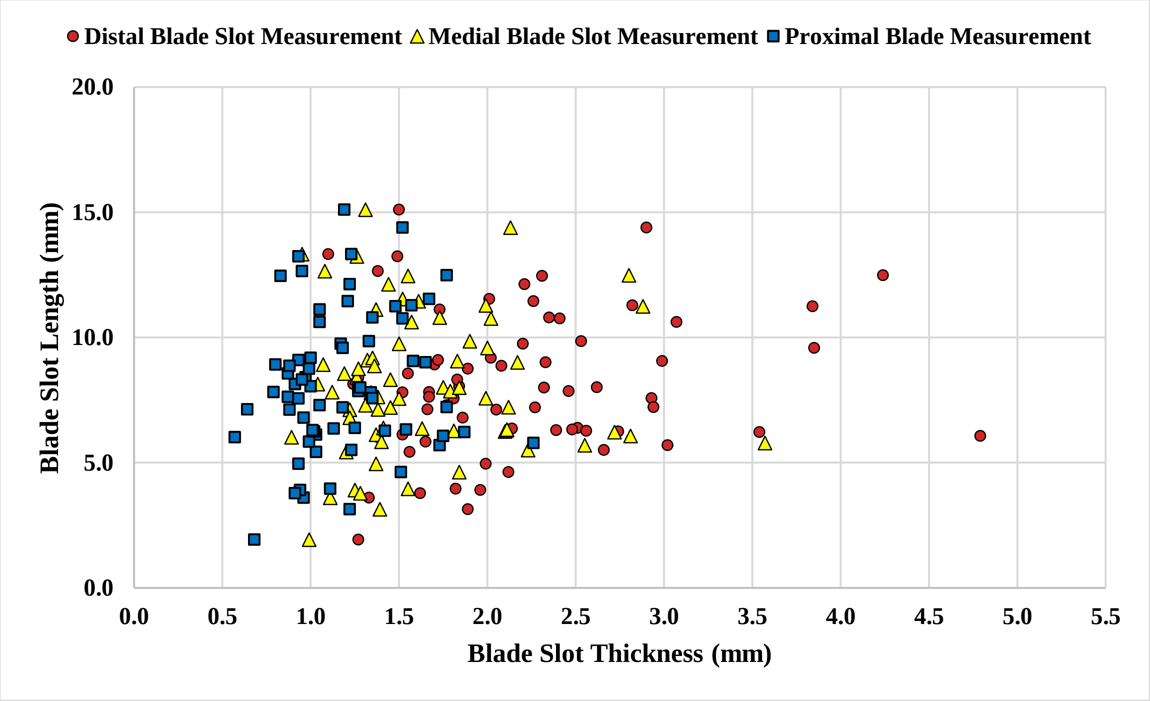

Figure 5.19: The relationship between proximal (n=68), medial (n=68), and distal (n=68) blade thickness and blade slot length for Type G harpoon heads.

Type G	Pearson’s Correlation Coefficient
Proximal	0.089
Medial	0.004
Distal	0.081

Table 5.10: Pearson’s correlation coefficient values for Type G blade slot thicknesses and blade slot length.

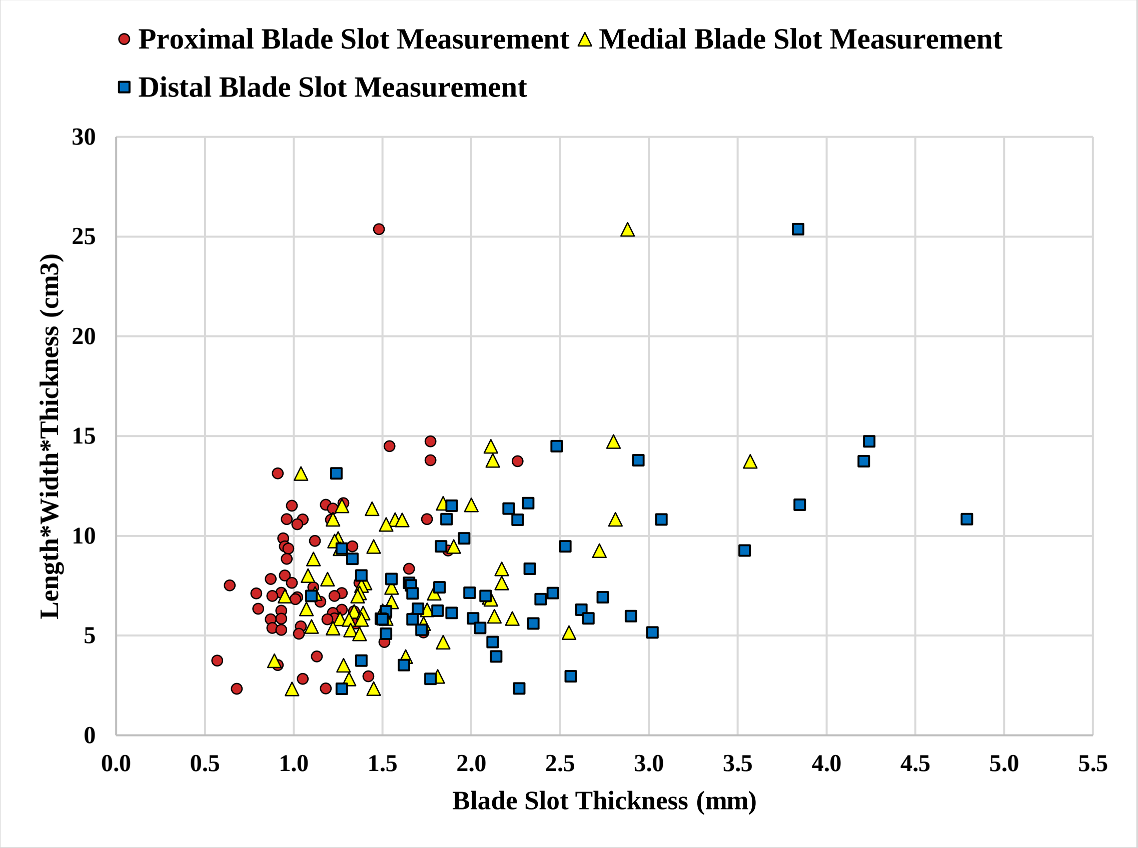

Figure 5.20: The relationship between Type G blade slot thickness at the proximal (n=62), medial (n=62), and distal (n=57) measurement locations plotted against a rough overall volume of the harpoon head (LxWxT).

Type G	Pearson's Correlation Coefficient
Proximal	0.353
Medial	0.463
Distal	0.495

Table 5.11: Pearson's correlation coefficient values for Type G blade slot thickness (at all three locations) and overall harpoon head size (calculated to cm^3).

Complicating some of the Type G harpoon head results is the sampling bias of the dataset itself. Of the 74 Type G harpoon heads 35 are from QiLd-1 (Brooman Point) (Table 5.12). Moreover, the overall distribution of the sites that had Type G harpoon heads that were sampled cluster in effectively three regions: the northwest Foxe Basin, the Central Arctic (around McDougall Sound and Port Refuge), and the High Arctic (Ellesmere Island) (see Figure 5.17). The main reasons for this distribution is partly due to the availability of material at the Prince of Wales Northern Heritage Centre and the Canadian Museum of History but more significantly by the current state of excavated Late Dorset sites in the

Arctic with suitable material for this analysis. Two key regions not included in this analysis but that have been extensively investigated are southern Victoria Island and the coasts of the Boothia Peninsula and Somerset Island. The applicable material from both these regions were on loan and could not be accessed.

Region/Site	**Number of Specimens**
Northwest Foxe Basin	
NiHf-4	6
NiHg-1	1
NjHa-1	1
Sub-Total	*8*
Central Arctic	
QiLd-1	35
QjJx-1	7
QiLf-25	2
QiLa-3	1
QjLd-25	1
RaJu-1	1
Sub-Total	*47*
High Arctic	
SgFm-3	7
SiFi-4	4
SgFm-5	3
SgFm-12	1
SgFm-17	1
SlHq-1	1
Sub-Total	*17*
Other Sites	
NiNg-17	1
PgHb-1	1
Sub-Total	*2*
Grand Total	**74**

Table 5.12: Number of Type G specimens included in the dataset separated by site and region.

With these minor limitations in mind, the variation of blade slot thicknesses across the three main regions does not differ drastically (Figure 5.21 and Figure 5.22). Additionally, 76.6% of Central Arctic, 62.5% of Foxe Basin, and 81.2% of High Arctic Type G medial blade slot thicknesses are less than 1.9mm. This suggests that blade slot size (and potentially the choice of using metal blades) was not only limited to areas that had direct access to naturally occurring metal (e.g. southern Victoria Island and Coppermine River area or Ellesmere Island and High Arctic Greenland). Although, importantly, the majority of known Late Dorset metal specimens have been recovered from sites on Little Cornwallis Island, only 50km away by boat from QiLd-1 (Brooman Point). In this regard, the existing distribution of known Late Dorset metal objects is supported by the large amount of harpoon heads that have been identified to have a thinner slot.

Removing QiLd-1 (Brooman Point) from the analysis does alter the conclusions slightly. However, it is difficult to determine if the difference is due to QiLd-1 being unique or if it is simply due to statistical reasons since there are 35 specimens from QiLd-1 alone. In any case, the overall distribution of medial blade slot thickness does not change drastically when excluding QiLd-1 (Figure 5.23). The High Arctic sites, however, make up a much larger portion of the harpoon heads with thinner slots (i.e. below 1.9mm) and the Central Arctic sites are much more evenly distributed. Likewise, the distal thicknesses for all regions are much more evenly distributed (Figure 5.24). In saying all this, it should be emphasised that it is very difficult to assess these distributions given the low sample size of some regions.

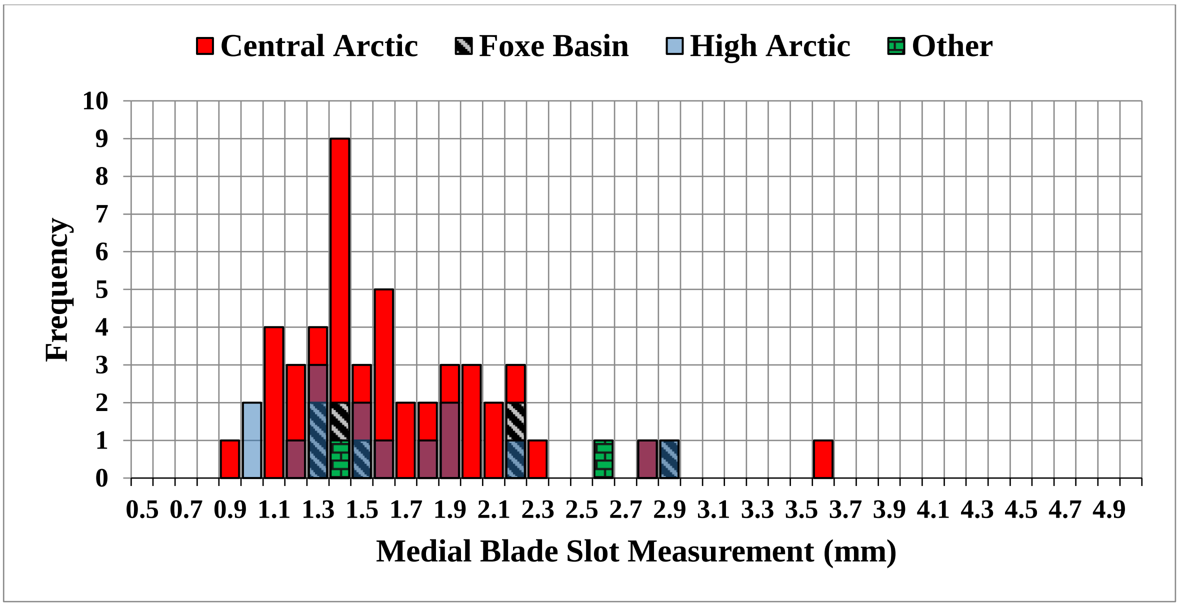

Figure 5.21: Medial blade slot thickness for harpoon heads from the Central Arctic (n=47), the Foxe Basin (n=8), the High Arctic (n=16), and "other" regions (n=2) included in this study. Note: the sample numbers for individual measurement locations may differ from the overall number of harpoon heads included in the dataset as some blade slots were preserved enough only for certain measurements.

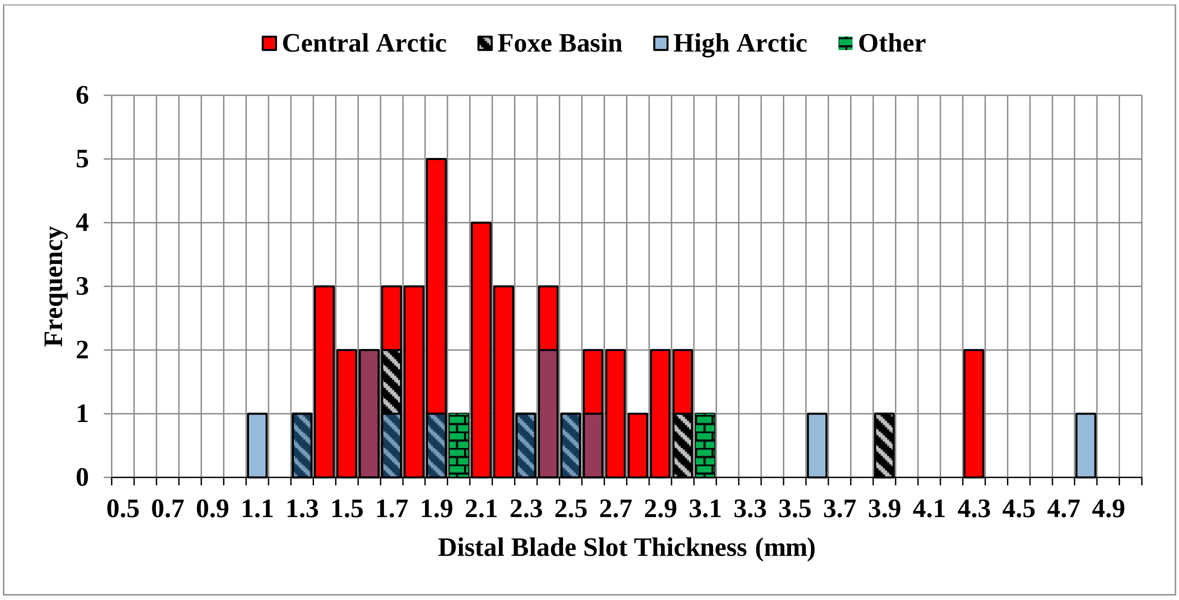

Figure 5.22: Distal blade slot thickness for harpoon heads from the Central Arctic (n=44), the Foxe Basin (n=8), the High Arctic (n=14), and "other" regions (n=2) included in this study. Note: sample size differs slightly from that reported in Figure 5.21 due to the distal blade slot measurement not being able to be recorded.

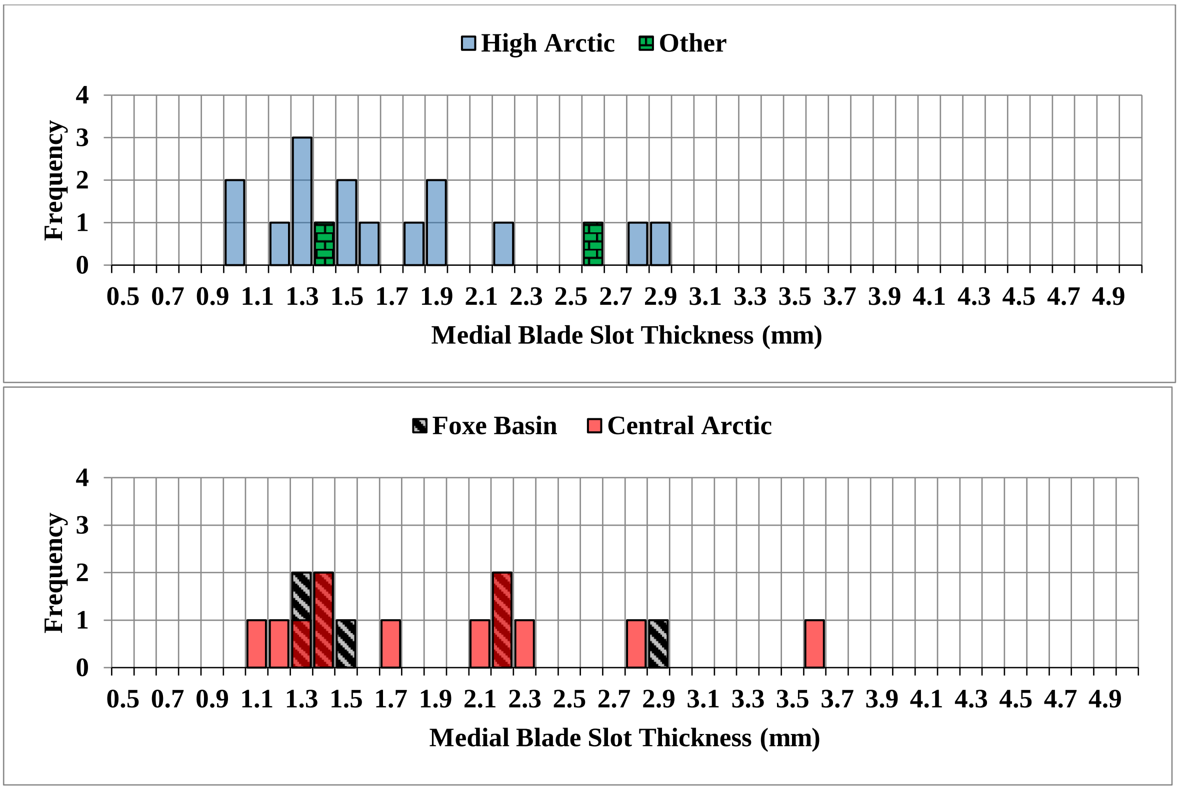

Figure 5.23: Medial blade slot thickness for harpoon heads after removing QiLd-1 (Brooman Point) from the Central Arctic (n=12), the Foxe Basin (n=8), the High Arctic (n=16), and "other" regions (n=2) included in this study..

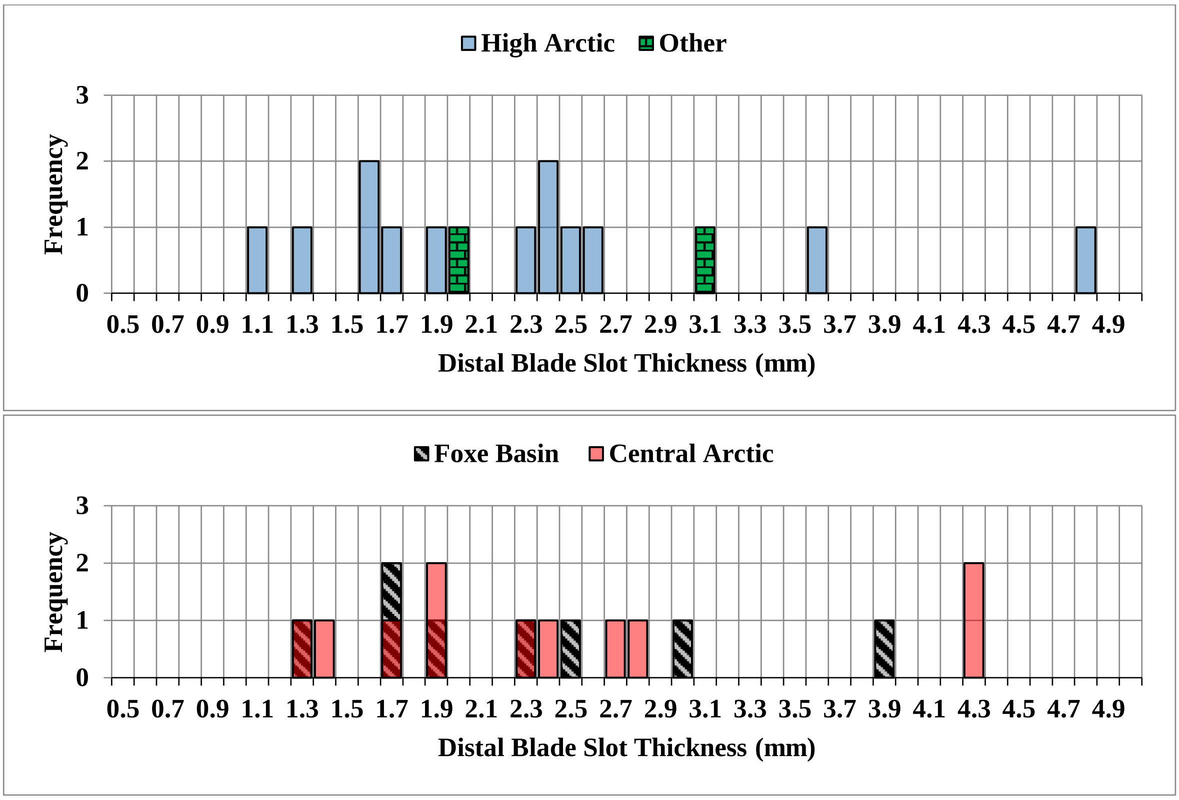

Figure 5.24: Distal blade slot thickness for harpoon heads after removing QiLd-1 (Brooman Point) from the Central Arctic (n=11), the Foxe Basin (n=8), the High Arctic (n=14), and "other" regions (n=2) included in this study.

Viewed quantitatively, all regions have a mean medial thickness below 1.9mm and a mean distal thickness below 2.5mm (regardless if QiLd-1 is included, excluded, or isolated) (Table 5.13). As can be seen in the histograms, QiLd-1 has some of the thinnest blade slots on average for both measurement locations and the least amount of variation. This may be one indication of more consistent (or ubiquitous) metal use compared to other regions or sites. Interestingly, by excluding QiLd-1 from the Central Arctic dataset, the site that has a majority of harpoon heads is QjJx-1 (7 specimens) which is located on Little Cornwallis Island and has more than 70 copper and iron objects in its assemblage. Despite this direct relation to metal objects, QjJx-1 Type G harpoon heads have a mean medial blade slot thickness of 1.88mm which is slightly thicker than QiLd-1 measurements. In this regard, it does not appear that the (relative) absence of metal at any given site influences overall blade slot thickness. In other words, absence of metal does not necessarily indicate that it was not used. While most harpoon heads from both QjJx-1 and QiLd-1 have blade slot thicknesses that are thinner than other harpoon head types and could have conceivably held metal endblades, the amount of metal found at either site does not seem to influence slot size. While QiLd-1 has a significant effect on the overall dataset (if only due to sheer numbers), the fact that all regions have a majority of medial blade slot thicknesses below 1.9mm still supports the interpretations made above that Type G harpoon heads tend to have thinner blade slots on average when compared to other harpoon head types. The slight differences in blade slot thickness may also be due to differences in lithic raw material from each region but given what was discussed above, it is unlikely to be the only cause.

Medial	**Foxe Basin**	**Central Arctic (all)**	**Central Arctic (without QiLd-1)**	**QiLd-1**	**High Arctic**	**Other**	**All**
n	8	**47**	12	35	16	2	73
Mean	1.73	1.60	**1.89**	1.50	1.61	1.96	1.63
Median	1.43	1.50	**1.86**	1.50	1.45	-	1.45
Maximum	2.88	**3.57**	**3.57**	2.13	2.81	2.55	3.57
Minimum	**1.26**	0.89	1.04	0.89	0.95	1.37	0.89
Range	1.62	**2.68**	2.53	1.24	1.86	1.18	2.68
Standard Deviation	0.58	0.49	**0.76**	0.32	0.55	0.83	0.51
Coefficient of Variation	33.53	30.63	**40.21**	21.33	34.16	42.35	31.29

Distal	**Foxe Basin**	**Central Arctic (all)**	**Central Arctic (without QiLd-1)**	**QiLd-1**	**High Arctic**	**Other**	**All**
n	8	**44**	11	33	14	2	68
Mean	2.25	2.21	**2.41**	2.15	2.22	2.51	2.23
Median	2.08	2.07	**2.26**	2.05	2.09	-	2.07
Maximum	3.84	4.24	4.24	3.85	**4.79**	3.02	4.79
Minimum	1.27	1.24	1.24	**1.38**	1.10	1.99	1.10
Range	2.57	3.00	3.00	2.47	**3.69**	1.03	3.69
Standard Deviation	0.83	0.71	**1.02**	0.58	0.97	0.72	0.77
Coefficient of Variation	36.89	32.13	42.32	26.98	**43.69**	28.69	34.53

Table 5.13: Descriptive statistics for medial and distal Type G harpoon head blade slot thicknesses separated by region and including, excluding, and isolating the outlier QiLd-1 (Brooman Point). Note: all units expressed in millimetres (except the sample number). Discrepancies in sample number between distal and medial measurements from the same region/site are because distal thicknesses were not possible to accurately measure on some harpoon heads. Bolded and underlined numbers represent the highest and lowest values across regions respectively ("Other" category excluded due to low sample size).

5.2.3 Pre-Late Dorset Harpoon Heads

There are 39 harpoon heads that were classified as pre-Late Dorset representing 11 sites across two major regions (Hudson Strait and Foxe Basin) with a small number of specimens coming from northern Baffin Island and the Central Arctic (Figure 5.25). The largest collection of the pre-Late Dorset harpoon heads come from the Foxe Basin with 33.3% from NjHa-1 (Kapiuvik) on Jens Monk Island (Table 5.14). The distribution of medial and distal blade slot thicknesses (Figure 5.26) matches closely the middle distribution peaks found in Figure 5.7 and Figure 5.8. The mean medial thickness is 2.20mm and the mean distal thickness is 2.74mm (Table 5.17).

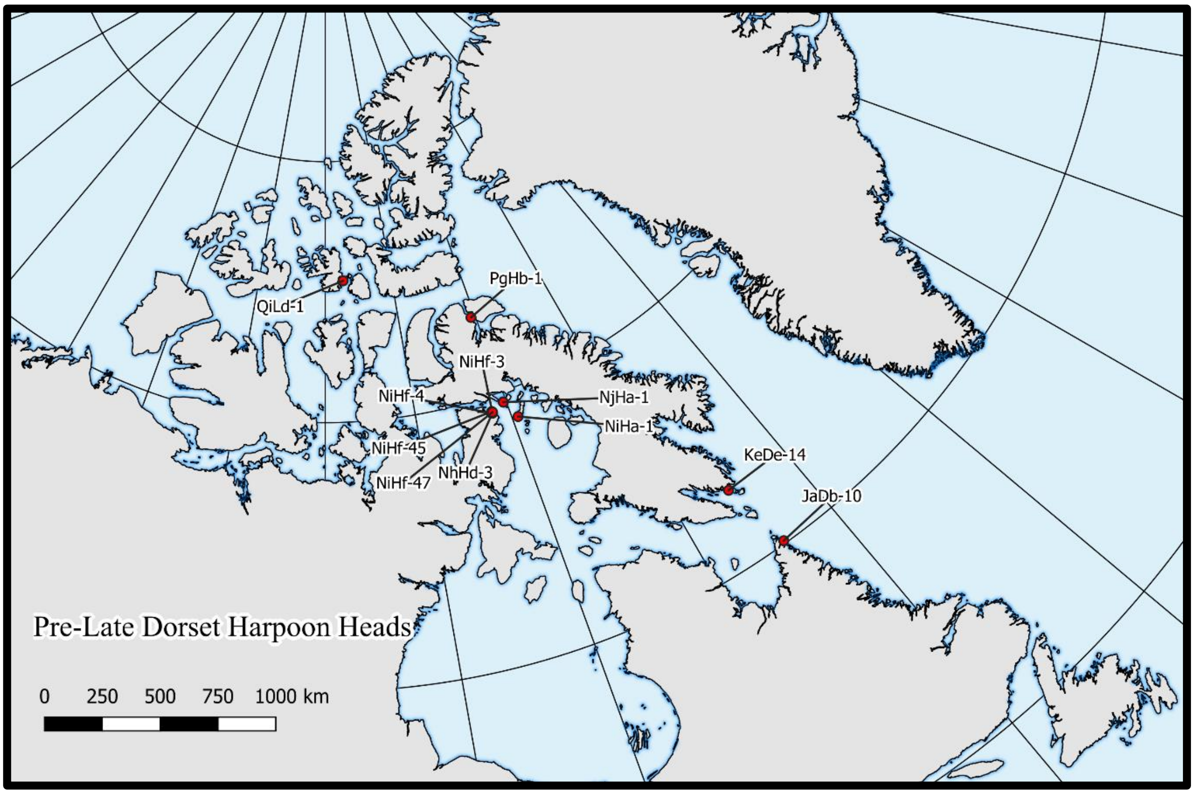

Figure 5.25: Sites with pre-Late Dorset harpoon heads included in the study.

Region/Site	Number of Specimens
Hudson Strait	
KeDe-14	9
JaDb-10	1
Sub-Total	*10*
Northwest Foxe Basin	
NjHa-1	13
NiHf-3	4
NhHd-3	3
NiHa-1	2
NiHf-4	1
NiHf-45	1
NiHf-47	1
Sub-Total	*25*
Other	
PgHb-1	3
QiLd-1	1
Sub-Total	*4*
Grand Total	**39**

Table 5.14: Number of pre-Late Dorset specimens included in the dataset separated by site and region.

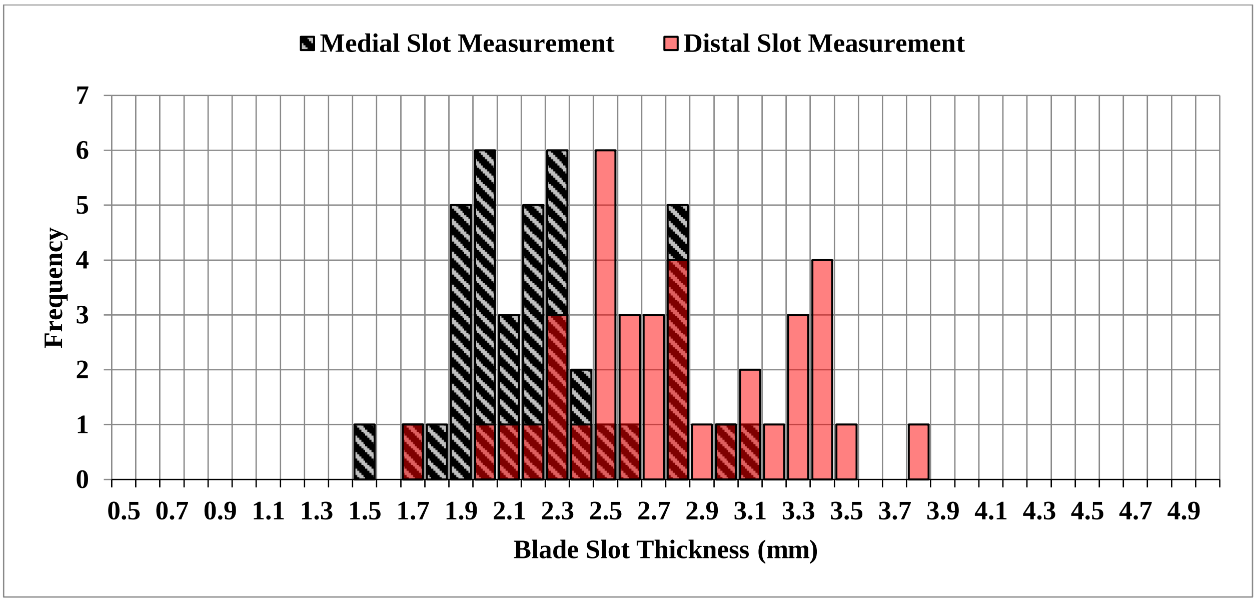

Figure 5.26: Medial (n=39) and distal (n=38) blade slot measurements for pre-Late Dorset harpoon heads.

Blade slot thickness at any given measurement location seems weakly correlated with blade slot length (Figure 5.27). Similar to the other harpoon head categories, the proximal measurement has the weakest correlation to the overall blade slot length (Table 5.15). Interestingly, the values seen in Table 5.15 place pre-Late Dorset between Type G harpoon heads (which had the weakest correlation) and Dorset Parallel harpoon heads which had a much stronger correlation between blade slot thickness and length (Table 5.3 and Table 5.10). Additionally, much like the two other harpoon head categories, there seems to be a similar, if not slightly stronger, relationship between the blade slot thickness and the overall harpoon head size (Figure 5.28 and Table 5.16).

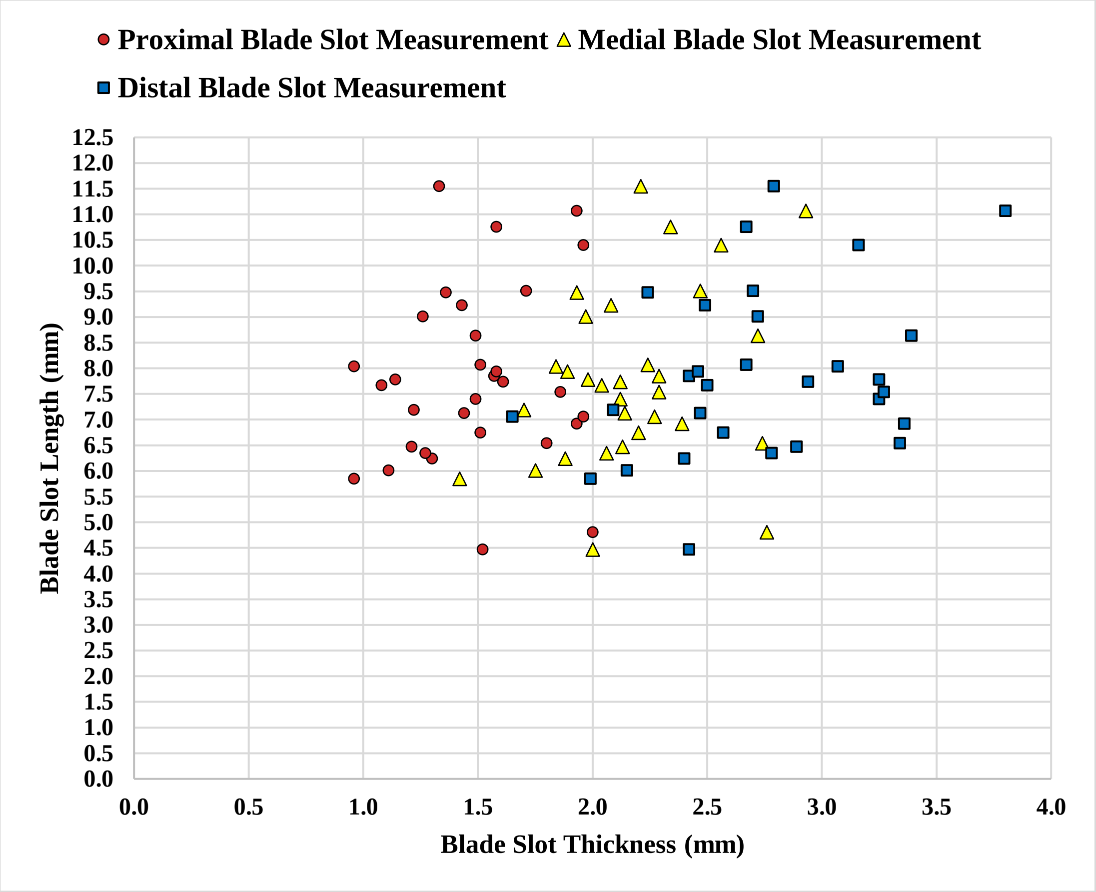

Figure 5.27: The relationship between proximal (n=31), medial (n=31), and distal (n=31) blade thickness and blade slot length for pre-Late Dorset harpoon heads.

Pre-Late Dorset	**Pearson's Correlation Coefficient**
Proximal	0.135
Medial	0.304
Distal	0.326

Table 5.15: Pearson's correlation coefficient values for pre-Late Dorset harpoon head blade slot thicknesses (at all three locations) and blade slot length.

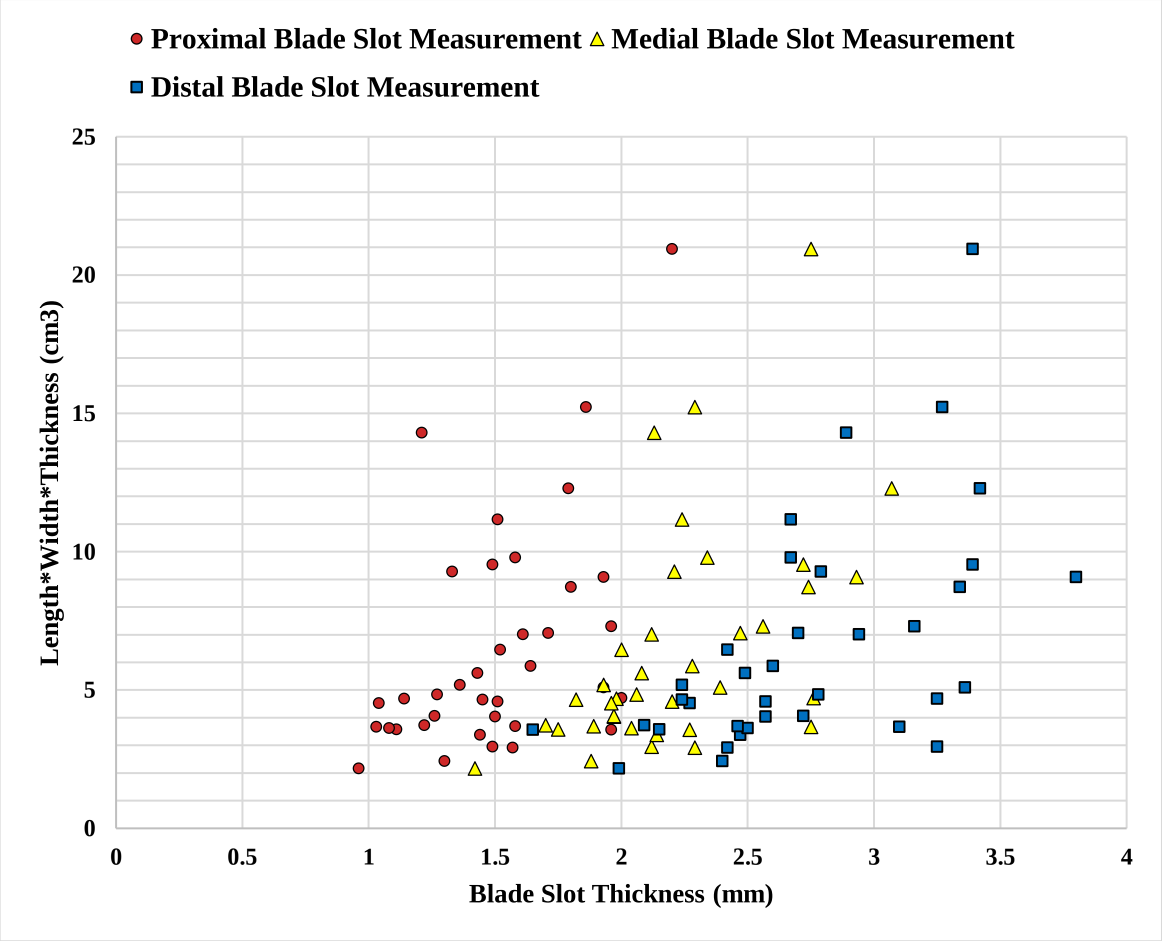

Figure 5.28: The relationship between pre-Late Dorset harpoon head blade slot thickness at the proximal (n=37), medial (n=37), and distal (n=36) measurement locations and a rough overall volume of the harpoon head (LxWxT).

Pre-Late Dorset	Pearson's Correlation Coefficient
Proximal	0.483
Medial	0.522
Distal	0.555

Table 5.16: Pearson's correlation coefficient values for pre-Late Dorset blade slot thickness (at all three locations) and overall harpoon head size (calculated to cm^3).

In every case, the mean thicknesses regardless of measurement location of Type G specimens are thinner than the pre-Late Dorset harpoon heads which are also thinner than the Dorset Parallel specimens (Table 5.18). In fact, when separating harpoon heads by category, it is clear that each of the three peaks from the original medial blade slot distribution in Figure 5.7 represents each of the harpoon head categories despite the dip test suggesting unimodal distribution (Figure 5.29). While there are 23 (31.5%) Type G harpoon heads that have a medial blade slot thickness equal to or greater than 1.9mm, there are only 8 (20%) pre-Late Dorset harpoon heads with a thickness less than or equal to 1.9mm. Despite the pre-Late Dorset harpoon head category being the most variable in terms typology and have a temporal range equal to the Dorset Parallel category, it has the smallest amount of variation in terms of blade slot size with the Dorset Parallel harpoon heads being slightly more variable than Type G (Table 5.19). Similar patterning exists in the distal blade slot thicknesses of the three different categories which likely indicates the difference being real rather than due to randomness in the data (Figure 5.30). Having a greater variance in both Type G and Dorset Parallel suggests they held a wider range of endblades (at least in terms of thickness) when compared to the pre-Late Dorset. Interestingly, secondary peaks in Type G and Dorset Parallel blade thicknesses also occur around the main peak in the pre-Late Dorset harpoon heads. It is tempting to suggest that the presence of secondary peaks in both Type G and Dorset Parallel but not in pre-Late Dorset datasets is indicative of use of both metal and lithic endblades (or at least of two different endblade sizes). This will be debated in more detail in the next chapter. In any case, according to these data, Late Dorset in general used a wider range of endblades (and potentially in terms of raw materials) than Early/Middle Dorset.

Medial	**All**
n	39
Mean	2.20
Median	2.13
Maximum	3.07
Minimum	1.42
Range	1.65
Standard Deviation	0.37
Coefficient of Variation	16.82
Distal	**All**
n	38
Mean	2.74
Median	2.69
Maximum	3.80
Minimum	1.65
Range	2.15
Standard Deviation	0.48
Coefficient of Variation	17.52

Table 5.17: Descriptive statistics for all medial and distal pre-Late Dorset harpoon head blade slot thicknesses.

Mean Thickness	Pre-Late Dorset	Dorset Parallel	Type G
Proximal	1.50	1.64	1.19
Medial	2.20	2.56	1.63
Distal	2.74	3.38	2.23

Table 5.18: Mean blade slot thicknesses grouped by harpoon head category.

Medial Thickness	Pre-Late Dorset	Dorset Parallel	Type G
n	39	79	73
Mean	2.20	2.56	1.63
Median	2.13	2.58	1.45
Maximum	3.07	3.96	3.57
Minimum	1.42	1.05	0.89
Range	1.65	2.91	2.68
Standard Deviation	0.37	0.59	0.51
Coefficient of Variation	16.82	23.05	31.29

Table 5.19: Descriptive statistics for medial blade slot thicknesses separated by harpoon head category. Note: all thickness values expressed in millimetres.

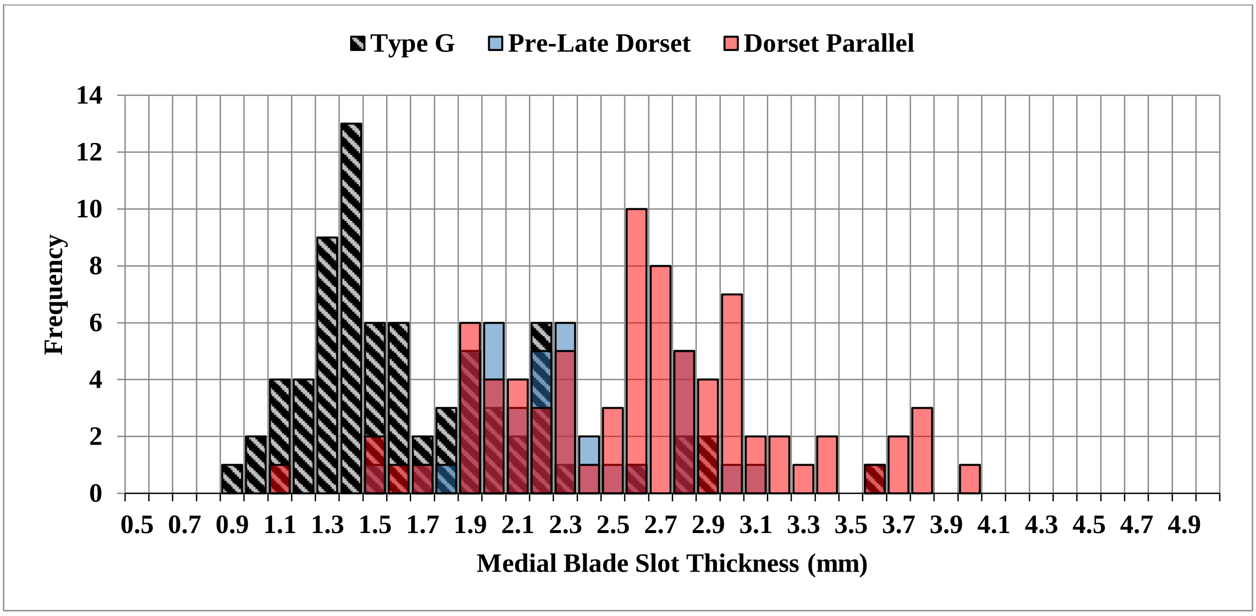

Figure 5.29: Medial blade slot measurements for Type G (n=73), pre-Late Dorset (n=39), and Dorset Parallel (n=79) harpoon heads.

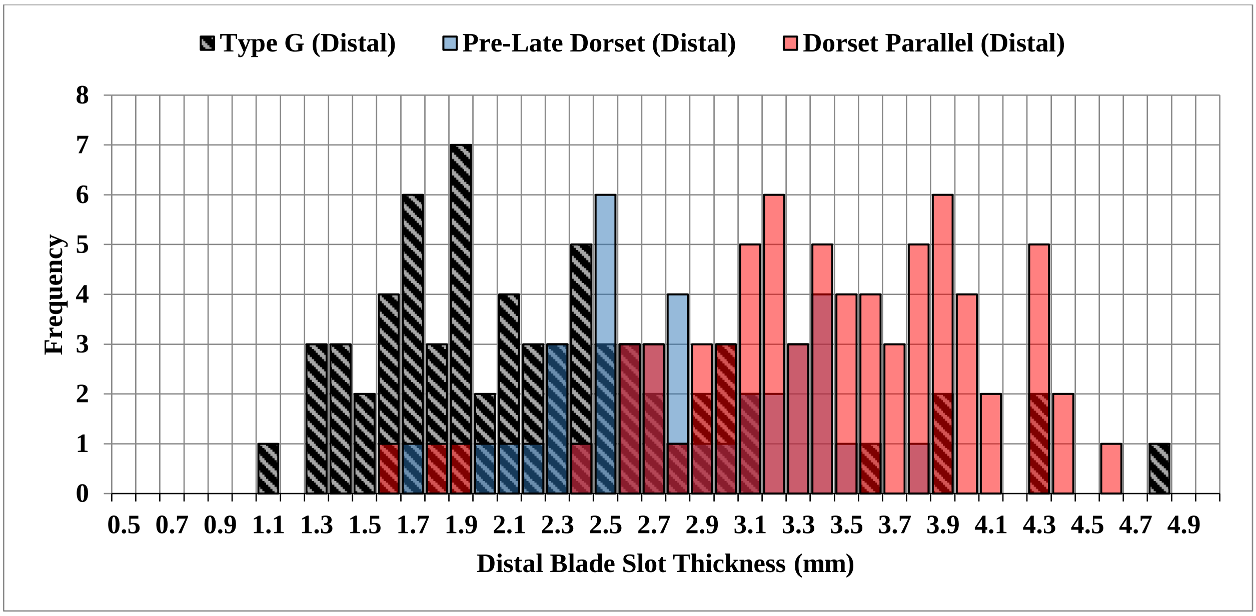

Figure 5.30: Distal blade slot measurements for Type G (n=68), pre-Late Dorset (n=39), and Dorset Parallel (n=72) harpoon heads.

5.2.4 Endblade Securing Techniques

Across all harpoon heads, there were only two visible attributes on the harpoon heads which were clearly related to securing its endblade, although, this does not mean that other methods were not used. The first is a gouged hole that pierces both blade beds, referred to below as a “securing hole”, and the second is one or more transverse grooves that circumnavigate the harpoon head generally at or just below the blade slot, referred to as “lashing grooves”. Both these features appear overwhelmingly on Type G harpoon heads (Figure 5.31).

Twenty-eight of the Type G and five of the Dorset Parallel harpoon heads have what Schledermann (1990:213) called a securing hole and others (LeMoine et al. 2003:258; Maxwell 1985:237; Schledermann 1975:300) have referred to as a rivet hole. If the hole is specifically for the purpose of securing (or riveting) the endblade to the harpoon head, then that is potentially another indicator of the raw material of the endblade (Schledermann 1975:300). While most examples appear as a gouged hole that pierces both blade beds, the perforation occasionally extends distally through the whole blade bed, appearing as notch. It is unclear if these distal notches are intentional. Fourteen (all Type G) have longitudinal grooves running from the securing hole (or notch) down to one of the two line holes, indicating the endblade was not always secured with a rivet but rather a line of some kind.

With this in mind and the small amount of identifiable organic, lithic, or metal rivets in the Late Dorset archaeological record, the term "securing hole" (or securing notch) is preferred over rivet hole. This technique is also slightly regionally dependent. All examples in this dataset are found either in the Central Arctic or in the Foxe Basin. Maxwell (1985:219) states Type G harpoon heads from the Bell site (NiNg-2) on Victoria Island that also have this attribute.

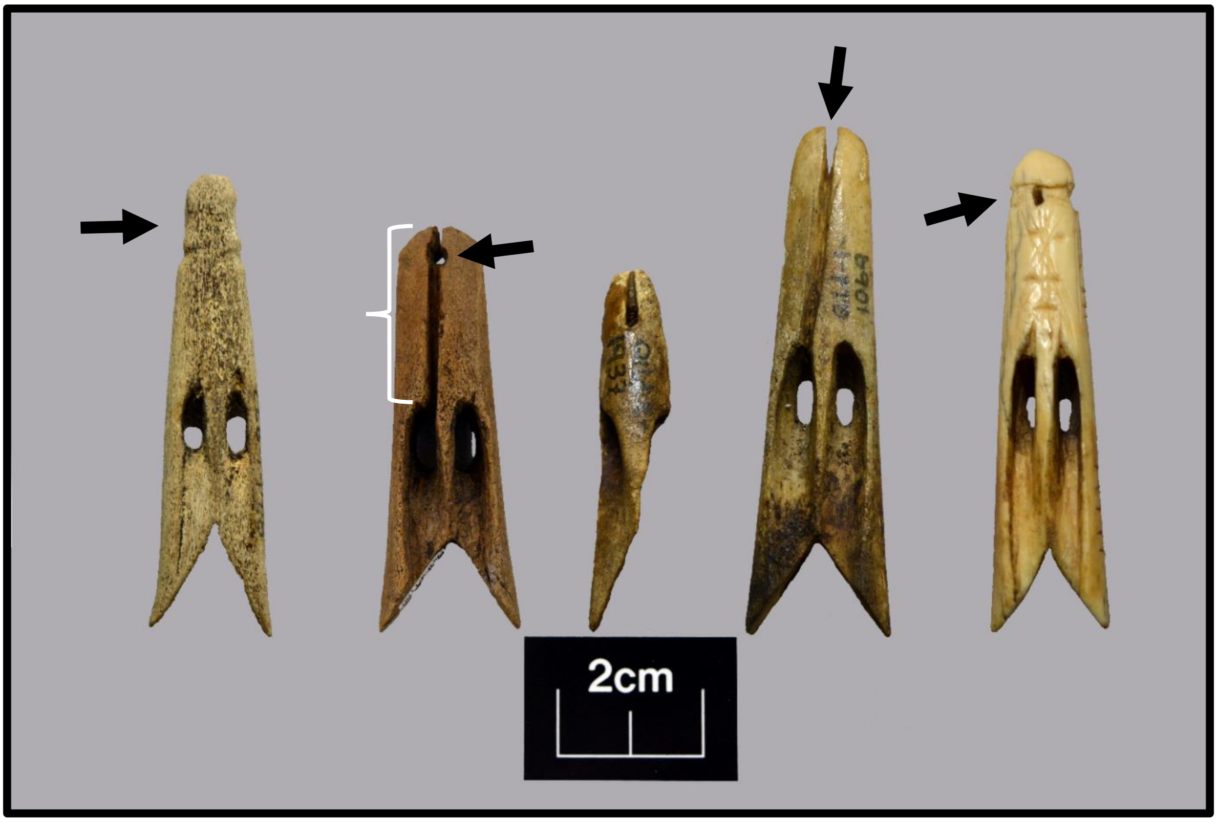

Figure 5.31: The variations of Late Dorset harpoon head endblade securing techniques (from left to right): Type G with lashing grooves (QiLd-1:937), Type G with securing hole (arrow) and longitudinal groove (bracket) (NiHf-4:1150), Dorset Parallel with securing hole (QiLd-1:1937), Type G with distal securing "notch" (arrow) and longitudinal groove (QiLd-1:1069), and Type G with both lashing grooves and securing hole (arrow) (note the facial decoration) (SgFm-5:165). Photo permission courtesy of the Government of Nunavut, the Canadian Museum of History, and the Prince of Wales Northern Heritage Centre.

Schledermann (1975:300) reports one spot find Type G from Buchanan Lake (SiHw-1) on Axel Heiberg Island that has a longitudinal groove but states this attribute is not known from other High Arctic sites. One example (QiLa-3:174) has a distal securing notch passing through the distal-most portion of the blade bed and an additional gouged securing hole found below the blade bed. In this case, the endblade would have been secured with a line and then likely tied through the hole beneath the blade bed. Either way, both would need to have a line or rivet pass through the endblade itself for it to function correctly. While a number of early Inuit slate endblades have holes drilled in them, likely to facilitate a rivet or securing line, Late Dorset endblades are almost all made of chert which physically cannot have a hole drilled (or gouged or flaked) through it easily without fracturing. If the Type G harpoon heads that had these supposed securing holes held a chert endblade, it would mean the hole was not used for securing the endblade and served some other unknown purpose. Conversely, metal endblades can be punctured and maintain their shape. While there are very few known examples of metal Late Dorset endblades, one copper example has evidence of a rivet hole (Appelt et al. 2016, Figure 33.2c). Of the Type G that have securing holes, one is punctured below the blade bed (and does not have an accompanying distal notch) (QjJx-1:95) and one has a securing hole that passes through only one blade bed (NjHa-1:2007), suggesting the “securing” holes on these examples were used for different purposes than fixing the endblade. Or, at least, fixed the endblade in a different manner. The remaining 26 Type G harpoon heads with a functional securing hole have a mean medial blade slot thickness of 1.51mm and a mean distal blade slot thickness of 2.01mm which is amongst the thinnest for all Type G specimens analysed (Figure 5.32). Additionally, five Dorset Parallel harpoon heads have evidence of securing holes, four of which appear to be functional. All four have blade slot measurements thinner than the average medial (<2.56mm) and distal (<3.38mm) measurements for all Dorset Parallel harpoon heads (Table 5.20). Therefore, the presence of a securing hole along with a thin blade slot, regardless of harpoon head type, seems to be a strong indicator of the raw material of the blade that it supported. Schledermann (1975:300) argues that these securing holes are likely indicative of metal endblade use by the Late Dorset but does not discuss the attribute further.

Borden Number	Artefact Number	Proximal Blade Thickness	Medial Blade Thickness	Distal Blade Thickness
NiNg-17	25	0.78	1.81	2.53
QiLd-1	1937	0.92	1.05	1.73
SgFm-3	21	1.55	2.06	2.51
SgFm-3	22	1.50	2.24	n/a
Mean		1.19	1.79	2.26
Median		1.21	1.94	2.51

Table 5.20: All Dorset Parallel harpoon heads included in the dataset with identifiable securing holes along with the blade thickness measurements at all three locations. Note: blade thickness measurements expressed in millimetres.

Lashing grooves are the other identifiable feature that likely involved fastening the endblade to the harpoon head found on the harpoon heads in this dataset. While there is some variation, lashing grooves are essentially a groove that circumnavigates the distal-most portion of the harpoon head, frequently around the blade beds. In this dataset, 23 of the harpoon heads have evidence of lashing grooves, all of which are from Type G specimens. The mean medial blade slot thickness is 1.66mm and the mean distal blade slot thickness is 2.36mm. Only two harpoon heads have both securing holes and lashing grooves.

Observing just the Type G harpoon heads (74 total), there are 25 (33.8%) without a functioning securing hole or lashing grooves, 21 (28.4%) with lashing grooves, 26 (35.1%) with securing holes, and 2 (2.7%) with both securing holes and lashing grooves. The specimens that have lashing grooves tend to have a slightly thicker medial blade slot than those with securing holes but, in general, there is relatively good distribution throughout the range of blade slot thicknesses regardless (Figure 5.32). The medial and distal blade slot thicknesses for Type G harpoon heads that have securing holes and lashing grooves are thinner than Type G harpoon heads without either of those attributes that have a mean medial blade slot thickness of 1.82mm and a distal slot thickness of 2.46mm. If anything, this distribution supports the hypothesis that the securing hole would have been used for metal endblades as they tend to be cluster in the thinner slot grouping. However, the data clearly demonstrate that even Type G specimens that do not have either attribute can still have relatively thin slots compared to the other harpoon head types. While these proportions do not perfectly represent “real” frequencies of these harpoon head attributes, it is interesting to note that two thirds of the Type G harpoon heads needed to have their endblade secured with something more than simply the pressure of being wedged in the blade slot.

There are no pre-Late Dorset harpoon heads that have either functional securing holes or lashing grooves in this dataset. However, one specimen in the dataset (PgHb-1:4039) has what appear to be “lashing grooves” and a single hole (similar to a securing hole) that penetrates through the harpoon head near the distal portion of the object but both features are below the blade slot itself which indicates they played little or no role in securing the endblade to the harpoon head. Surveying the published record, the only known examples of single line hole harpoon heads that have lashing grooves are found at PeHa-1 (Saatut), a late Middle Dorset site, on Type D harpoon heads (which are also found in some Late Dorset contexts). Mary-Rousselière (2002:83-84) reports that 30 out of 100 Type D harpoon heads (only 3 are complete) from PeHa-1 have lashing grooves that are found between the blade slot and line hole, between the line hole and the basal spurs, or directly on the basal spurs (see Mary-Rousselière 2002:181, Planche 29c and 29d). Seven of these appear to be repairs when the blade slot broke (Mary-Rousselière 2002:84). Unfortunately, outside of that figure, it is not stated how many have lashing grooves directly related with the blade slot. Other than these examples, none of the published harpoon heads from Early or Middle Dorset contexts in the Arctic (including Newfoundland) have evidence for securing holes or lashing grooves around the blade slot.

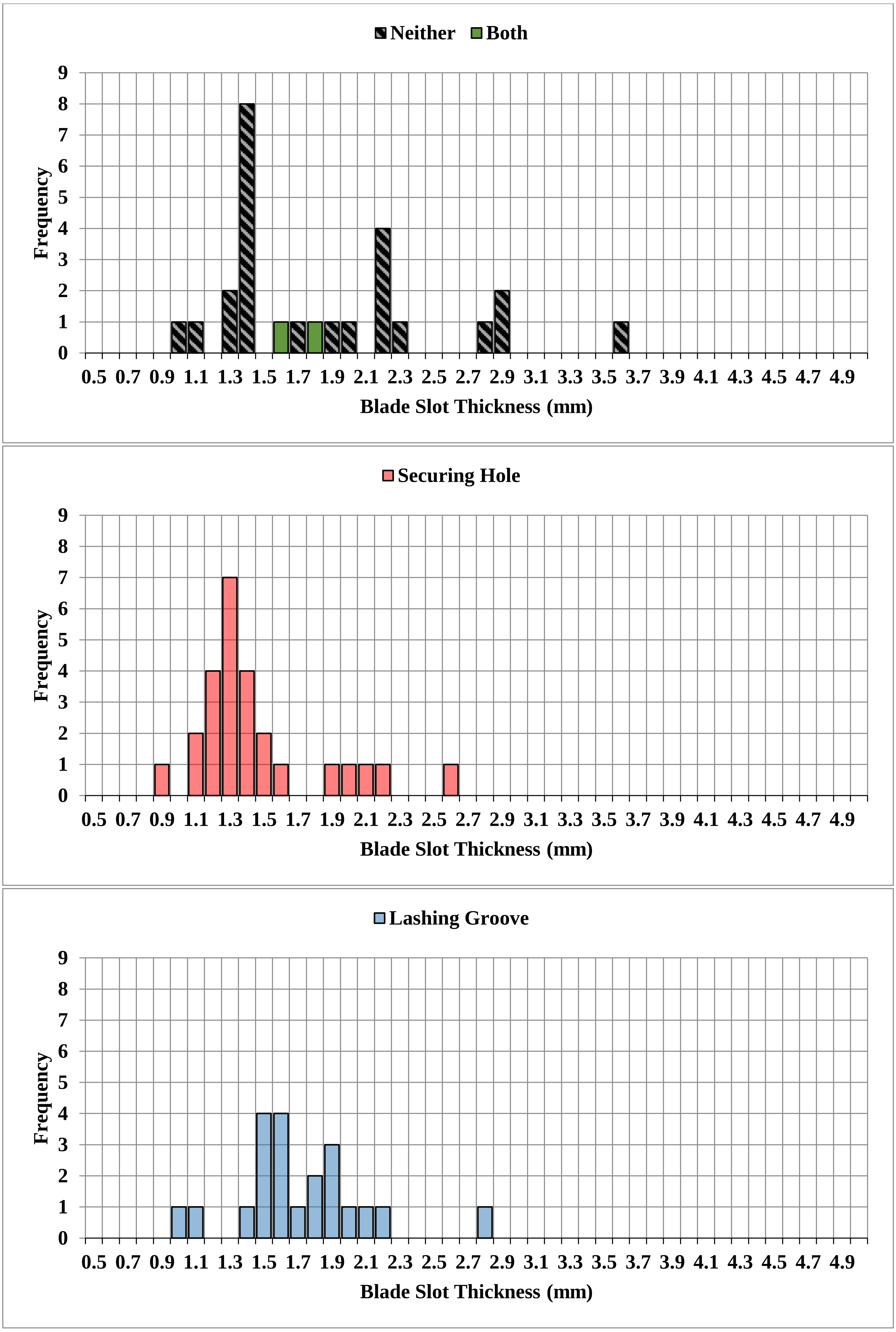

Figure 5.32: Medial blade slot thickness for Type G harpoon heads that have securing holes (n=26), lashing grooves (n=21), both (n=2), or neither attribute (n=24).

5.3 Handles

The other major category of organic tool analysed are knife handles. In total, 80 handles were analysed from 14 sites across the Arctic (Figure 5.33). They were predominantly made from bone and, unlike harpoon heads, wood but a small amount were made of ivory. For the purposes of this study, they can be classified into two distinct categories: end-hafted and side-hafted handles. Side-hafted handles have longitudinally carved blade slots (Figure 5.34) while end-hafted handles have the blade slot carved into the handle body from the distal-most portion of the tool (similar to the way an endblade is hafted into a harpoon head), effectively splitting it in two (Figure 5.35). Occasionally, some handles had multiple blade slots. In these cases, the slots share an artefact number (as they are attributes of a singular object) but treated as two discrete data points for this analysis.

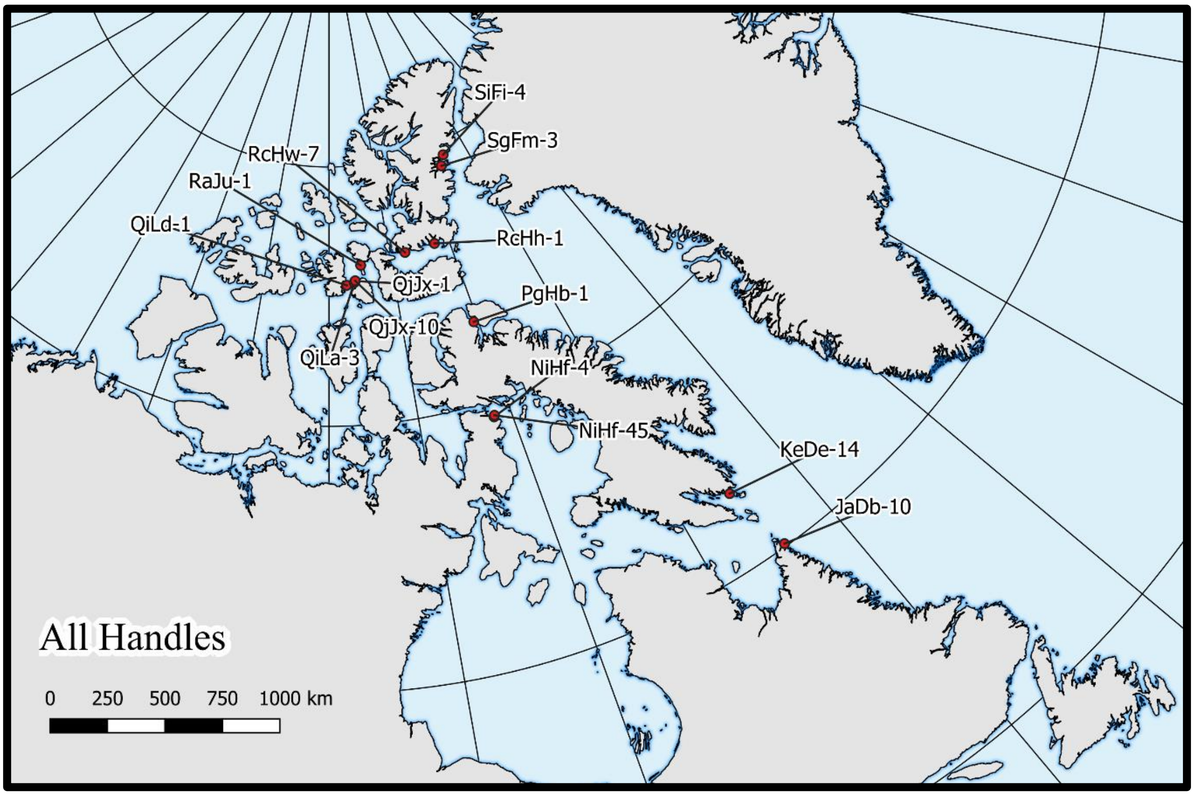

Figure 5.33: Sites containing handles included in this study.

Knife handles fulfilled a number of tasks and, as such, took a variety of forms. Essentially any organic tool that had a slot for a lithic (or metal) object were included. This means that the handles may have supported a biface, endblade, microblade, side-blade, scraper, or burin throughout its lifetime. As such, the range of objects classified as "handles" might have performed a wider range of tasks when compared to harpoon heads and may have also changed over time. Blade slot measurements for end-hafted handles were recorded in a similar fashion as harpoon heads (with measurements taken at the proximal, medial, and distal-most portions of the slot).

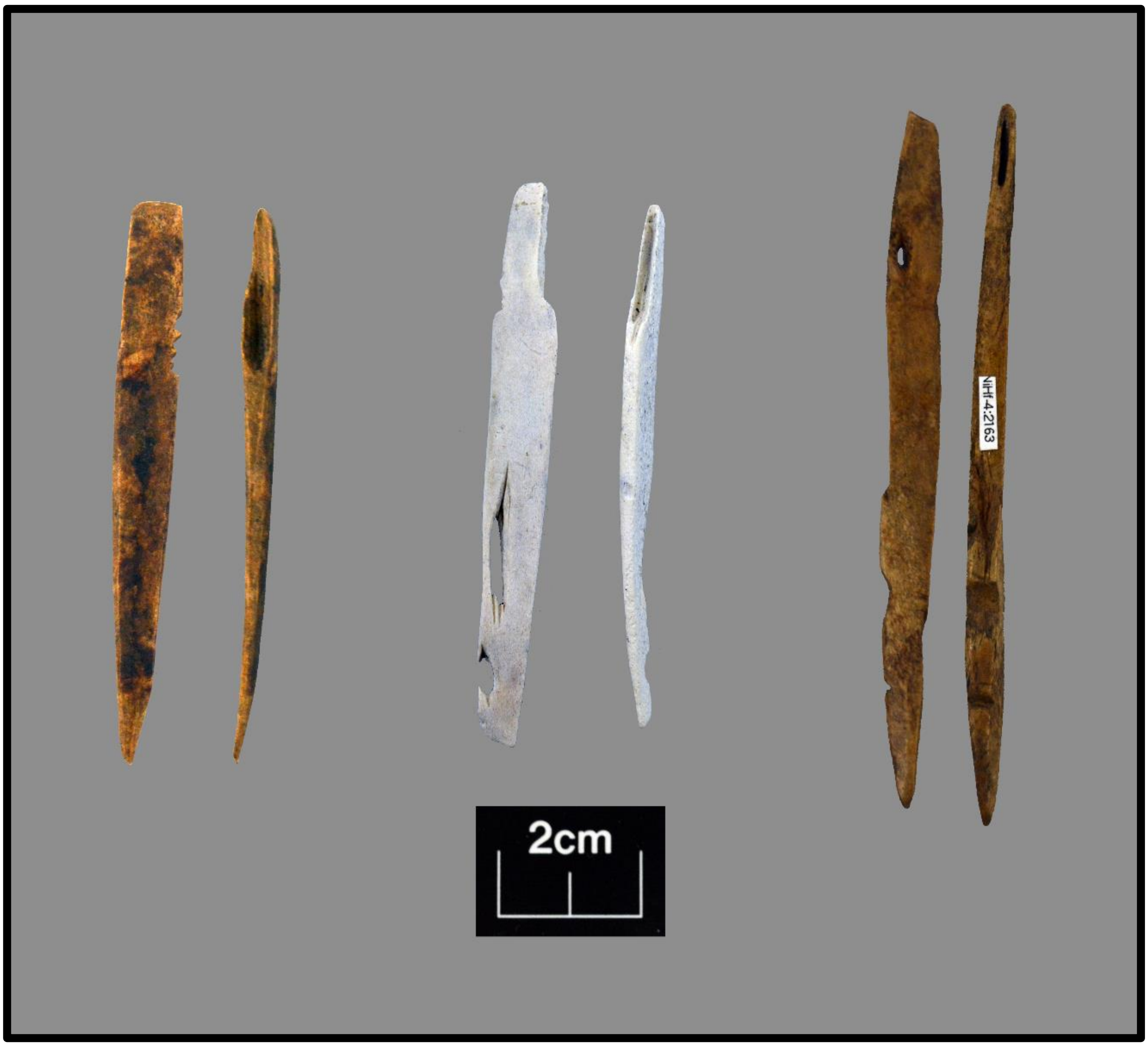

Figure 5.34: A selection of side-hafted handles showing both the lateral and front views. From left to right: NiHf-45:714, QjJx-10:387, NiHf-4:2163. Photo permission courtesy of the Government of Nunavut and the Prince of Wales Northern Heritage Centre.

Side-hafted handles were approached slightly differently since the blade would have been mounted laterally and, therefore, the widest portion of the slot was generally the medial portion with the overall shape of the slot being roughly symmetrical. Moreover, most side-hafted slots were too small for a set of callipers to reach towards the interior of the slot. With this in mind, measurements were recorded slightly differently. While, for the purposes of this thesis, the measurements are still referred to as proximal, medial, and distal, the measurement locations were slightly different. Recall, for side-hafted handles, the blade slot thicknesses were measured at the proximal-most portion of the slot, in the exact midpoint of the slot between both ends, and finally at a centre point between the proximal and midpoint measurement. While the midpoint measurement, which will be referred to as the "distal" measurement below (as it technically is the distal-most measurement of the three), it was not taken at the distal-most portion of the slot. The reasoning behind this is because the blade slots on side-mounted handles are generally symmetrical with the proximal-most and distal-most portion of the slot being roughly the same thickness. Effectively, side-hafted blade slot measurements were taken from the outermost (i.e. lateral) portion of the slot which would likely have made contact with the thickest part of the blade (Figure 4.2).

Figure 5.35: A selection of end-hafted handles showing front and lateral views. From left to right: JaDb-10:2590, JaDb-10:2794. Photo permission courtesy of the Rooms Museum.

For both end- and side-hafted handles, their blade slots are not as uniform as harpoon heads. Occasionally, the medial measurement (or less frequently the proximal measurement) was thinner than the distal measurement for both handle types. Significantly, the diversity seen in the Dorset handle is, expectedly, mirrored in its blade slot size.

Observing the proximal, medial, and distal blade slot thickness measurements together across all handles and some general patterns can be seen (Figure 5.36, Figure 5.37, and Figure 5.38). The overall pattern seems to be log normal distribution for all three measurement locations. In any case, the variation seen across all measurement locations for all handles is greater than what was seen in harpoon heads (Table 5.21). To clarify the data, end- and side-hafted handles will be discussed separately for the rest of this chapter. Adding to the complexity of this object category is that there are no obvious distinctions between Early/Middle Dorset and Late Dorset handles. While there is no simple approach to isolate the chronological association of these handles, an attempt will be made to separate material found within Late Dorset contexts from those that were found in earlier or mixed contexts.

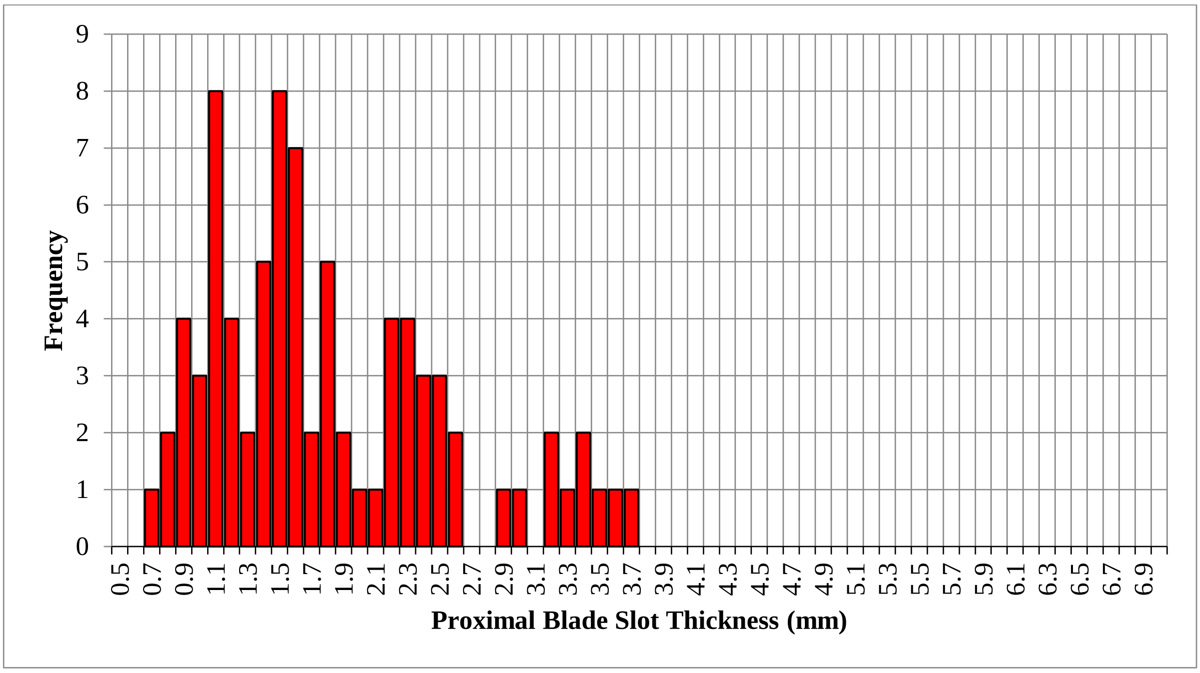

Figure 5.36: Proximal blade slot thickness measurement for all knife handles included in this thesis (n=80).

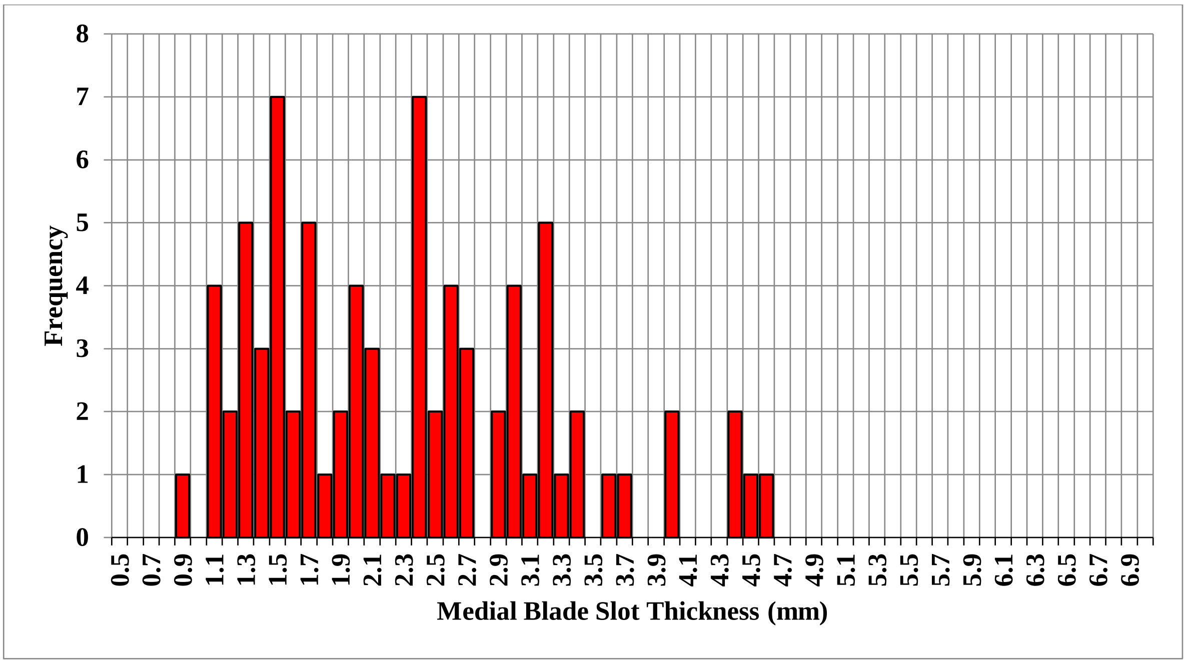

Figure 5.37: Medial blade slot thickness measurement for all knife handles included in this thesis (n=80). Note one handle had a medial blade slot measurement greater than 7mm.

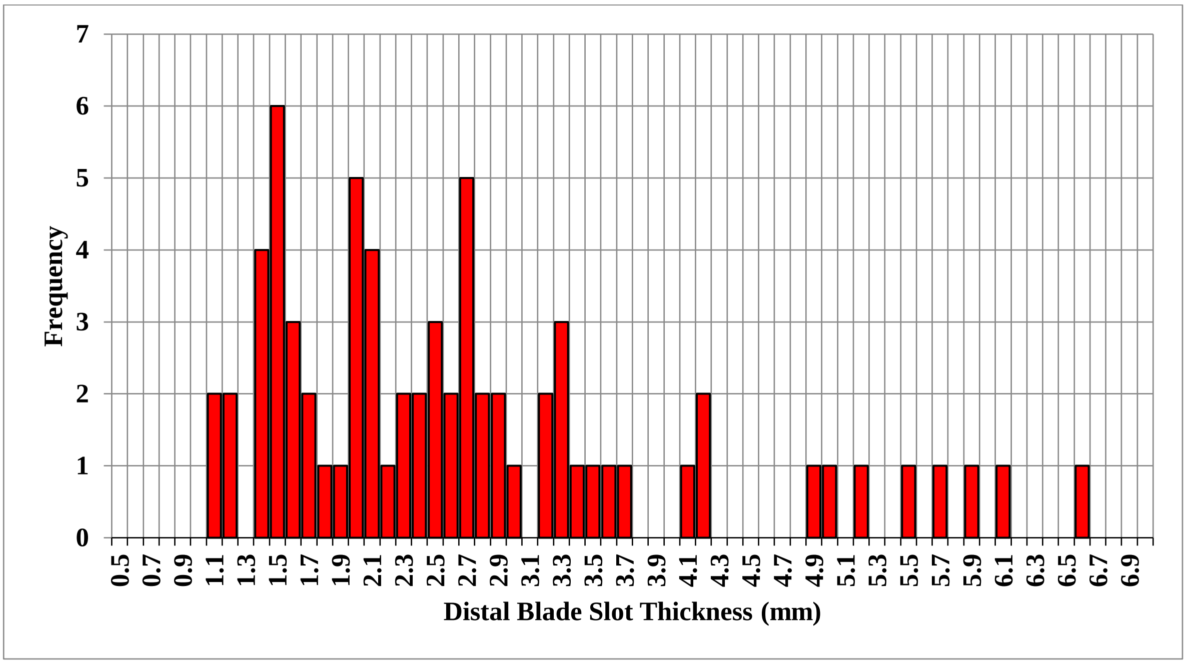

Figure 5.38: Distal blade slot thickness measurement for all knife handles included in this thesis (n=70). Note one handle had a distal blade slot measurement greater than 7mm.

All Handles	Proximal	Medial	Distal
n	80	79	70
Mean	1.76	2.28	2.67
Median	1.52	2.20	2.41
Maximum	3.66	4.52	6.6
Minimum	0.64	0.89	1.03
Range	3.02	3.63	5.57
Standard Deviation	0.75	0.91	1.31
Coefficient of Variation	42.61	39.91	49.06

Table 5.21: Descriptive statistics for proximal, medial, and distal blade slot measurements across all handles.

5.3.1 Side-Hafted Handles

There are 55 handles from 12 sites that have a side-hafted blade slots included in this dataset (Figure 5.39). The majority of the handles come from sites in the High Arctic, Central Arctic, Foxe Basin, and Northern Baffin Island (Table 5.22). It is generally assumed that a lithic microblade or side-blade or a metal blade would have been fitted into the slot. This is perhaps unsurprising as microblades are one of the most common tool types recovered among Dorset sites but compose a smaller relative proportion of the material collected and become much more irregular from Late Dorset sites (Cox 1978:111; Owen 1987:147; Desrosiers and Sørensen 2012:391; Sørensen 2012: 296). While some blades would have been lashed onto the lateral portion of the handle, it is more likely that they were held in place with a support braced against the outward facing edge of the blade after it had been slotted into the handle (Figure 5.40). Only a small number of these supports have been identified in Dorset collections as many can end up being wrongly sorted into faunal remains due to their small size. Moreover, occasionally some of the supports only have a very shallow groove or none at all (for examples both with grooves and without see Houmard 2011:159-160). The examples with a shallow groove may not even accurately depict the overall thickness of the microblade as it frequently only makes contact with the lateral-most edge of the blade itself. Table 5.23 is a summary of the descriptive statistics for the handle supports that were measured. All were from sites in northwestern Foxe Basin except for two which came from the Central Arctic at QjJx-1. Undoubtedly, the dataset vastly underrepresents the overall extent of this object category. Additionally, the groove on these supports was frequently very short which is the primary reason why only one thickness measurement was taken. All have slot thicknesses greater than 1.5mm except for four examples, two of which are from QjJx-1 and two from NiHf-4, that range from 0.82mm to 1.13mm.

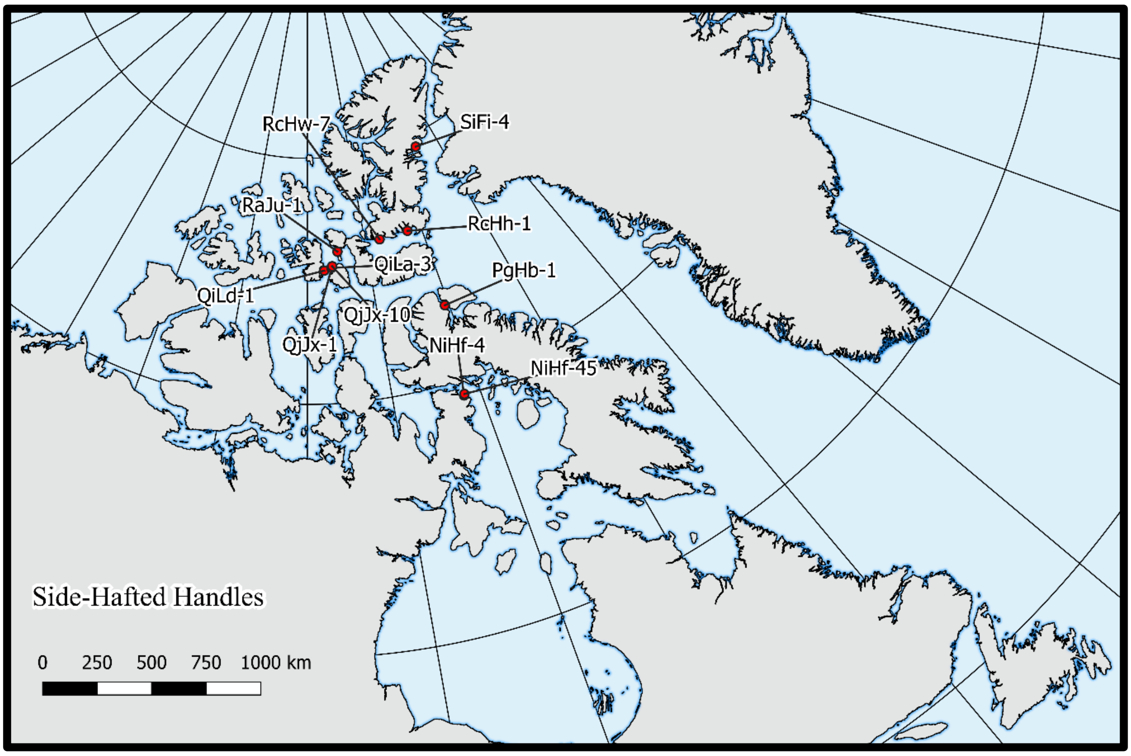

Figure 5.39: Distribution of side-hafted handles included in this thesis.

Region/Site	Number of Specimens
Northwest Foxe Basin	
NiHf-4	12
NiHf-45	3
Sub-Total	*15*
Northern Baffin Island	
PgHb-1	14
Sub-Total	*14*
Central Arctic	
QiLd-1	11
QjJx-1	5
QjJx-10	4
QiLa-3	1
RaJu-1	1
RcHh-1	1
RcHw-7	1
Sub-Total	*24*
High Arctic	
SiFi-4	2
Sub-Total	*2*
Grand Total	**55**

Table 5.22: Number of side-hafted handle blade slots included in the dataset separated by site and region.

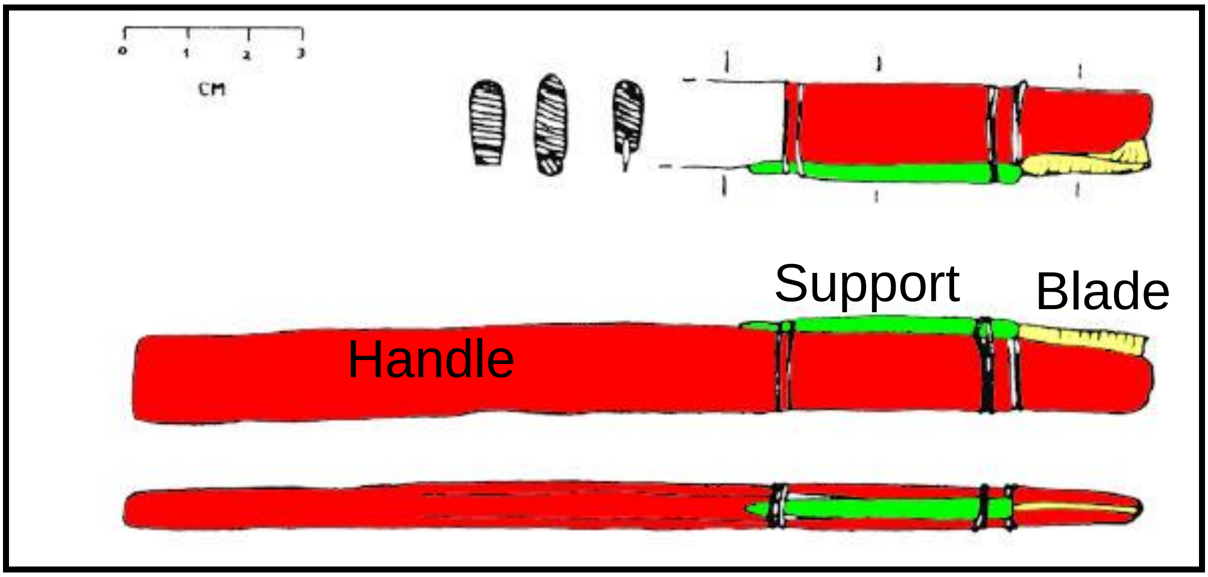

Figure 5.40: A complete side-hafted Dorset handle from PgHb-1 (illustration from Owen 1987, colourised by author). The handle is red, the support is green, and the microblade is yellow.

Handle supports/braces	Slot thickness	Overall Length	Overall Width	Overall Thickness
n	10	10	10	10
Mean	1.51	40.68	4.31	5.26
Median	1.49	43.43	4.54	5.03
Maximum	2.35	59.94	6.15	7.19
Minimum	0.82	24.65	2.66	4.15
Range	1.53	35.29	3.49	3.04
Standard Deviation	0.51	3.00	2.00	0.95

Table 5.23: Descriptive statistics for side-hafted handle supports/braces included in the dataset. Note: all measurements (except sample size) are millimetres.

Much like the overall picture for all handles, the side-hafted handles have a proximal, medial, and distal blade slot thickness clustering around 1.5mm or slightly below and all are positively skewed (Figure 5.41, Figure 5.42, and Figure 5.43). All the side-hafted handles have a medial blade slot thickness of 1.97mm and a distal slot thickness of 2.23mm, although the distal blade slot thicknesses are the less regularly distributed and have the greater range when compared to the proximal and medial measurements.

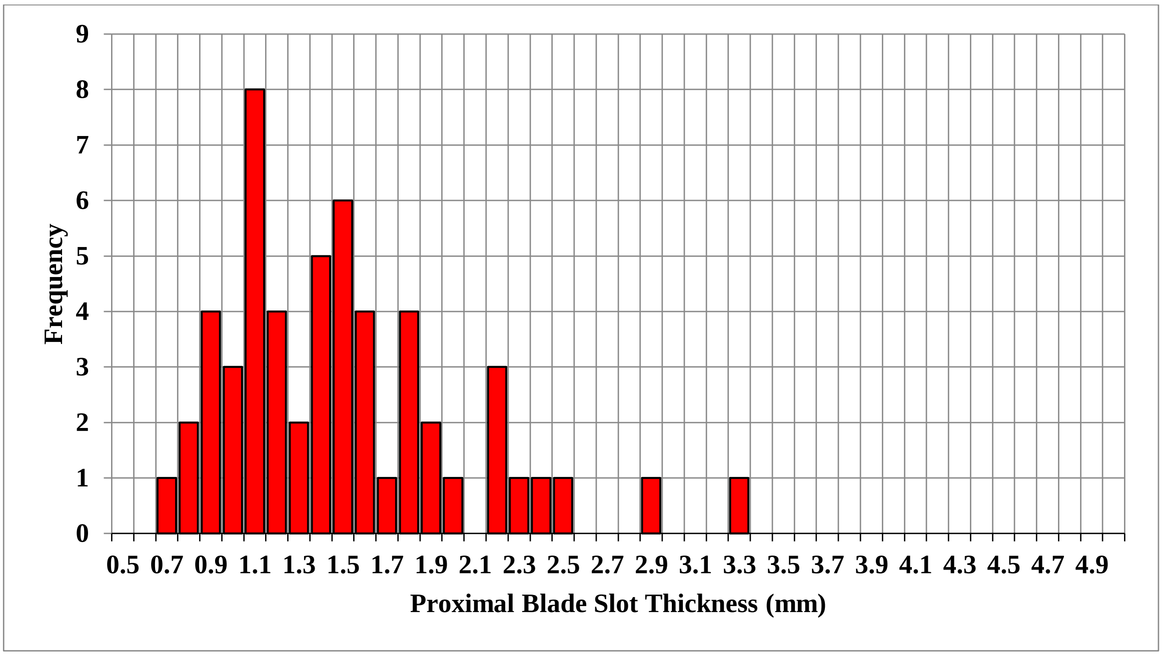

Figure 5.41: Proximal blade slot thickness of side-hafted handles (n=55).

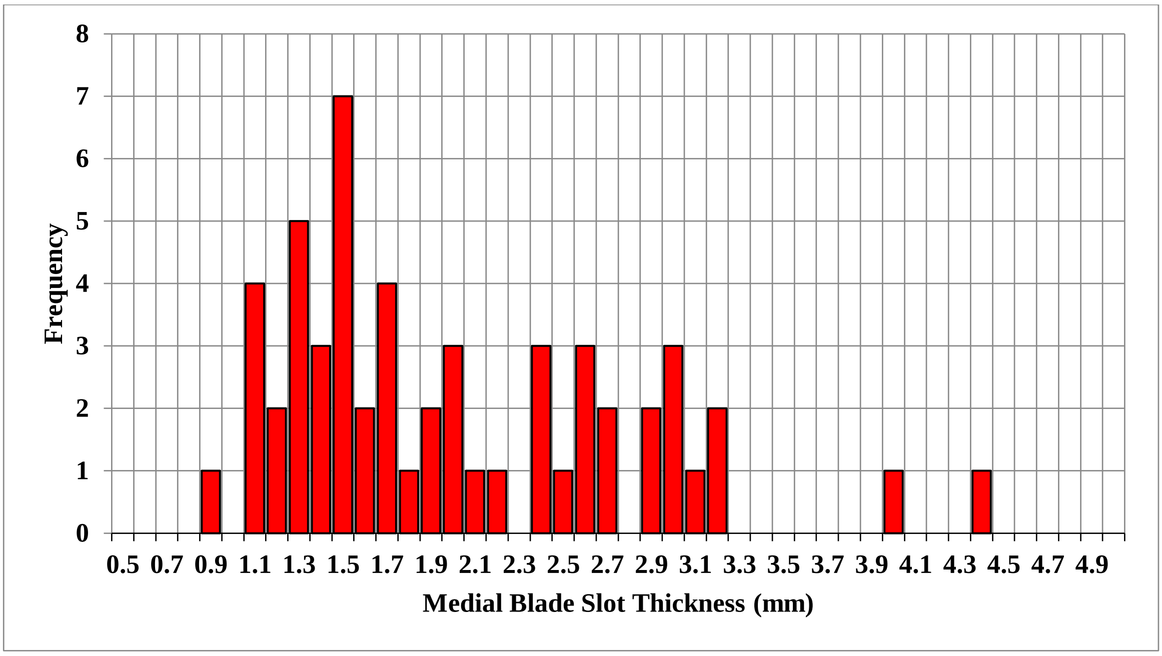

Figure 5.42: Medial blade slot thickness of side-hafted handles (n=55).

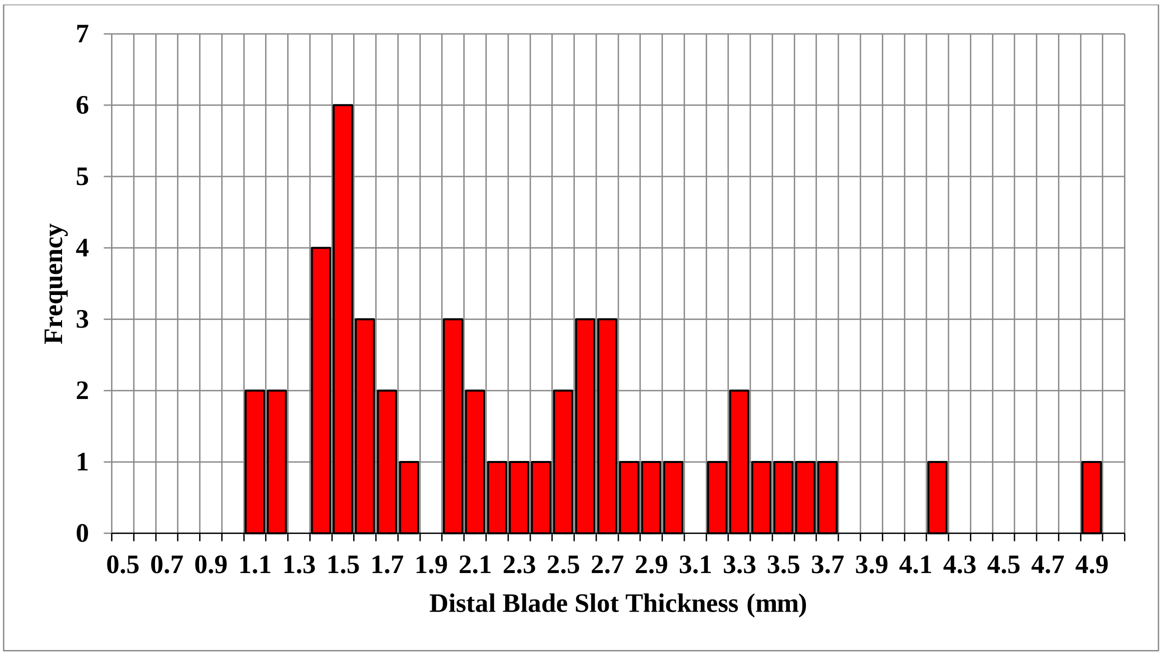

Figure 5.43: Distal blade slot thickness of side-hafted handles (n=48).

Similar to harpoon heads, the blade slot thickness of handles does correlate, if slightly weakly, with the length of the slot and the overall size of the artefact. There is some correlation between blade slot length and thickness (Figure 5.44). Interestingly, Pearson's correlation coefficient values are broadly similar to those seen for pre-Late Dorset and Dorset Parallel harpoon heads (Table 5.24). In essence, while there is a general trend for longer blade slots to be thicker, there are a number of exceptions in the dataset. Assessing the impact of the overall handle size on blade slot thickness is complicated by the fact many knife handles may have been parts of composite tools. Furthermore, only 40 of the analysed examples were complete or near-complete. To be considered “near-complete”, the handle should have the majority of its overall length surviving. Figure 5.45 compares a rough estimate for handle size for the complete and near-complete specimens with, as with harpoon heads, some amount of correlation between the overall size and the ultimate size of the blade slot but it is weaker than the correlation between slot thickness and length (Table 5.25). The correlation values are weaker than the harpoon heads when comparing slot thickness with overall object size. This is most likely associated with the fact side-hafted handles can vary greatly in overall size when compared to harpoon heads. Overall, despite the slight correlation that can be seen between blade slot thickness with slot length and overall handle size, it is still possible that other factors, such as the raw material of the blade itself, may also be related to the size of the slot rather than the overall size of the object.

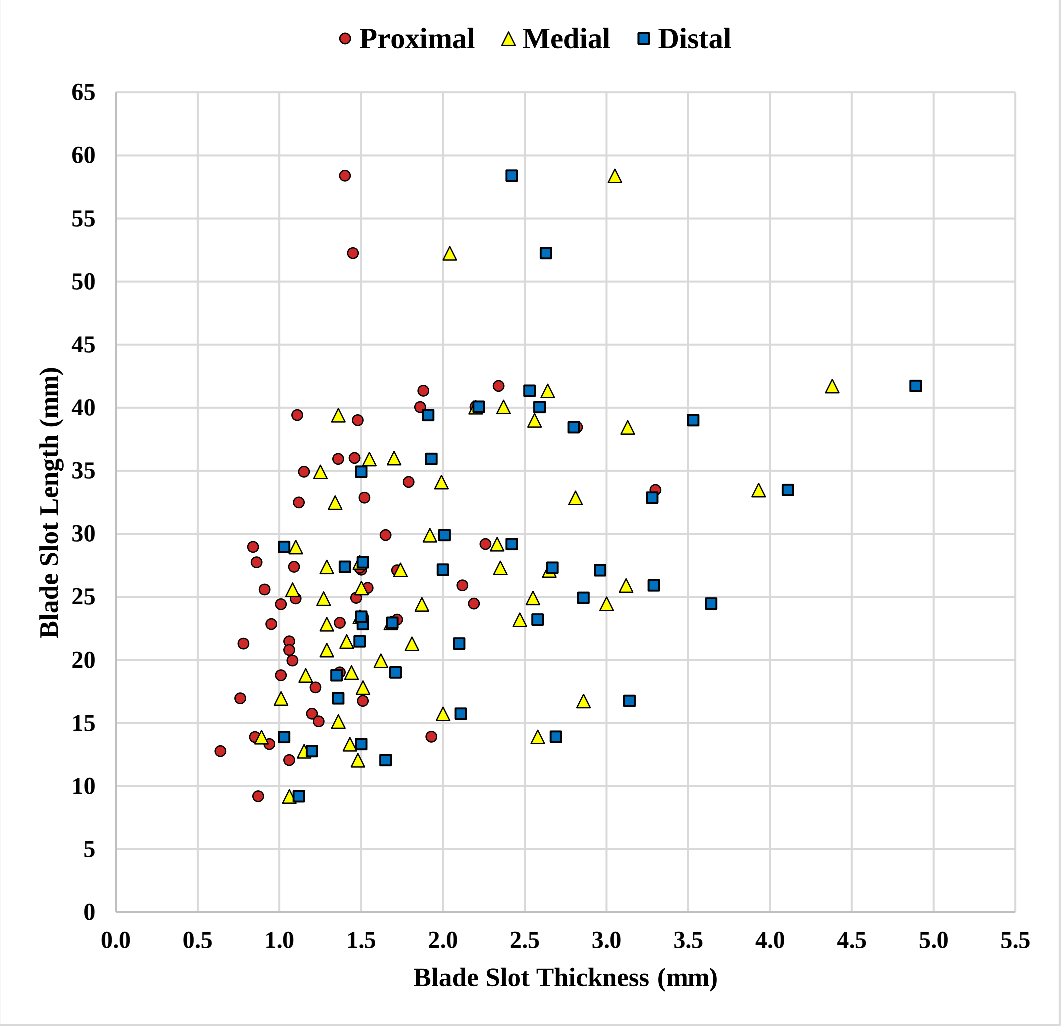

Figure 5.44: Proximal (n=55), medial (n=55), and distal (n=48) blade slot thicknesses compared to blade slot length for all side-hafted handles.

Side-hafted Handles	Pearson's Correlation Coefficient
Proximal	0.430
Medial	0.459
Distal	0.450

Table 5.24: Pearson's correlation coefficient values for blade slot length and blade slot thickness (at all three measurement locations) for all side-hafted handles.

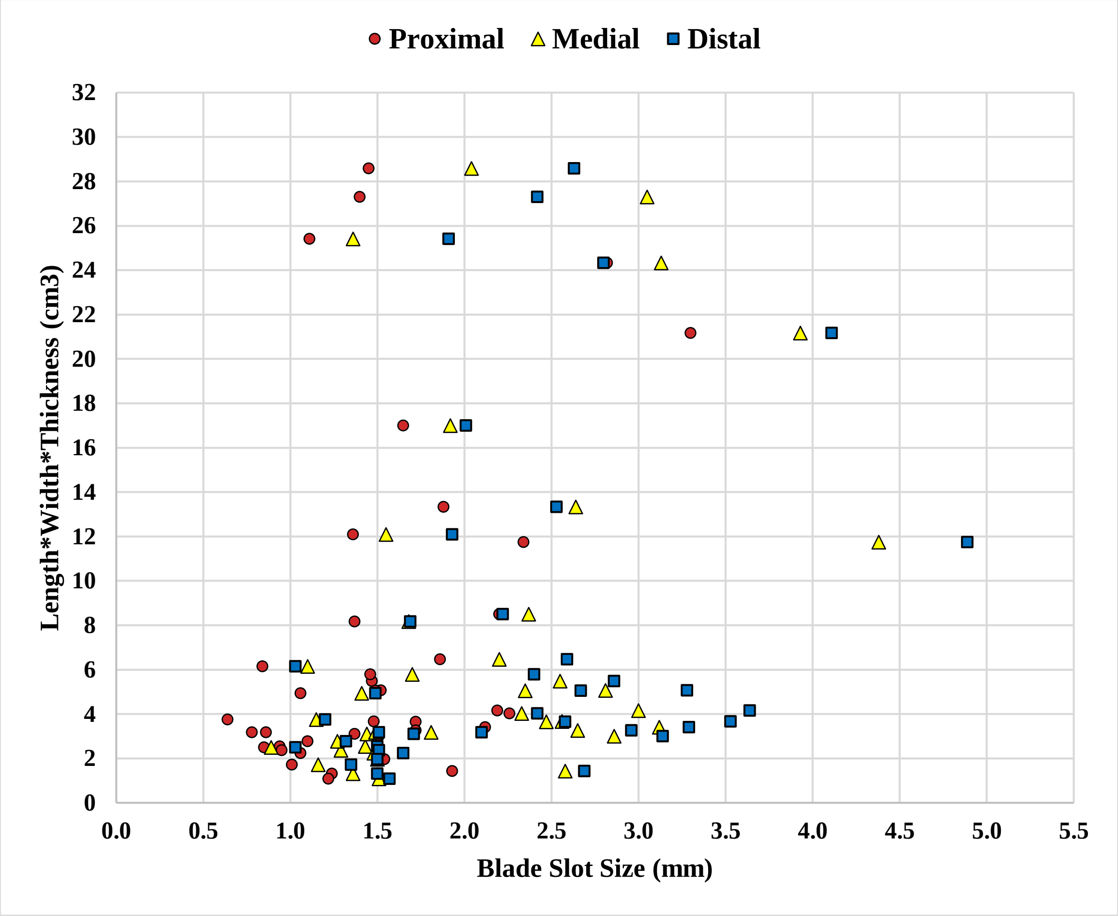

Figure 5.45: Proximal (n=39), medial (n=39), and distal (n=39) blade slot thicknesses compared to overall handle size for all side-hafted handles. Only complete or "near-complete" handles are included.

Side-hafted Handles	Pearson's Correlation Coefficient
Proximal	0.369
Medial	0.348
Distal	0.271

Table 5.25: Pearson's correlation coefficient values for overall handle size and blade slot thickness (at all three measurement locations) for all side-hafted handles (n=39).

Separating the handles into the four main geographic groupings detailed in Table 5.22, the patterns remain largely the same although there are some important differences. Significantly, by separating the side-hafted handles by region decreases the sample size for each individual region when compared to the overall sample, making some comparisons for some regions (e.g. High Arctic sites) difficult given the small size. For the proximal (Figure 5.46), medial (Figure 5.47), and distal (Figure 5.48) blade slot thicknesses, PgHb-1 seems to overall have the greatest variability in terms of blade slot thickness as well as the thickest blade slots on average (Table 5.26). For the most part, the majority of the blade slot thicknesses for each region cluster next to each other. An exception for this is the medial and distal measurements for the Foxe Basin specimens which seem to have two groups, one cluster of thinner slots (<2.0mm) and one thicker cluster (>2.5mm). A similar, although slightly weaker, pattern can be seen in the Central Arctic examples for both the medial and distal slot sizes. As stated previously, given the difficulties to separate the handles based on time period solely from the typology or site-wide chronologies due to the multi-component nature of most sites, it is not clear if these differences are specifically related to changes through time or if they are functional differences. In saying that, sites that are less mixed and are more likely to represent a Late Dorset presence, such as QjJx-1 (Central Arctic), are nearly evenly split between those two size clusters. Similarly, NiHf-4 (Foxe Basin), which is a multi-component site but one where the material included in this dataset is from what appeared to be Late Dorset or Late Dorset/Thule mixed components (Murray 1996:73), contained Late Dorset knife handles with slots that are from both size clusters. It seems possible, in this regard, that the potential size clustering that is seen in Central Arctic and Foxe Basin knife handles in both the medial and distal blade slot thicknesses (Figure 5.49 and Figure 5.50) may indicate something more than simply changes through time or space and perhaps might indicate the use of two blade sizes. These blade sizes may then correlate to the raw material of the blade but this point is not easily answered with simply observing blade and slot thicknesses.

Hartigan's Dip Test helps clarify these qualitative differences (Table 5.27). In particular, it shows that there is likely only unimodal log normal distribution for Central Arctic side-hafted handles for both medial and distal blade slot thicknesses. Likewise, there is likely unimodal log normal distribution for distal blade slot thicknesses of Foxe Basin side-hafted handles. However, there does appear to be statistically multimodal distribution for medial blade slot thicknesses of Foxe Basin side-hafted handles. Given that the distal measurement is the most important for the purposes of assessing metal use in side-hafted handles, the visual clustering that can be seen in the histograms is not as strong as initially thought. As always, the dip test does not give a definitive answer but does indicate that most of the distributions seen are log normal.

As will be seen in Chapter 6, microblades can be incredibly thin and could conceivably be used in both instances. Secondly, the appearance of these two clusters may be sample or observer bias and, upon collecting new data, may disappear. This is especially the case given that the dip test did not detect multimodality in most cases. Whether these blade sizes reflect metal use will be discussed in Chapter 9.

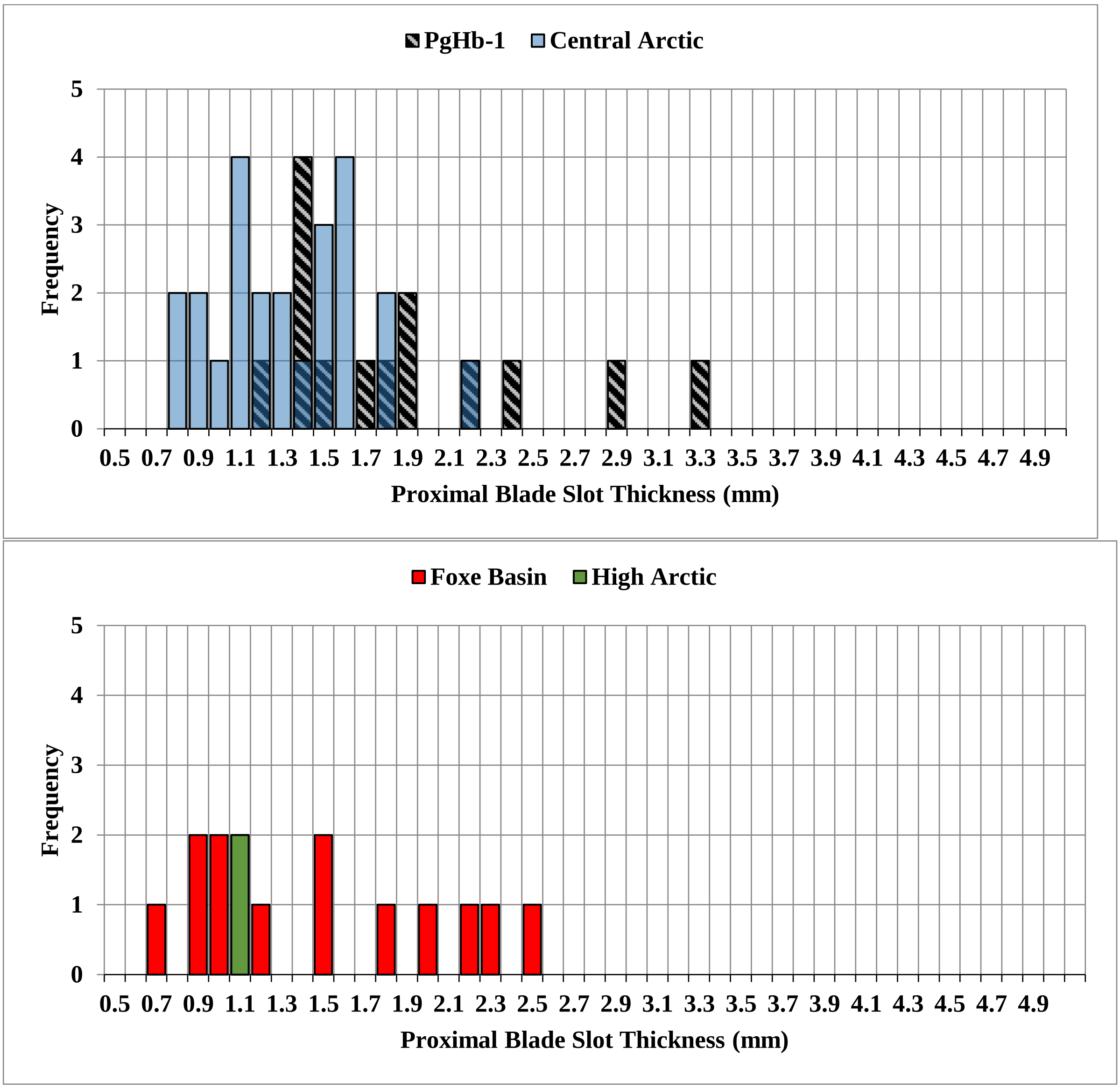

Figure 5.46: Proximal blade slot thickness for side-hafted handles from the Foxe Basin (n=15), PgHb-1 (n=14), Central Arctic (n=24), High Arctic (n=2).

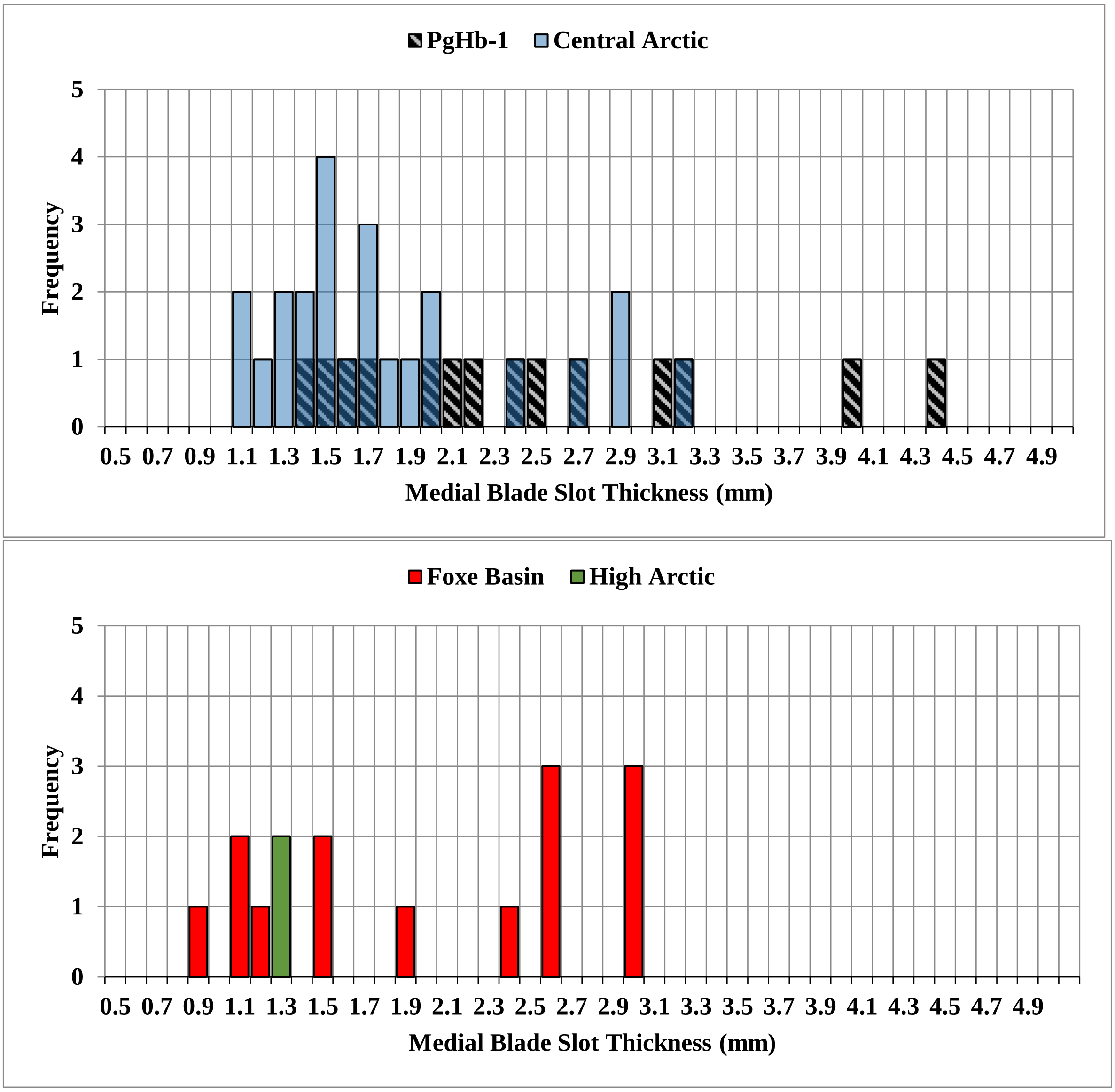

Figure 5.47: Medial blade slot thickness for side-hafted handles from the Foxe Basin (n=15), PgHb-1 (n=14), the Central Arctic (n=24), and the High Arctic (n=2).

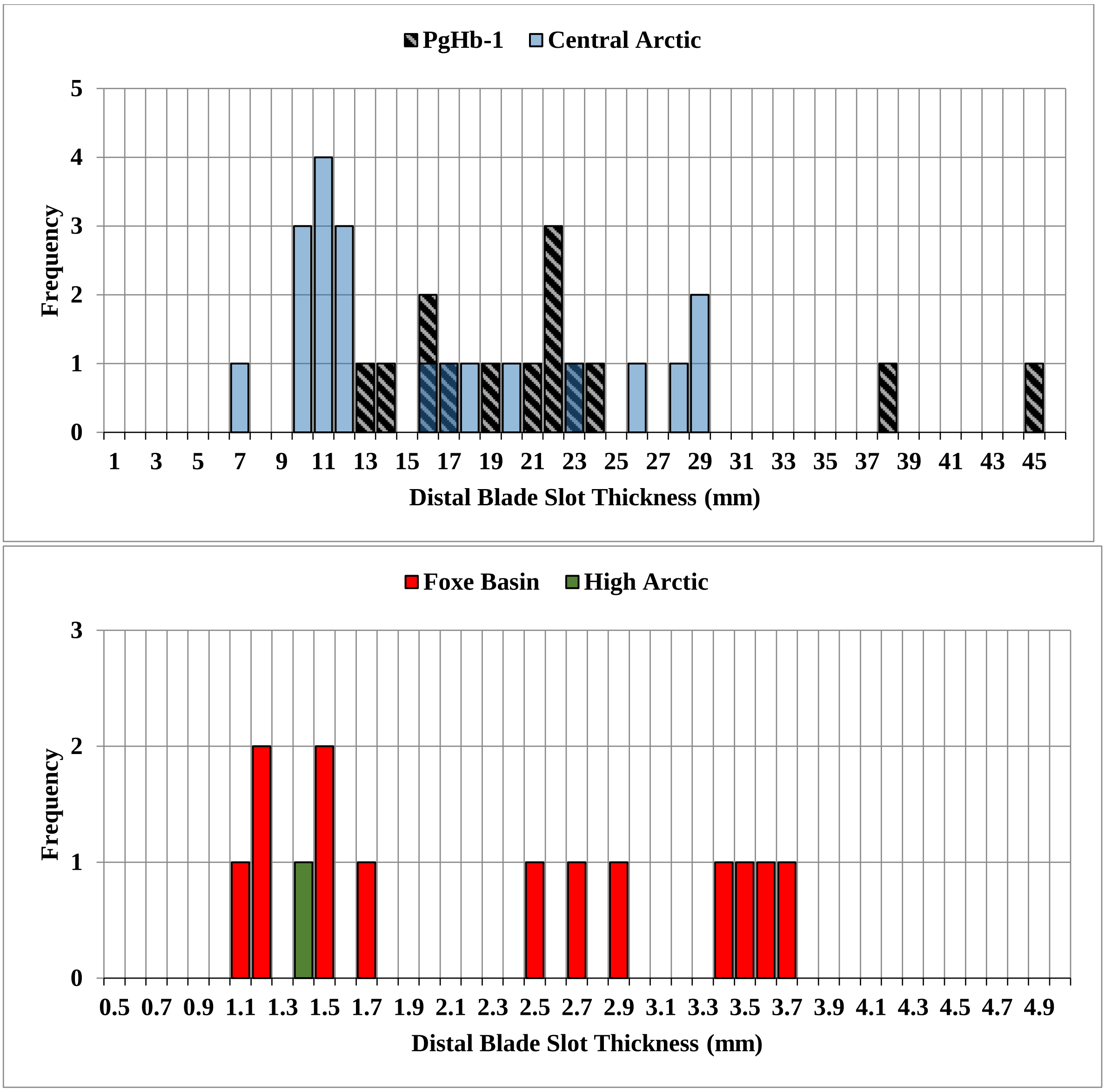

Figure 5.48: Distal blade slot thicknesses for side-hafted handles from the Foxe Basin (n=13), PgHb-1 (n=14), the Central Arctic (n=20), and the High Arctic (n=1). Note: some data for Foxe Basin sites are obscured, see below figures to see full extent of data.

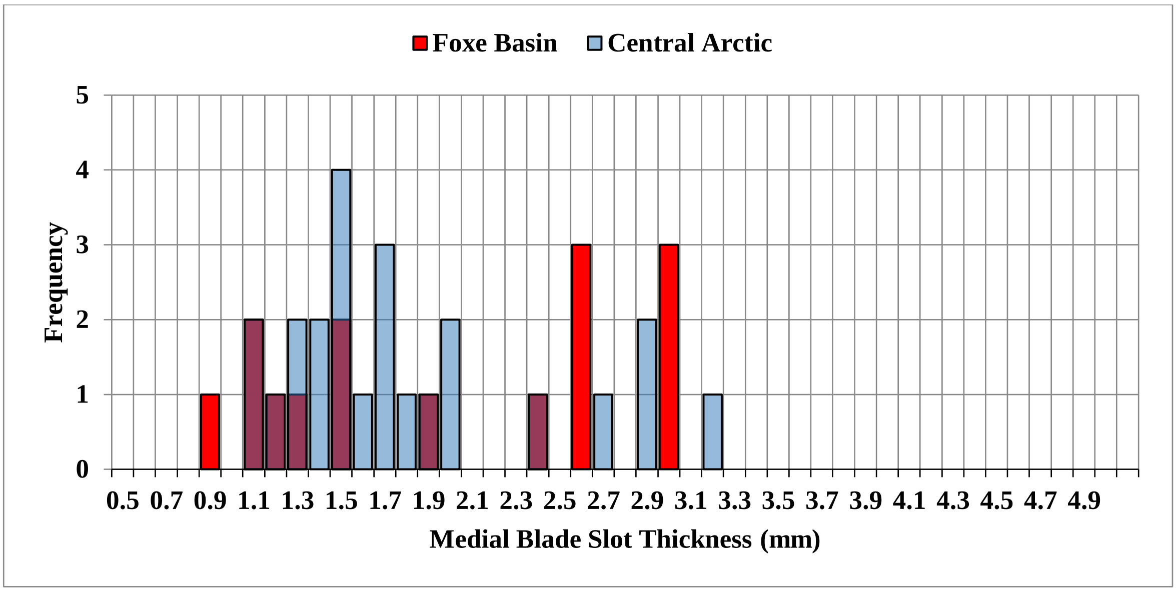

Figure 5.49: Medial blade slot thicknesses of side-hafted handles from Foxe Basin (n=15) and Central Arctic (n=24).

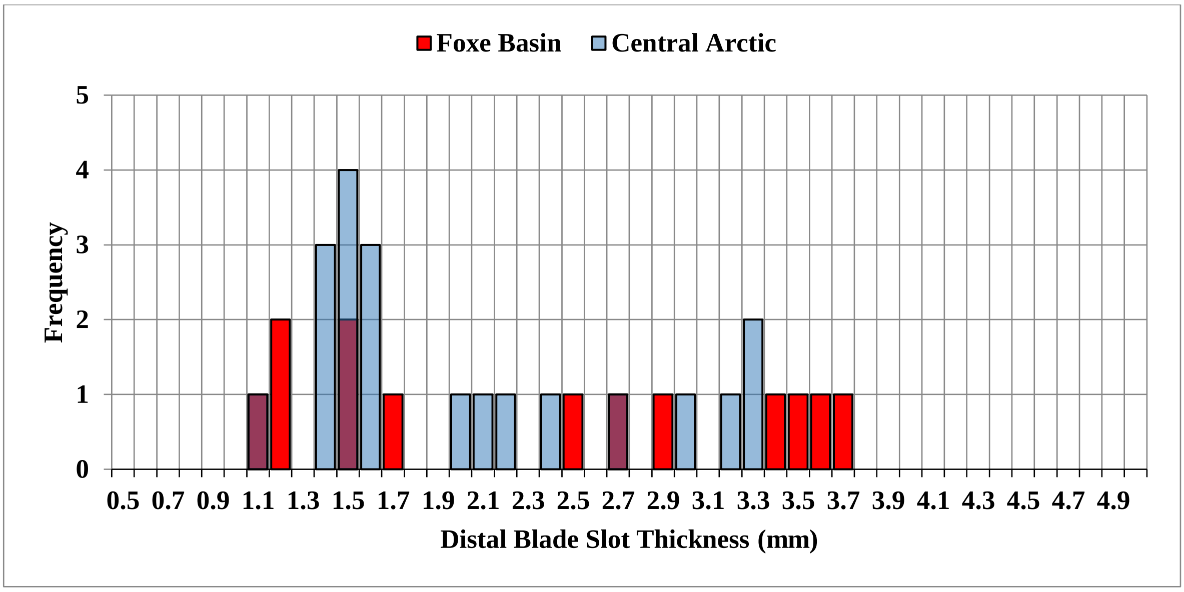

Figure 5.50: Distal blade slot thicknesses of side-hafted handles from the Foxe Basin (n=13) and Central Arctic (n=20).

Medial	**Foxe Basin**	**Central Arctic**	**PgHb-1**	**High Arctic**	**All**
n	15	**24**	14	2	55
Mean	1.95	1.76	**2.44**	1.28	1.97
Median	1.87	1.57	**2.29**	1.28	1.70
Maximum	3.00	3.12	**4.38**	1.29	4.38
Minimum	0.89	1.01	**1.36**	1.27	0.89
Range	2.11	2.11	**3.02**	0.02	3.49
Standard Deviation	0.79	0.59	**0.92**	0.01	0.78
Coefficient of Variation	40.51	35.52	**37.70**	0.78	39.59

Distal	**Foxe Basin**	**Central Arctic**	**PgHb-1**	**High Arctic**	**All**
n	13	**20**	14	1	48
Mean	2.30	1.98	**2.57**	1.32	2.23
Median	2.42	1.54	**2.48**	1.32	2.06
Maximum	3.64	3.29	**4.89**	1.32	4.89
Minimum	1.03	1.03	**1.69**	1.32	1.03
Range	**3.64**	2.26	3.20	1.32	3.86
Standard Deviation	**1.00**	0.72	0.90	-	0.88
Coefficient of Variation	**43.48**	36.36	35.02	-	39.46

Table 5.26: Descriptive statistics for medial and distal blade slot thicknesses of side-hafted handles separated into region. Bolded and underlined numbers represent highest and lowest value across regions respectively.

Hartigan's Dip Test	**Medial Blade Slot D-Value**	**Medial Blade Slot p-Value**	**Distal Blade Slot D-Value**	**Distal Blade Slot p-Value**
Central Arctic	0.0480	0.96	0.0597	0.84
Foxe Basin	0.121	0.043	0.115	0.12

Table 5.27: Hartigan's Dip Test of unimodality for side-hafted handle medial and distal blade slot thicknesses separated by region. A p-value of <0.05 is considered statistically significant. In the case of the calculations here, only the medial blade slot thicknesses from the Foxe Basin are not unimodal (i.e. at least bimodal).

5.3.2 End-Hafted Handles

The number of end-hafted handles included in this thesis is much lower than the number of side-hafted examples. Despite the frequency not being formally quantified, there appeared to be a higher rate of end-hafted handles being damaged or were missing one of the blade beds which meant accurate thickness measurements could not be taken when compared to side-hafted handles. Therefore, although the sample number of end-hafted handles is lower in this dataset than side-hafted handles that should not be an indication of overall frequency and preference on the part of the Dorset for one hafting technique over another.

There are 25 end-hafted handles that were identified in 5 sites across the Arctic (Table 5.28). They have been grouped into four regions: the Hudson Strait, Northern Baffin Island, the High Arctic and the Central Arctic (Figure 5.51). All end-hafted handles were made out of antler, bone, or wood but wood was much more prevalent than with other organic tool categories. Another major contrast is that most of the end-hafted handles displayed evidence of some sort of lashing grooves around the blade slot, indicating these were not likely held in by pressure alone. Importantly, most of the sites included are from predominantly Middle Dorset sites or are from sites with significant Middle Dorset occupations. QjJx-1 and SgFm-3 are the only sites that has been identified as solely Late Dorset and, unfortunately, the sites with the fewest end-hafted handles. Additionally, the specimen from QjJx-1 (QjJx-1:127) is unlike the other end-hafted handles in that the blade slot is contained within the handle and not bisecting the entire tool (Figure 5.52). Similar tools are described as adze sockets in other Dorset contexts (McGhee 1981:92). While PgHb-1 has Late Dorset material the excavated houses are largely either pre-Late Dorset (or Inuit) or have mixed components. Interestingly, unlike most other organic objects in this dataset, there are two end-hafted handles that still have their lithic endblades attached. KeDe-14:885 and JaDb-10:2732 each have a chert and Ramah chert endblade attached respectively (Figure 5.53). The endblade of JaDb-10:2732 is broken distally but closely resembles other bifaces included in the dataset. Importantly, the overall width of the endblade here does not exceed the slot width which is unlike harpoon head endblades which tend to be wider than the supporting harpoon head.

Region/Site	Number of Specimens
Hudson Strait	
KeDe-14	7
JaDb-10	6
Sub-Total	*13*
Northern Baffin Island	
PgHb-1	10
Sub-Total	*10*
Central Arctic	
QjJx-1	1
Sub-Total	*1*
High Arctic	
SgFm-3	1
Sub-Total	*1*
Grand Total	**25**

Table 5.28: Sites containing end-hafted handles separated by region included in this thesis.

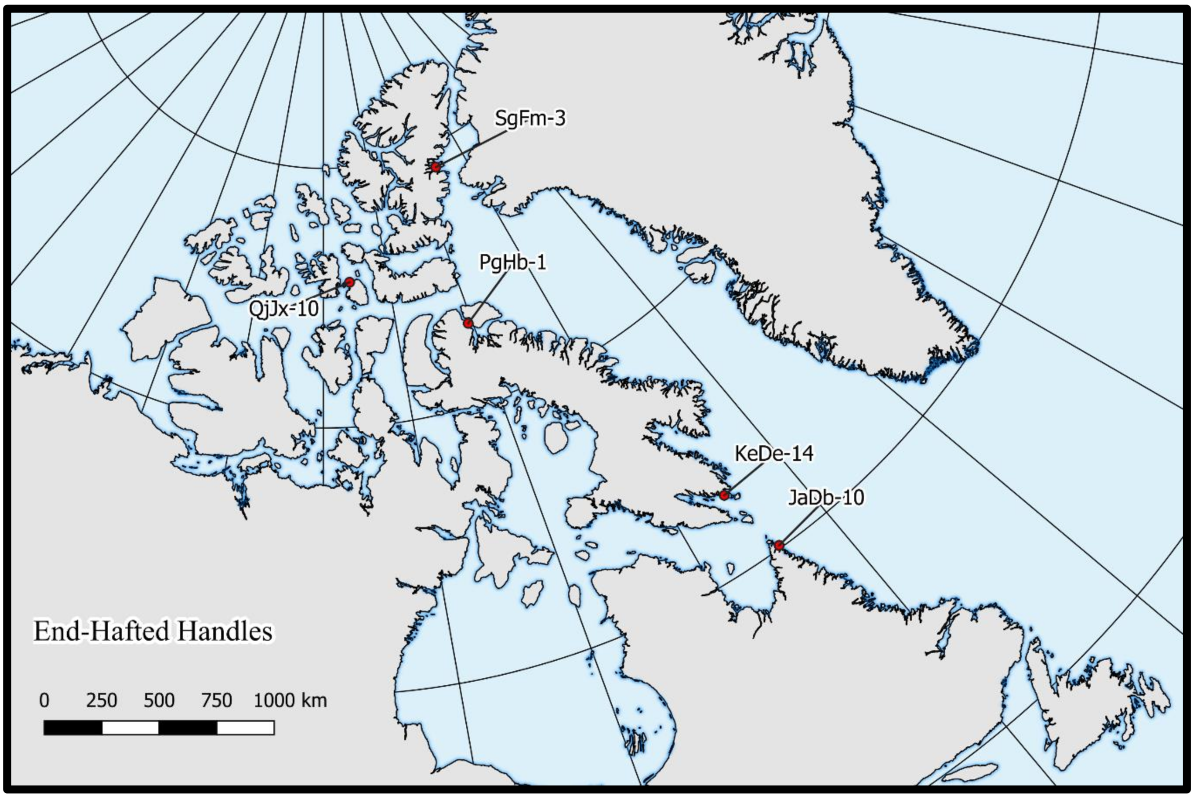

Figure 5.51: Distribution of End-Hafted Handles included in this thesis.

Figure 5.52: The only end-hafted handle included in this study from a Late Dorset context (QjJx-1:127). Photo permission courtesy of the Government of Nunavut and the Prince of Wales Northern Heritage Centre.

Figure 5.53: End-hafted handle with intact Ramah chert endblade from Avayalik Island (JaDb-10:2732). Photo permission courtesy of the Rooms Museum.

The overall blade slot thicknesses for all end-hafted handles at each measurement location generally conforms to normal distribution (Figure 5.54, Figure 5.55, and Figure 5.56). The mean medial blade slot thickness is 2.88mm, making them, on average, thicker than pre-Late Dorset harpoon heads, Type G harpoon heads, and side-hafted handles but just thinner than Dorset Parallel harpoon heads. Moreover, despite the small sample size compared to the other artefact types, just over half (54%) of end-hafted handles have medial blade slot measurements between 2.4mm and 3.4mm, making end-hafted handles more comparable in terms of blade slot thickness with Dorset Parallel harpoon heads. However, unlike Dorset Parallel harpoon heads, end-hafted handles have less difference between their medial (Figure 5.55) and distal (Figure 5.56) blade slot thicknesses. Overall, blade slot thickness among the end-hafted handles correlate more strongly between slot thickness and slot length (Figure 5.57 and Table 5.29) as well as slot thickness and object size (Figure 5.58 and Table 5.30) than other organic tool category. Ultimately, this indicates that blade slot length and object size explain the thickness of the blade slot in end-hafted handles with more confidence than with any other organic tool category. This indicates that endblade raw material would have had less of an impact (or potentially was not as diverse) than other tool categories.

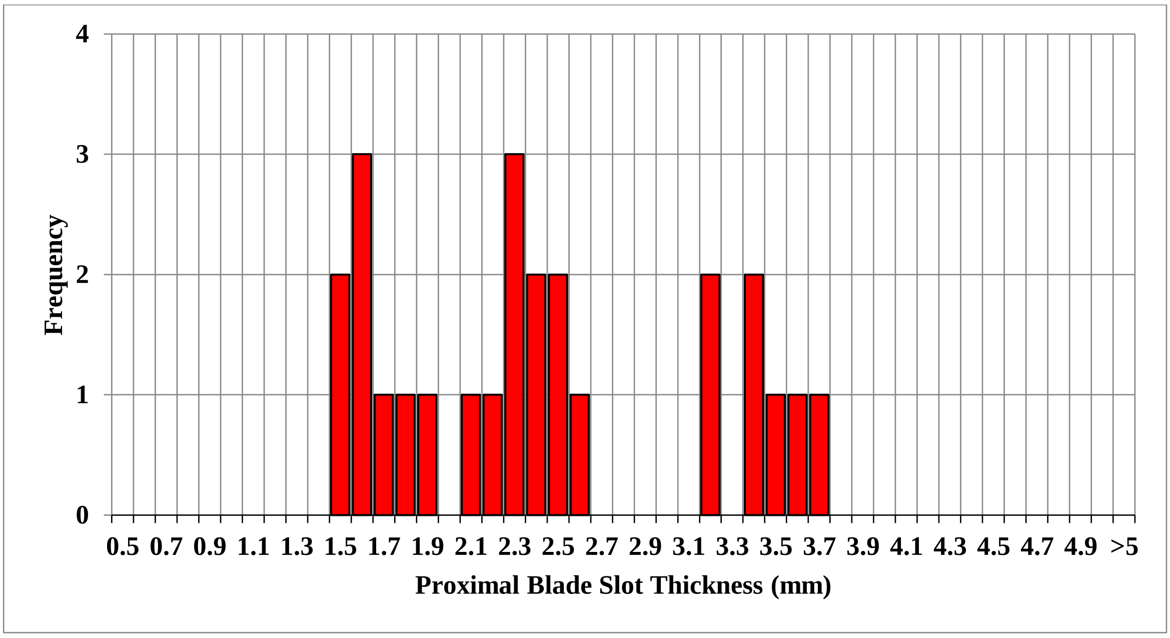

Figure 5.54: Proximal blade slot thickness of end-hafted handles (n=25).

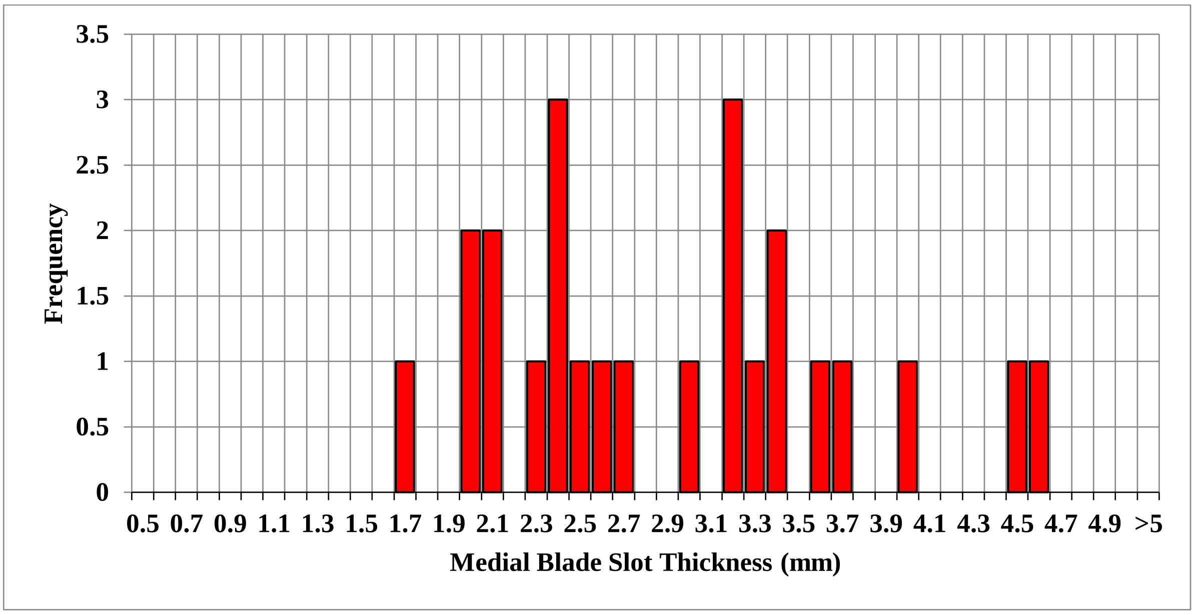

Figure 5.55: Medial blade slot thickness of end-hafted handles (n=24). QjJx-1:127 shown in red.

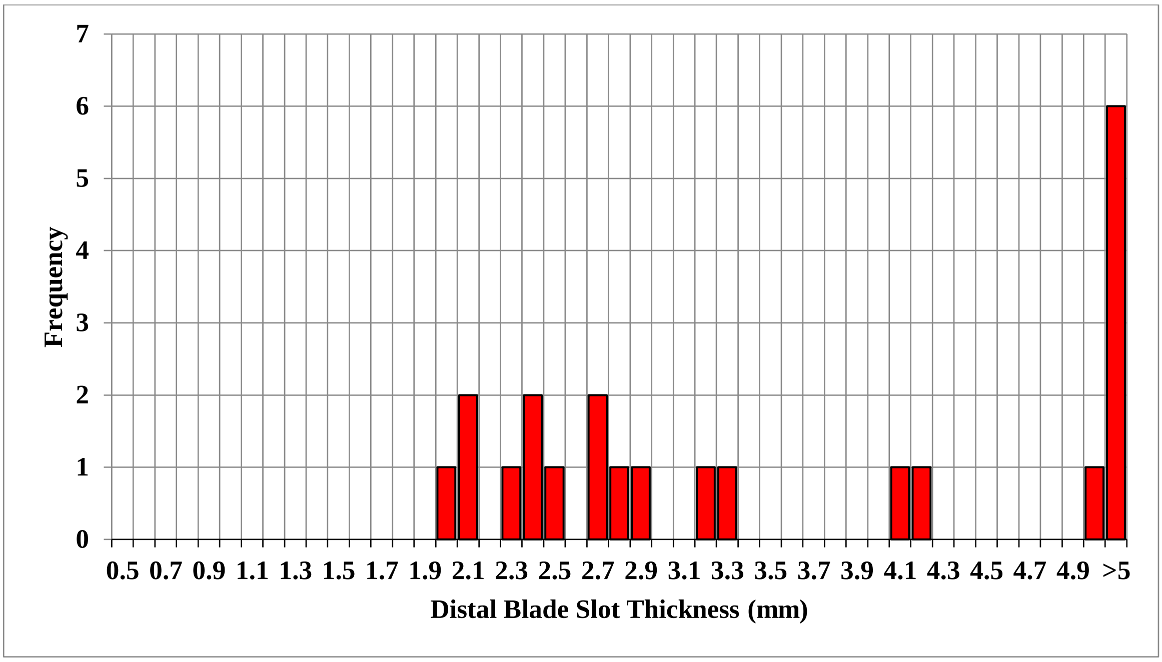

Figure 5.56: Distal blade slot thickness of end-hafted handles (n=22). Note that the last value contains all specimens with blade slot thicknesses greater than 5mm.

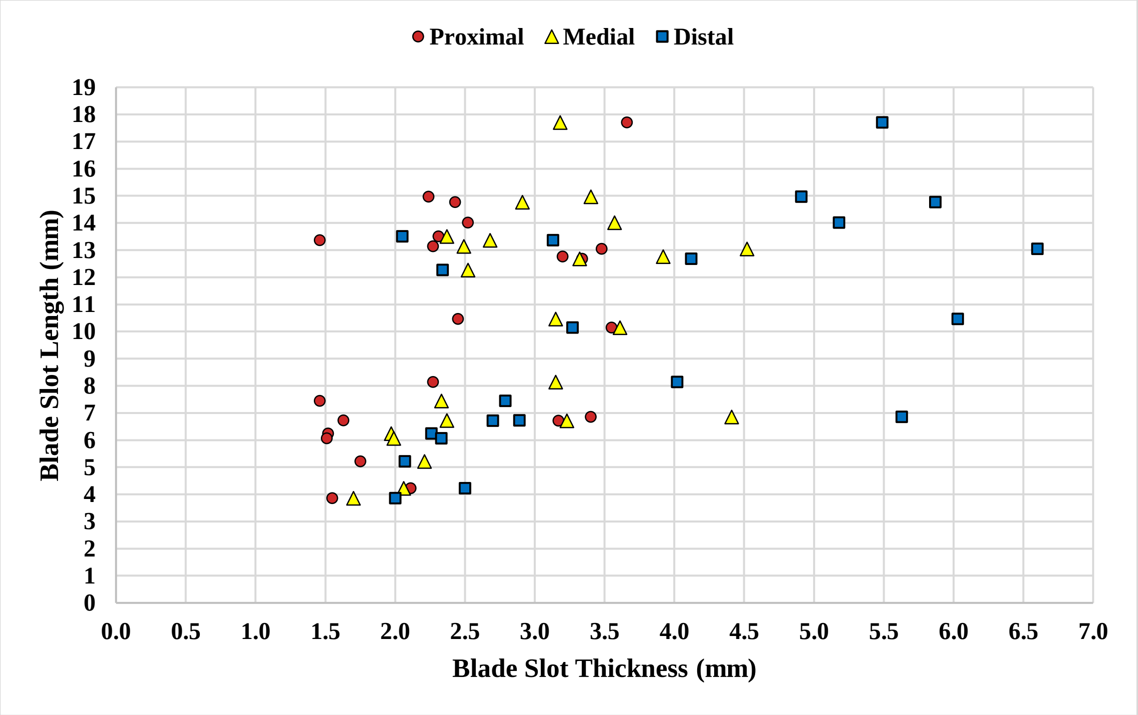

Figure 5.57: Proximal (n=24), medial (n=23), and distal (n=21) blade slot thicknesses compared to blade slot length for all end-hafted handles.

End-Hafted Handles	Pearson's Correlation Coefficient
Proximal	0.351
Medial	0.329
Distal	0.468

Table 5.29: Pearson's correlation coefficient values for blade slot length and blade slot thickness (at all three measurement locations) for all end-hafted handles.

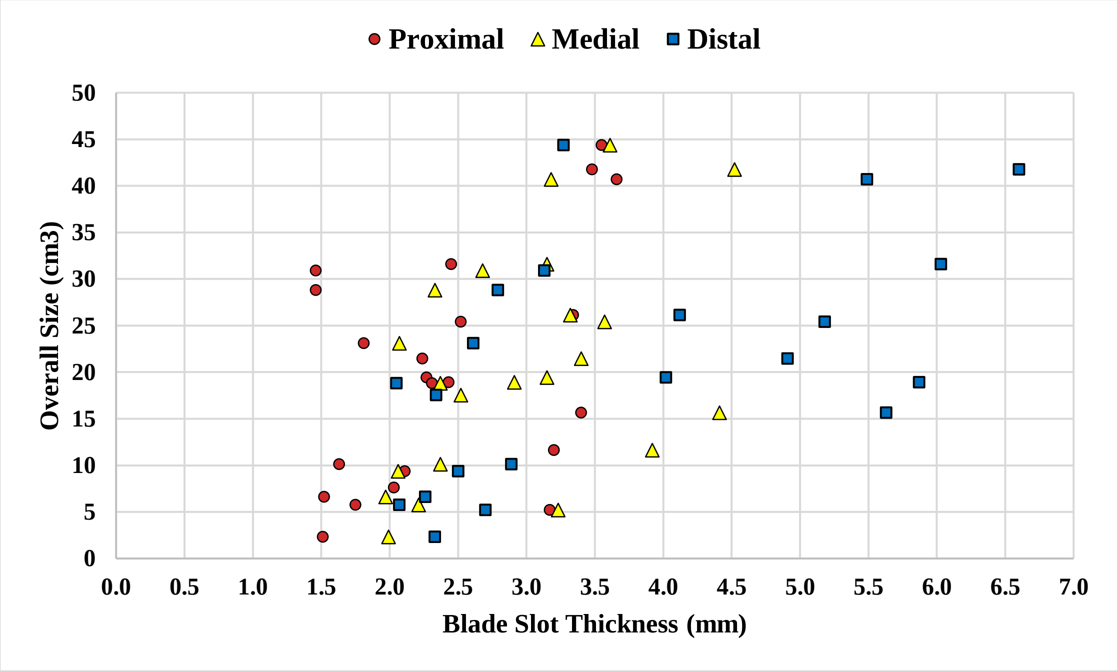

Figure 5.58: Proximal (n=25), medial (n=24), and distal (n=22) blade slot thicknesses compared to overall handle size for all end-hafted handles. Only complete or "near-complete" handles are included.

End-Hafted Handles	Pearson's Correlation Coefficient
Proximal	0.469
Medial	0.468
Distal	0.553

Table 5.30: Pearson correlation coefficient values for overall size of object and blade slot thickness (at all three measurement locations) for all side-hafted handles.

Interestingly, when separated by region (Figure 5.59 and Figure 5.60), there is a clear pattern between blade slot thickness. While there is regional overlap between the three groupings for proximal blade slot thickness, the majority of Hudson Strait handles have thinner blade slots than the examples from Northern Baffin Island. This is particularly visible in medial blade slot thicknesses which is likely the better proxy indicator of actual blade thickness for the same reasons described above for harpoon heads (Figure 5.60;

Table 5.31). Welch's t-test confirms this assessment showing that there is a significant statistical difference between the medial blade slot sizes of end-hafted handles from the Hudson Strait and northern Baffin Island (Table 5.32). It is unlikely that this represents metal usage in one region versus another since each region is consistently grouped together rather than showing any sort of bimodal distribution within each region. This is unlike the bimodal distribution seen in Dorset Parallel harpoon heads from Late Dorset contexts which have roughly equal distribution between both groupings within each region (Figure 5.16).

The uppermost contexts at KeDe-14 (the contexts which contained most of the wooden handles included in this thesis) have been dated to the later Middle Dorset (or very early Late Dorset) (Odess 1996:153; 1998:425) and JaDb-10 is a Middle Dorset site that has a small overlying Late Dorset component (Fitzhugh et al. 2006:155). This could possibly indicate the end-hafted handles from JaDb-10 are intrusive Late Dorset material despite all wooden handles being associated with the Middle Dorset component by the original excavators. This might mean the generally thinner blade slots from Hudson Strait may indicate metal use compared to the likely thicker Middle Dorset examples from PgHb-1. However, given that the wood objects from JaDb-10 display no signs of being shaped with metal tools (Fitzhugh et al. 2006:169) and the harpoon heads are stylistically early (and have medial blade slot thicknesses greater than 3.0mm) compared to Late Dorset harpoon heads from the rest of the Arctic, it seems unlikely that the distribution seen here in blade slot thickness for end-hafted handles is representative of incipient metal use. Rather, the distinctions seen between Hudson Strait and Northern Baffin Island blade slot thicknesses of end-hafted handles is likely the result of different manufacturing techniques of the handles, hafting techniques, functions, and lithic raw materials (i.e. Ramah chert vs. tan chert). Interestingly, each of these three sites has been used by Sutherland (2000; 2009) as evidence of Dorset-Norse contact. One of the primary materials used to support this argument is the presence of non-Arctic metals in Dorset sites on lithic whetstones or vessels (e.g. Sutherland 2009; Sutherland and Thompson 2016; Sutherland et al. 2015). However, it would be expected that both Hudson Strait and Northern Baffin Island sites would equally show evidence of metal use (at least according to the blade slots) but this is not the case. If evidence for Dorset-Norse contact and Dorset metal use exists at these sites, it is not seen in the end-hafted handle or harpoon head data.

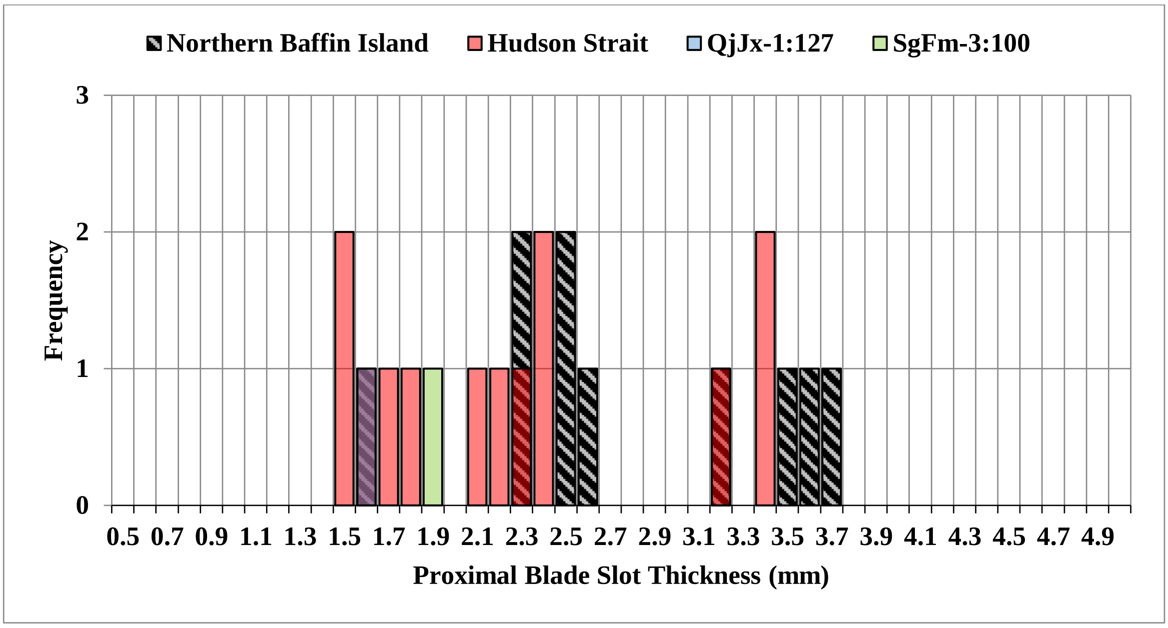

Figure 5.59: Proximal blade slot thicknesses of end-hafted handles from Hudson Strait (n=12) and Northern Baffin Island (n=10).

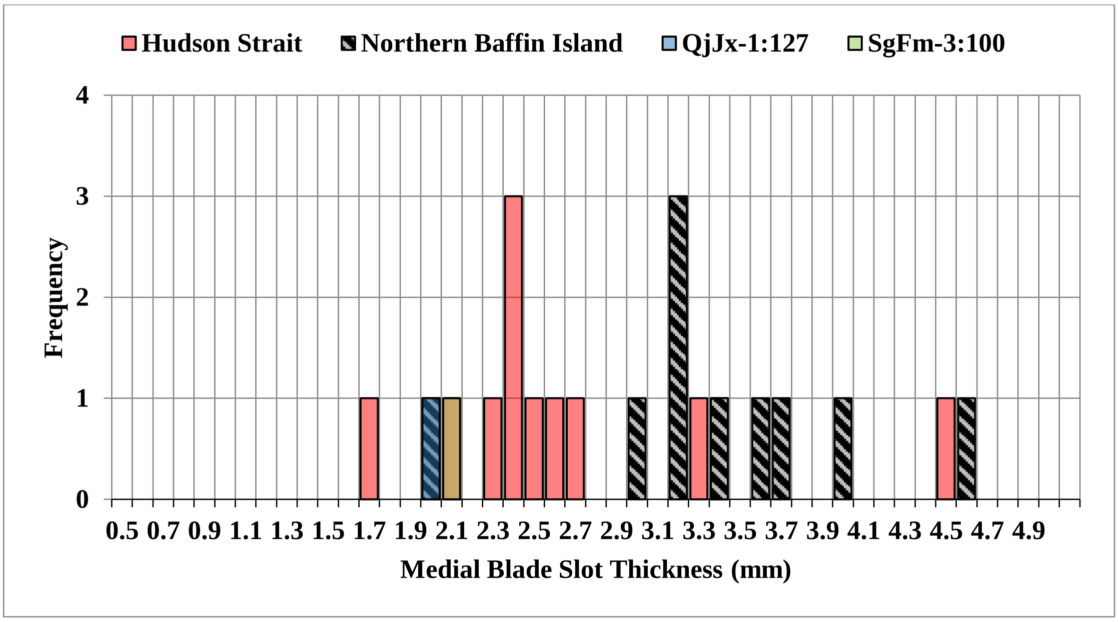

Figure 5.60: Medial blade slot thicknesses of end-hafted handles from Hudson Strait (n=12), Northern Baffin Island (n=10), QjJx-1:127, and SgFm-3:100. Note QjJx-1:127 overlaps with one observation from Northern Baffin Island at 2.0mm and SgFm-3:100 overlaps with one observation from the Hudson Strait at 2.1mm.

Medial	**Hudson Strait**	**Northern Baffin Island**	**All**
n	12	**10**	22
Mean	2.64	3.34	**2.96**
Median	2.43	3.29	**3.03**
Maximum	4.41	4.52	**4.52**
Minimum	1.70	1.97	**1.70**
Range	2.71	2.55	**2.82**
Standard Deviation	0.72	0.67	**0.77**
Coefficient of Variation	27.27	20.06	**23.65**
Distal	**Hudson Strait**	**Northern Baffin Island**	**All**
n	11	**9**	20
Mean	2.93	4.85	**3.79**
Median	2.70	5.18	**3.20**
Maximum	5.63	6.60	**6.60**
Minimum	2.00	2.26	**2.00**
Range	**3.63**	4.34	4.60
Standard Deviation	**1.08**	1.41	1.55
Coefficient of Variation	**36.86**	29.07	40.90

Table 5.31: Descriptive Statistics for end-hafted handles from the Hudson Strait and Northern Baffin Island.

Welch's t-Test (Hudson Strait vs. N. Baffin Island)	**Medial Blade Slot Thickness**
t-Stat	2.36
t Critical (two-tail)	2.09
p-Value	0.03

Table 5.32: Two sample Welch's t-test results for medial blade slot thicknesses for end-hafted handles from Hudson Strait and northern Baffin Island. The t-stat being greater than the critical value and the p-value being less than 0.05 indicates there is a significant statistical difference. In this case, there is a significant statistical difference between the medial blade slot thicknesses between the two regions.

Chapter 6

Results: Lithic Artefacts

6.1 Overview

This chapter will present the results for all lithic artefacts included in this study. Like the previous results chapter concerning organic objects, this chapter follows a similar structure. The material has been separated into the main artefact categories: Endblades, knives, scrapers, burin-like-tools, and microblades. Each object category will have its overall statistics and distribution presented prior to more fine grain analysis. One exception to the data presented is that there are two organic objects that were classified as “endblades” that are also included in this chapter. Other than the raw material and the presence of a securing hole, there was virtually no difference between the two types of endblades. Therefore, it was decided to include the two organic points here. All metal objects are discussed in Chapter 7.

6.2 Endblades

Endblades are one of the best represented artefact classes in this thesis. There are 372 specimens from Labrador and the Arctic Archipelago spanning Early, Middle, and Late Dorset time periods. Prior to describing the overall statistics for this dataset, a brief overview of how endblades were distinguished from knives/bifaces. While what was described as an “endblade” in site catalogues was incredibly variable, all specimens included in this section are what is normally referred to as “triangular endblades”. In general terms, these are roughly triangular-shaped endblades that do not have a stem and either have a flat or concave base. In almost all cases, endblades show evidence of basal thinning. They are frequently, but not always have plano-convex transverse cross-sections. They are sometimes also referred to as “points” by some. Occasionally, triangular endblades will have side notches but, in the interest of consistency, these were classified as “knives”. This follows similar lithic tool categorisation by Maxwell (1985:221).

There are four variables seen in endblades that will be tested in order to understand if there are specific patterns in blade thickness (Figure 6.1). First, endblades have either a straight or concave base. Second, they can be either bifacially or unifacially flaked. Third, some endblades are "tip fluted". This is a process where two parallel flakes (or flutes) are removed from the distal tip of the object (one from each side of the midline) which forms a roughly triangular piece of debitage (Plumet and Lebel 1997). Originally, tip fluting was considered a finishing activity that sharpens the endblade but more recent research has shown it to be part of the manufacturing process and multiple flute spalls can be removed from a single endblade throughout its use-life (Nagle 1984; Plumet and Lebel 1997). Nagle (1984:345) argues that unifacially flaked endblades, more commonly found in Early/Middle Dorset than Late Dorset (Plumet and Lebel 1997:159), are actually an alternative to tip fluted endblades in areas distant from raw material sources as they require less raw material. Tip fluted endblades are frequently associated with Early and Middle Dorset lithic industries and have rarely, if ever, been associated with Late Dorset contexts but variation across regions is present (Maxwell 1985:177; Nagle 1984:345). Fourth, some endblades were labelled as "tiny" or as micro-points in some catalogues. These can be broadly defined as endblades which are less than 20mm in overall length. As such, only complete endblades have been classified as "micro". While the majority of the endblades are made out of some variety of chert, some are quartz, quartz crystal, dolomite, and slate. Two potentially antler or ivory endblades have been included in this dataset. While it is not impossible that triangular endblades were hafted in a variety of tools, they are most frequently associated with harpoon heads. Finally, unless otherwise stated, not all endblades are complete but they all have surviving proximal portions. Recall, the measurements referred to as "proximal", "medial", and "distal" for lithic artefacts refer to the three basal measurement locations described in Chapter 4.

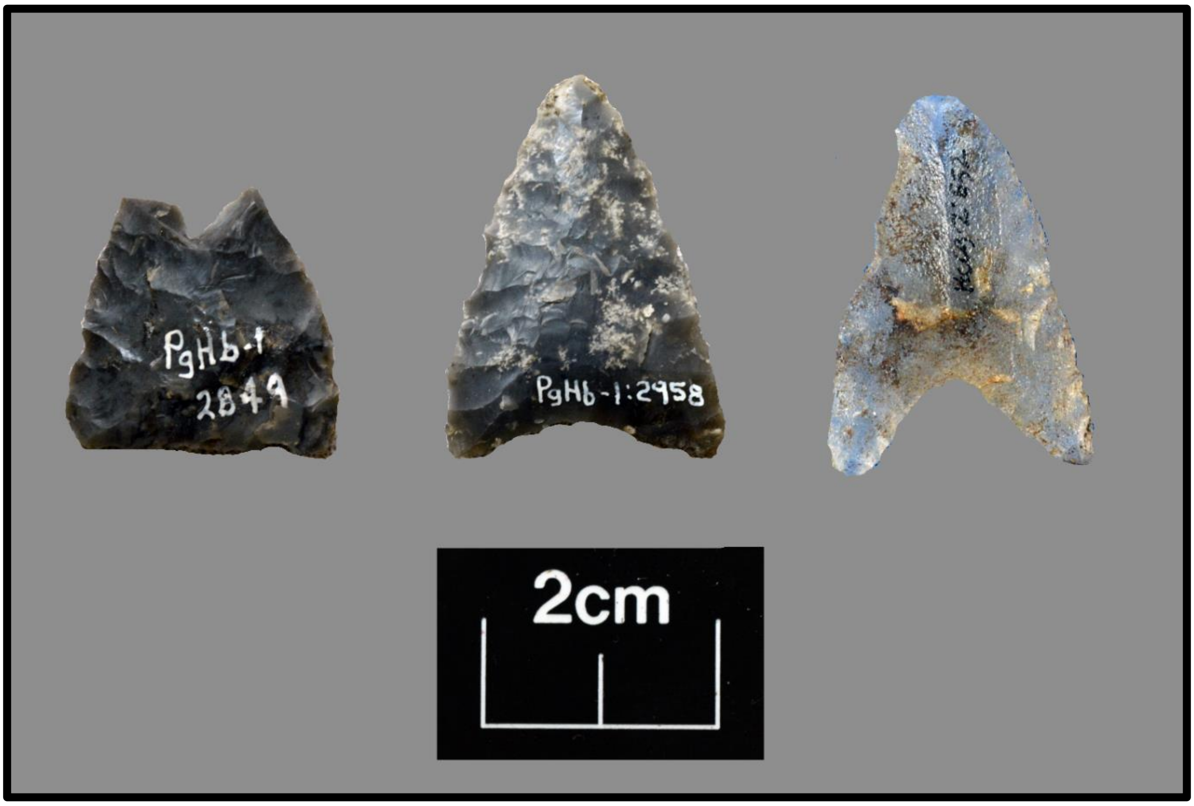

Figure 6.1: A selection of endblades. From left to right: PgHb-1:2849 is missing the distal tip but has a straight base, PgHb-2958 is a "typical" endblade with concave base and no tip fluting, and HcCg-2:652 with a deeply concave base and evidence of tip fluting. All examples are bifacially worked. Photo permission courtesy of the Government of Nunavut, the Canadian Museum of History, and the Rooms Museum.

The 372 endblades included in this thesis are found in 33 sites across the Arctic (Figure 6.2). The sites have been separated into 5 very broad regions: Labrador/Quebec, Baffin Island, Foxe Basin, Central Arctic, and High Arctic (Table 6.1). However, a little over half of the endblades come from Dorset sites in Labrador (55.6%). Overall, all endblades have roughly normal distribution when it comes to the thickness of their hafting regions. The proximal-most measurements are slightly negatively skewed which is expected given the way flaked stone tools are manufactured and the way the measurement was recorded (Figure 6.3). As a result, these measurements are likely the least valuable when assessing the thickness of the hafted portion of the object. Conversely, the "medial" and "distal" measurements are much more valuable as they relate to the mid-point and the distal-most point of the visible basal thinning on each endblade (Figure 6.4 and Figure 6.5). The maximum thickness was also recorded and its distribution is thicker again than the thickness measurement at the distal-most portion of the visible basal thinning (Figure 6.6).

Overall, these three measurements correlate well with each other and the distribution does not shift between each measurement location (Table 6.2). Before considering which of these measurements are most suitable to compare to the blade slot sizes of organic tools, the actual portion of the endblade that is used for hafting will be debated.

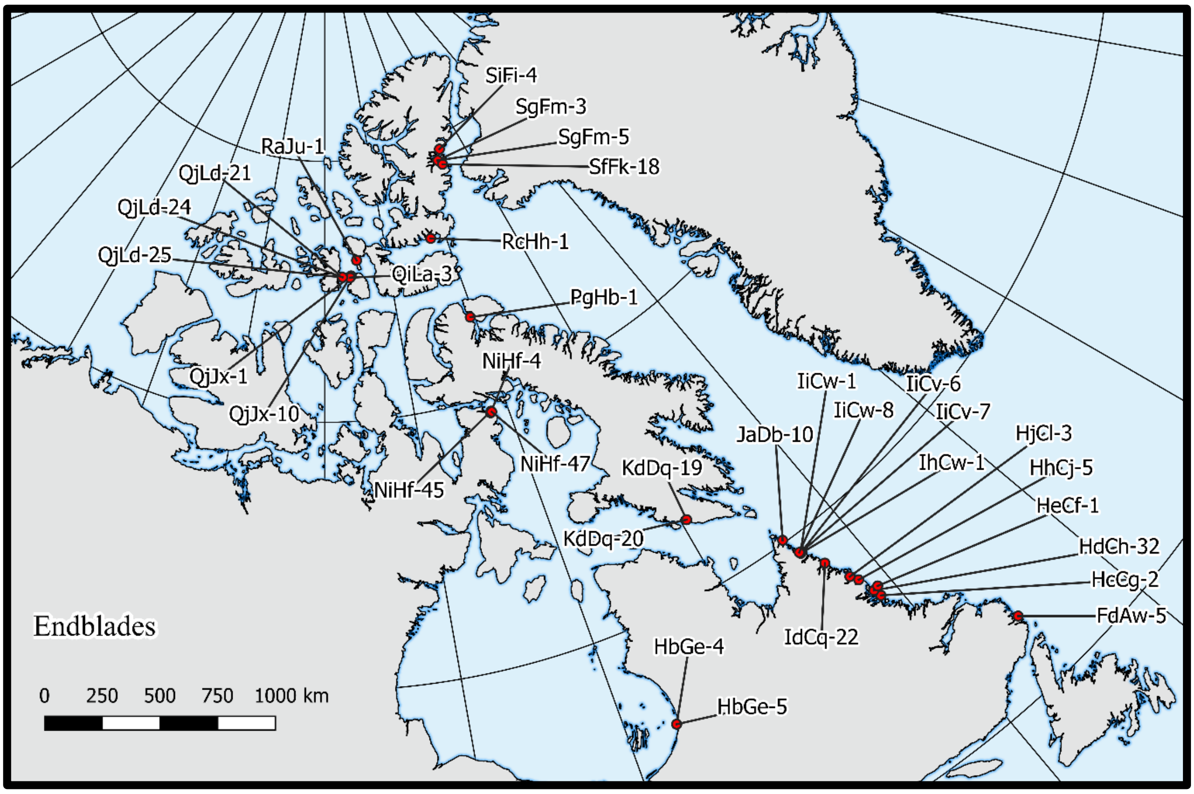

Figure 6.2: Distribution of all endblades included in this thesis.

Region/Site	Number of Specimens
Labrador/Quebec	
JaDb-10	47
IdCq-22	46
HjCl-3	18
IhCw-1	18
IiCw-8	18
HeCf-1	16
HcCg-2	12
IiCw-1	12
FdAw-5	4
HhCj-5	4
IiCv-6	4
HdCh-32	2
IiCv-7	2
HbGe-4	1
HbGe-5	1
Sub-Total	*205*
Baffin Island	
PgHb-1	55
KdDq-19	14
KdDq-20	1
Sub-Total	*70*
Foxe Basin	
NiHf-4	29
NiHf-45	12
NiHf-47	5
Sub-Total	*46*
Central Arctic	
QjJx-10	11
QjJx-1	10
RaJu-1	4
QiLa-3	3
QjLd-21	2
QjLd-24	2
QjLd-25	2
RcHh-1	2
Sub-Total	*36*
High Arctic	
SgFm-5	7
SfFk-18	3
SiFi-4	3
SgFm-3	2
Sub-Total	*15*
Grand Total	**372**

Table 6.1: The number of lithic endblades separated by site and region.

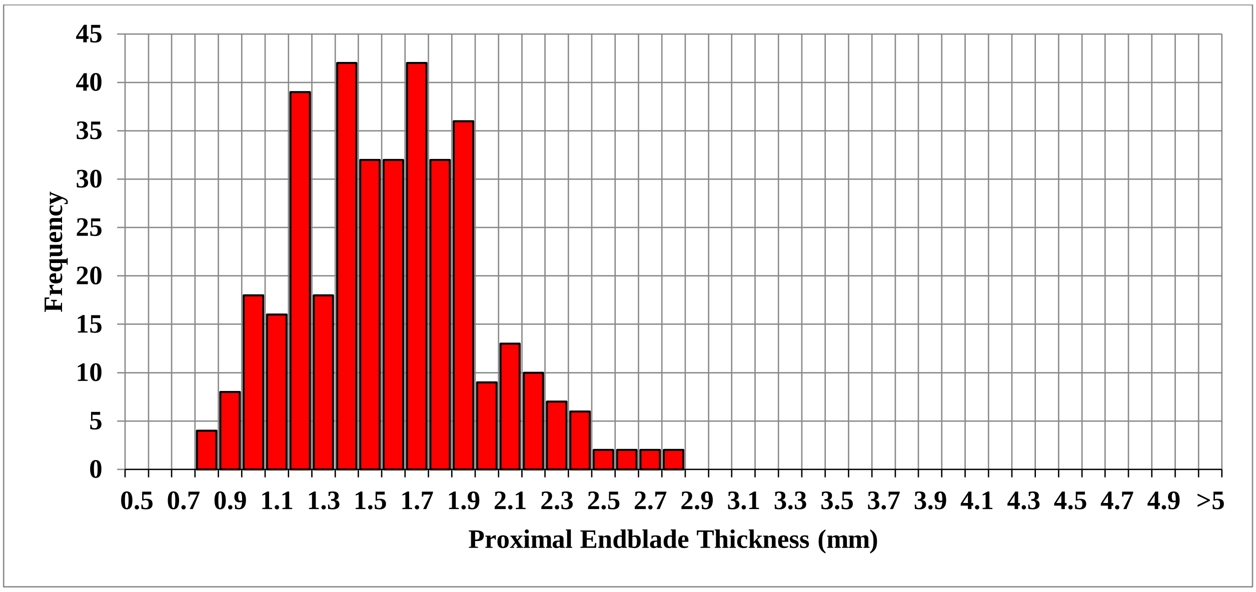

Figure 6.3: Proximal basal thickness of all lithic endblades included in this thesis (n=372).

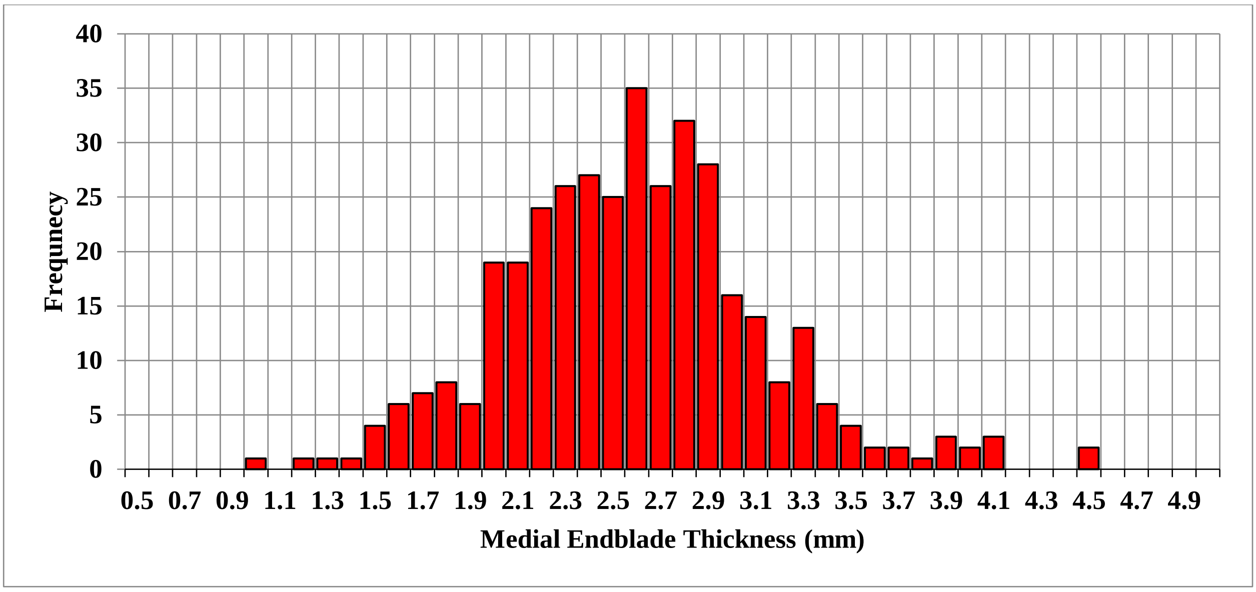

Figure 6.4: Medial basal thickness of all lithic endblades included in this thesis (n=372).

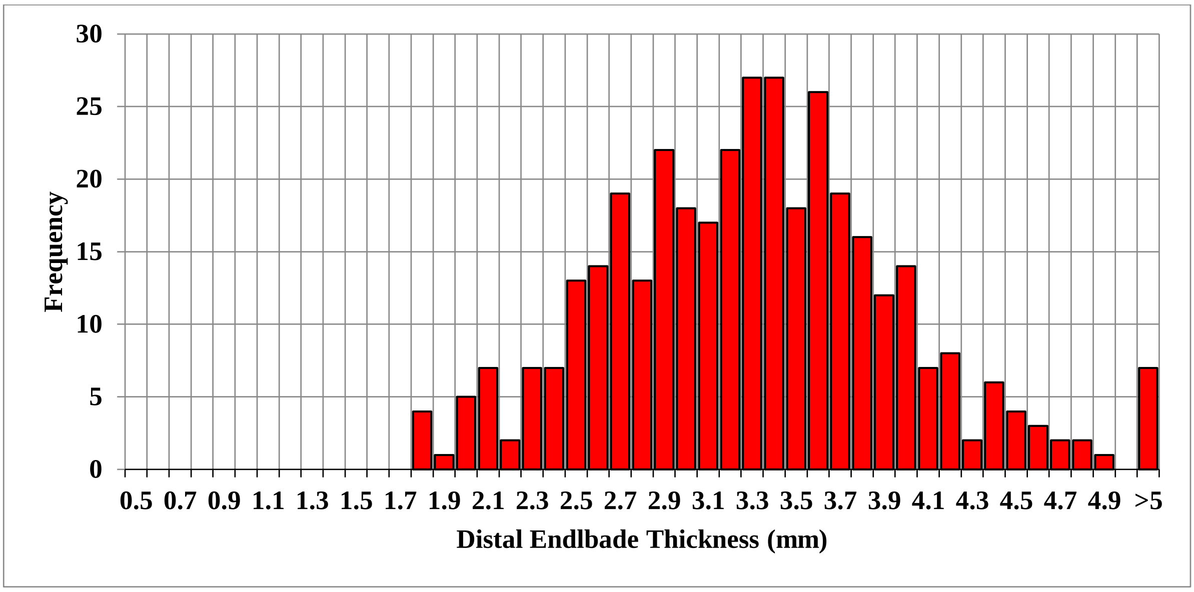

Figure 6.5: Distal basal thickness of lithic endblades included in this thesis (n=372). Note the thickest value includes all measurements greater than 5mm.

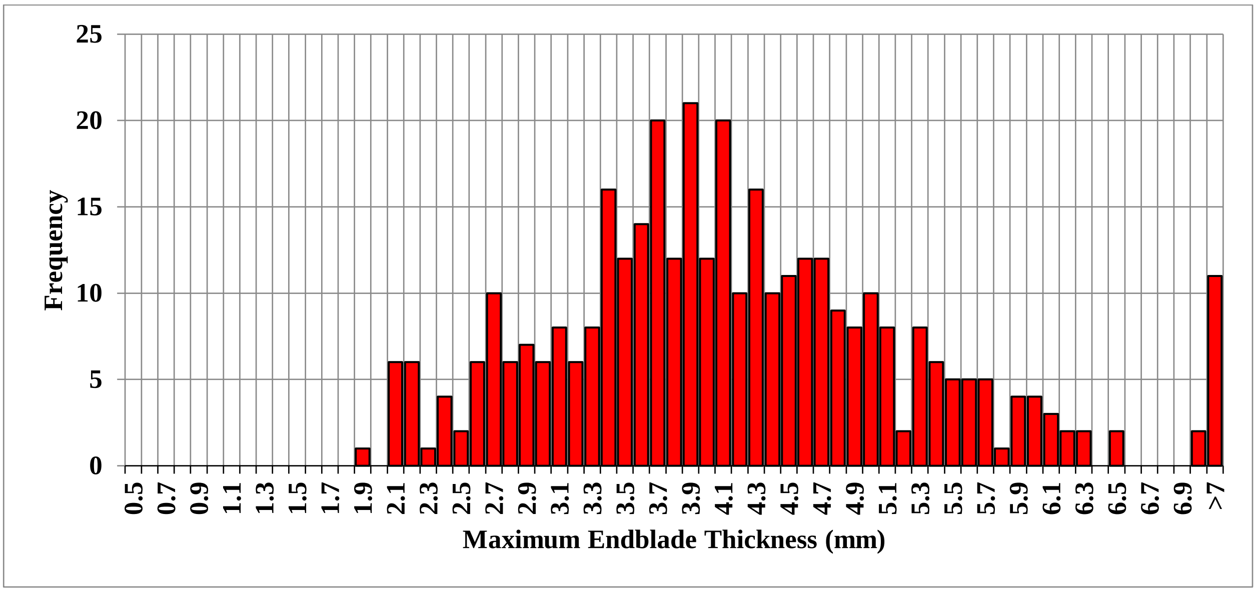

Figure 6.6: Maximum thickness of lithic endblades included in this thesis (n=372). Note the final value includes all measurements greater than 7mm.

All Endblades	Proximal	Medial	Distal	Maximum Thickness
n	372	372	372	372
Mean	1.54	2.54	3.27	4.14
Median	1.54	2.55	3.28	4.02
Maximum	2.77	4.50	6.25	8.45
Minimum	0.71	1.00	1.74	1.86
Range	2.06	3.50	4.51	6.59
Standard Deviation	0.39	0.54	0.70	1.14
Coefficient of Variation	25.32	21.26	21.41	27.54

Table 6.2: Descriptive statistics for basal and maximum thicknesses for all endblades included in this thesis.

While most endblades have identifiable basal thinning, it should not be assumed it is the only portion of the endblade that will come into contact with an organic object's blade bed. The majority of complete endblades have basal thinning which takes up less than 25% of their overall length (Table 6.3). Only 2 complete endblades have identifiable basal thinning that is more than up to 37% of the total length of the endblade. When compared to the slot lengths for harpoon heads and end-hafted handles, endblades tend to have slightly shorter basal thinning than the harpoon head slots are long. While this could mean that the widest part of the blade slot may come into contact with a portion of an endblade that is beyond the extent of its basal thinning, the methodology of the data collection may be skewing our understanding. Basal thinning lengths were measured from the mid-line of the endblade while the blade slot lengths were measured from the lateral portion of the slot (i.e. on the "outside" of the harpoon head). While not formally quantified, many harpoon head blade slots have convex bases that somewhat match the generally (but not always) concave base of endblades. If this is the case, then the blade slot length measurement would be longer than what it is in reality. In any case, there's only a minority of harpoon heads, regardless of the type, that have a slot length that is significantly longer than the length of basal thinning on most lithic endblades. Therefore, the distal endblade thickness measurement and not necessarily its overall thickness likely corresponds with the distal-most portion of a harpoon head blade slot. The analysis that follows will primarily utilise medial and distal blade thickness but will also reference the overall blade thickness when relevant.

Basal Thinning vs. Blade Slot Length	Basal Thinning	(Basal Thinning)/(Overall Length)	Pre-Late Dorset	Dorset Parallel	Type G	End-Hafted Handles
n	241	241	31	70	68	22
Mean	6.39	22.2%	7.82	8.23	8.14	10.30
Median	6.25	21.7%	7.67	7.77	7.84	10.31
Maximum	13.22	54.7%	11.55	14.89	15.10	18.05
Minimum	1.81	8.9%	4.47	3.63	1.93	3.86
Range	11.41	45.8%	7.08	11.26	13.17	14.19
Standard Deviation	2.04	6.4%	1.67	2.56	2.82	4.34
Coefficient of Variation	31.92	28.83	21.36	31.11	34.64	42.14

Table 6.3: Descriptive statistics for complete endblades with identifiable basal thinning and the blade slot lengths for harpoon heads and end-hafted handles.

The mean endblade thickness when separated by region is relatively similar (Table 6.4). The most significant difference is that Labrador endblades are thicker when taking into account the maximum thickness of the object. Additionally, Labrador distal endblade thickness is slightly thicker than the other regions and High Arctic medial endblade thicknesses are slightly thinner. The similarity in mean endblade thickness, at least when measured within the basal thinning, is most easily seen graphically (Figure 6.7). While there are some minor differences between the regions, almost every region has the bulk of their endblades measuring between 2.1mm and 2.9mm. In general, despite minor differences endblade thickness does not seem to be dependent on region. Additionally, almost all sites have mean medial basal thicknesses between 2.5mm and 2.8mm. The exceptions are JaDb-10 (n= 47) and NiHf-47 (n = 5) that have abnormally thin mean medial endblade thicknesses at 2.17mm and 2.19mm respectively. A single factor analysis of variance calculation shows that there is no significant statistical variation between medial thicknesses for lithic endblades but there is for distal and maximum thickness (Table 6.5). This test does not show which regions are statistically different but it gives some indication that there is some variation. The source is likely the Labrador endblades given the significantly larger sample size and larger mean distal and maximum thicknesses.

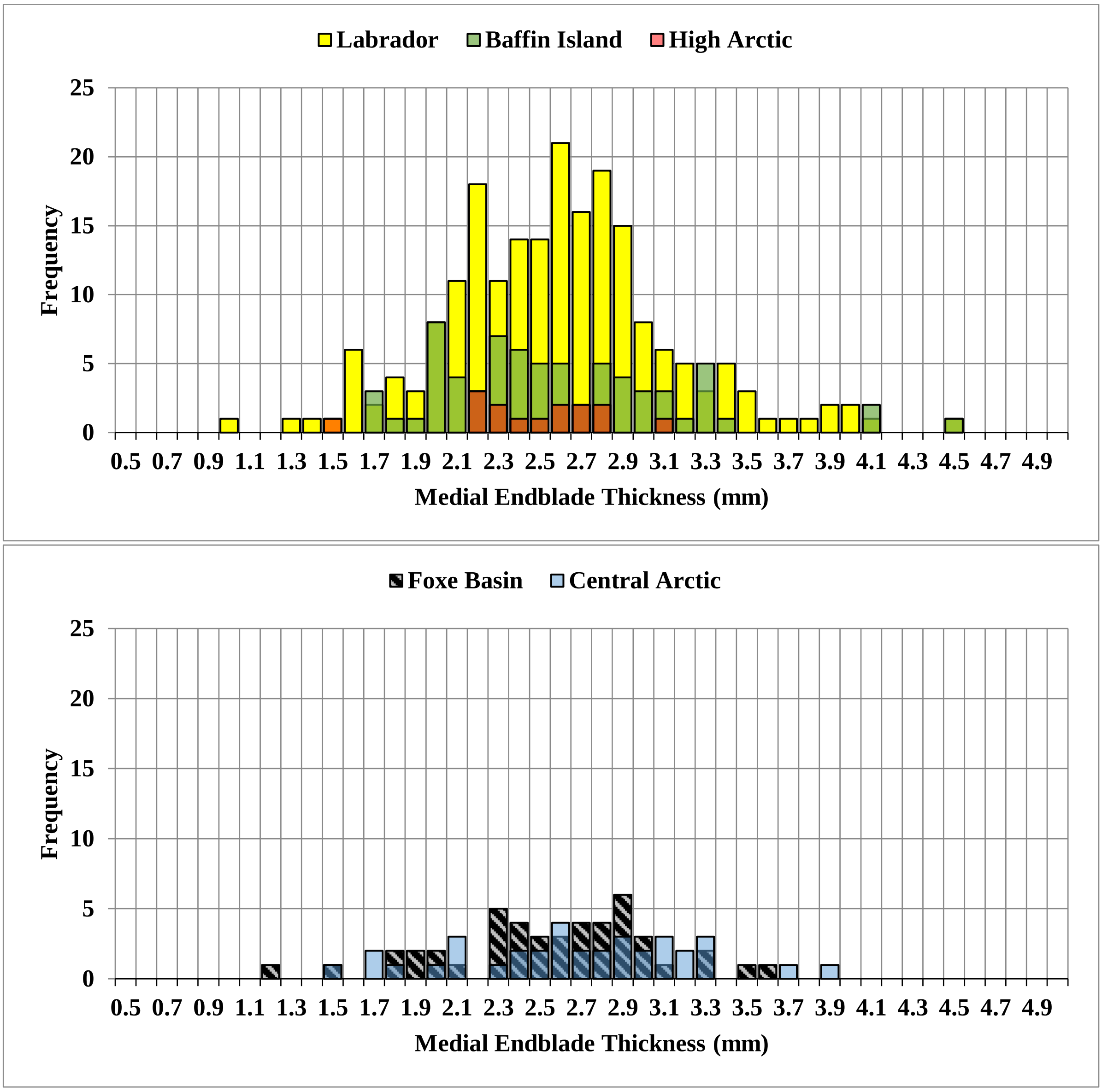

Figure 6.7: Medial basal endblade thickness for all endblades separated into 5 regions: Labrador (n=205), Baffin Island (n=70), Foxe Basin (n=46), Central Arctic (n=36), and High Arctic (n=15).

Blade Thickness	Labrador	Baffin Island	Foxe Basin	Central Arctic	High Arctic
n	205	70	46	36	15
Proximal	1.50	1.61	1.64	1.54	1.53
Medial	2.54	2.53	2.52	2.64	2.40
Distal	3.41	3.11	3.07	3.14	3.04
Maximum	4.64	3.46	3.43	3.61	3.80

Table 6.4: Mean basal and maximum endblade thickness separated by region.

Single Factor ANOVA	Medial Basal Thickness	Distal Basal Thickness	Maximum Basal Thickness
F	0.59	4.76	30.14
F Critical	2.40	2.40	2.40
p-Value	0.67	0.00093	$1.08*10^{-21}$

Table 6.5: Single factor analysis of variance calculation comparing the basal thickness means of lithic endblades separated by region. If F stat is greater than F critical and the p-value is less than 0.05 then the means are significantly different. In this case, medial basal thickness is not statistically variable across regions but distal and maximum thickness are.

Aside from sample size differences, endblade thickness does not change drastically between those with straight or concave bases. Perhaps the only perceptible difference is that straight bases tend to have relatively more thin specimens (Figure 6.8 and Figure 6.9). Much like the regional differences and, supposedly, Late Dorset endblades more frequently being concave, there appears to be little difference in terms of endblade thickness in the hafting region of the tool when it comes to the morphology of the basal portion. Using Welch's t-test shows that there are no significant statistical differences between the medial and distal basal thicknesses of endblades with concave or straight base morphology (Table 6.6).

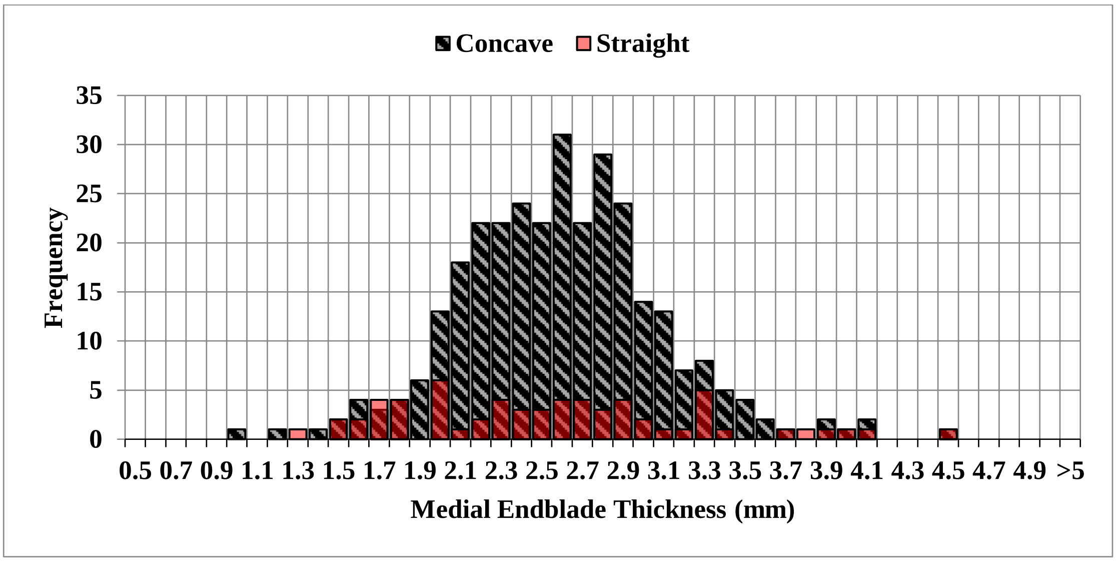

Figure 6.8: Medial basal endblade thickness for endblades with concave (n=309) and straight (n=63) bases.

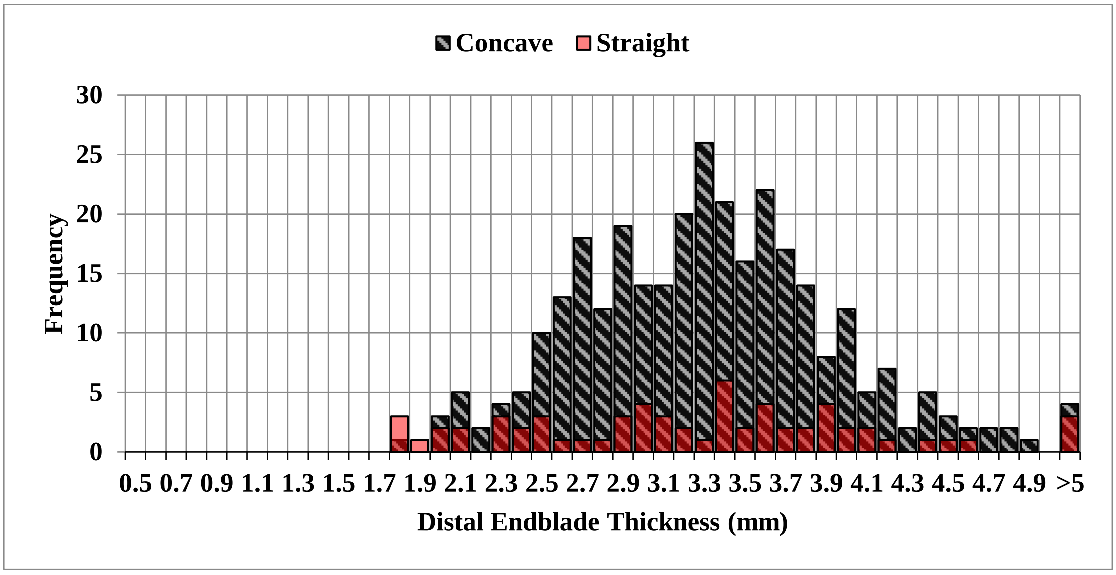

Figure 6.9: Distal basal endblade thickness for endblades with concave (n=309) and straight (n=63) bases.

Welch's t-Test (Concave vs. Straight)	**Medial Basal Thickness**	**Distal Basal Thickness**
t-Stat	0.34	0.38
t Critical (two-tail)	1.99	1.99
p-Value	0.74	0.71

Table 6.6: Two sample Welch's t-test results for medial and distal basal thicknesses for endblades with concave and straight base morphology. The t-stat being greater than the critical value and the p-value being less than 0.05 indicates there is a significant statistical difference. In this case, both base morphologies are not significantly different in terms of basal thickness at either measurement location.

Much like the data above, there is little difference between endblades that are bifacially or unifacially flaked when it comes to their basal thickness (Figure 6.10 and Figure 6.11). Welch's t-test confirms that there is no significant statistical difference between the medial, distal or maximum thickness of bifacial or unifacial endblades (Table 6.7). This is somewhat unexpected given unifacial tools generally require less lithic raw material than bifacial or tip fluted examples (Nagle 1984:345).

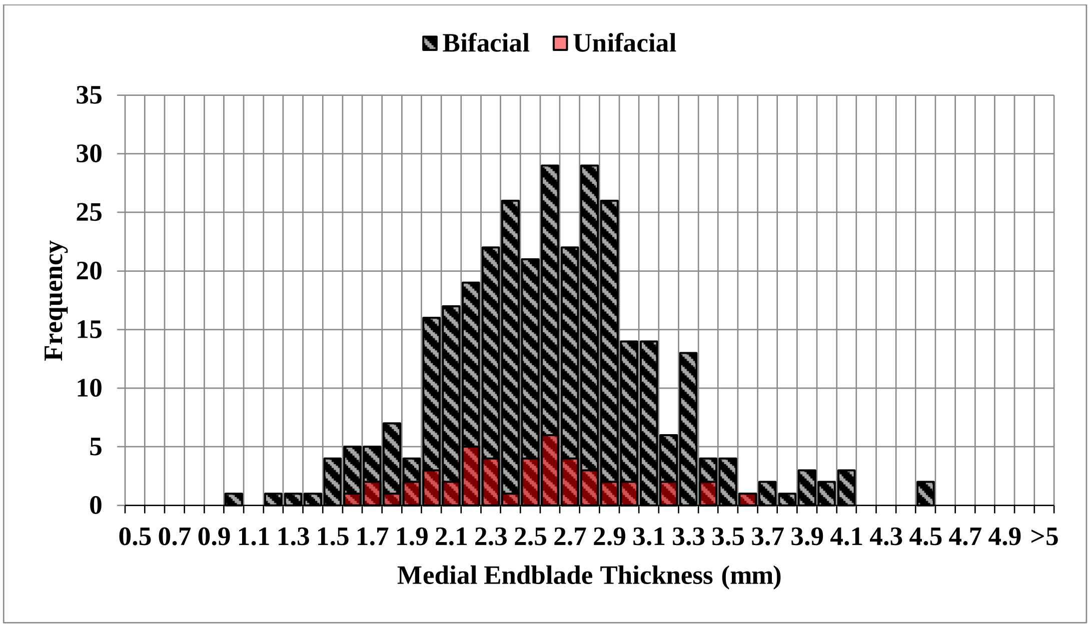

Figure 6.10: Medial basal endblade thickness for endblades that have been bifacially (n=325) and unifacially (n=47) flaked.

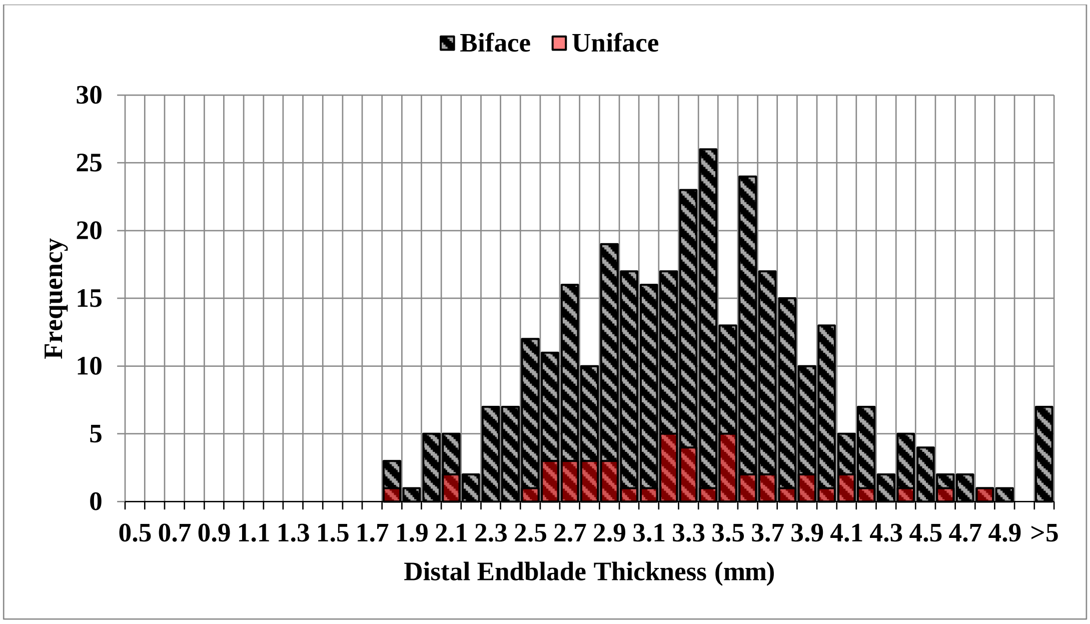

Figure 6.11: Distal basal endblade thickness for endblades that have been bifacially (n=325) and unifacially (n=47) flaked.

Welch's t-Test (Unifacial vs. Bifacial)	Medial Basal Thickness	Distal Basal Thickness	Maximum Basal Thickness
t-Stat	1.57	0.47	0.46
t Critical (two-tail)	2.00	2.00	2.00
p-Value	0.12	0.64	0.64

Table 6.7: Two sample Welch's t-test results for medial, distal, and maximum basal thicknesses for bifacial and unifacial endblades. The t-stat being greater than the critical value and the p-value being less than 0.05 indicates there is a significant statistical difference. In this case, both flaking techniques are not significantly different in terms of basal thickness at any measurement location.

When comparing the specimens that are tip fluted with those that are not, the trend continues with the distributions of both categories being roughly comparable (Figure 6.12 and Figure 6.13). Welch's t-test confirms this qualitative assessment indicating that there is no significant statistical differences in basal thicknesses of endblades that have been tip fluted and those that have not (Table 6.8). Although, the thinnest endblades tend to be not tip fluted.

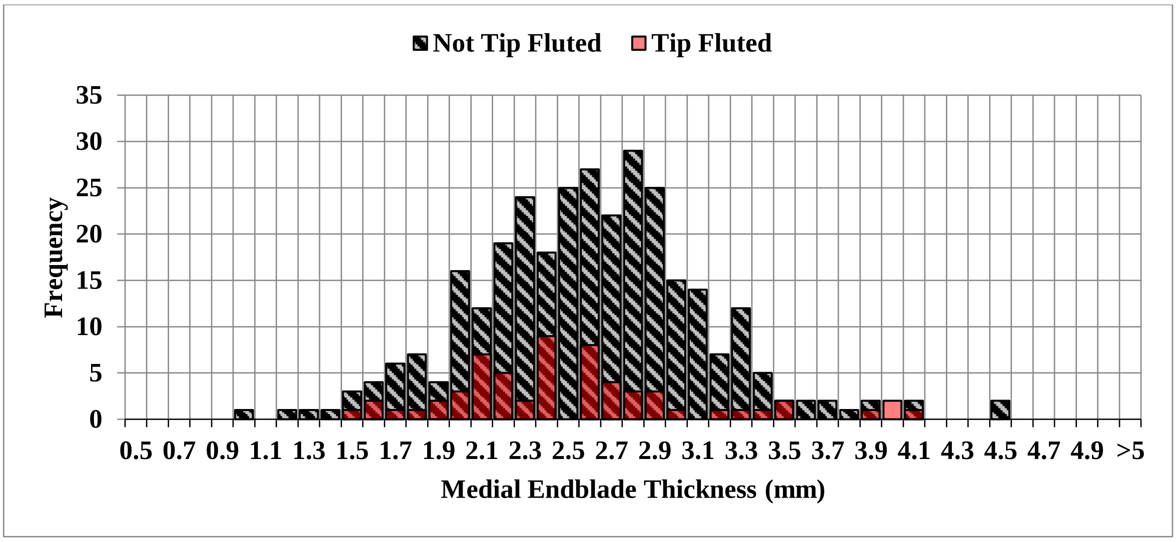

Figure 6.12: Medial basal endblade thickness for endblades that have been tip fluted (n=61) and not tip fluted (n=311).

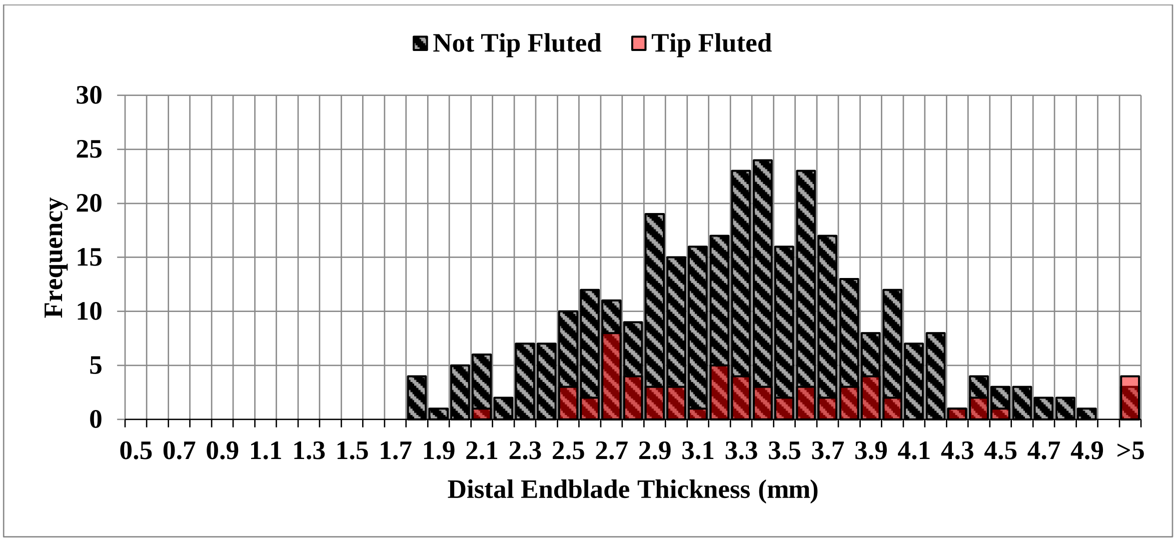

Figure 6.13: Distal basal endblade thickness for endblades that have been tip fluted (n=61) and not tip fluted (n=311).

Welch's t-Test (Tip Flute vs. No Tip Flute)	Medial Basal Thickness	Distal Basal Thickness
t-Stat	0.69	1.13
t Critical (two-tail)	1.99	1.99
p-Value	0.49	0.26

Table 6.8: Two sample Welch's t-test results for medial and distal basal thicknesses for endblades with and without tip fluting. The t-stat being greater than the critical value and the p-value being less than 0.05 indicates there is a significant statistical difference. In this case, tip fluted endblades are not statistically different in terms of basal thickness than non-tip fluted specimens.

Another variable worth considering is the actual size of the endblade. When sorting the endblades by their overall length or a rough area calculation (cm^2), it is clear that there is no major discontinuity in the size of the endblades. While there is considerable range, the endblades have a log normal distribution (Figure 6.14). Therefore, it is not clear what can and cannot be considered a "micro-point" or miniature endblade as they are sometimes described in site catalogues. In saying that, endblade thickness in its basal section is somewhat correlated with the overall object length and size (Table 6.9). The distal basal thickness and maximum thickness measurement correlates the strongest with the overall dimensions of the endblade while the medial and especially the proximal measurements have much weaker relationships. With these data, it is likely that the thinnest endblades are also those that are those that are the smallest. Despite the length of visible basal thinning being very weakly correlated with the thickness of the endblade, it is worth noting that Type G harpoon heads have, on average, the longest blade slots despite also having the thinnest slots as well. Although, as discussed in Chapter 5.2.2, blade slot length and the thickness of the blade slot is very weakly correlated, if at all, among Type G harpoon heads.

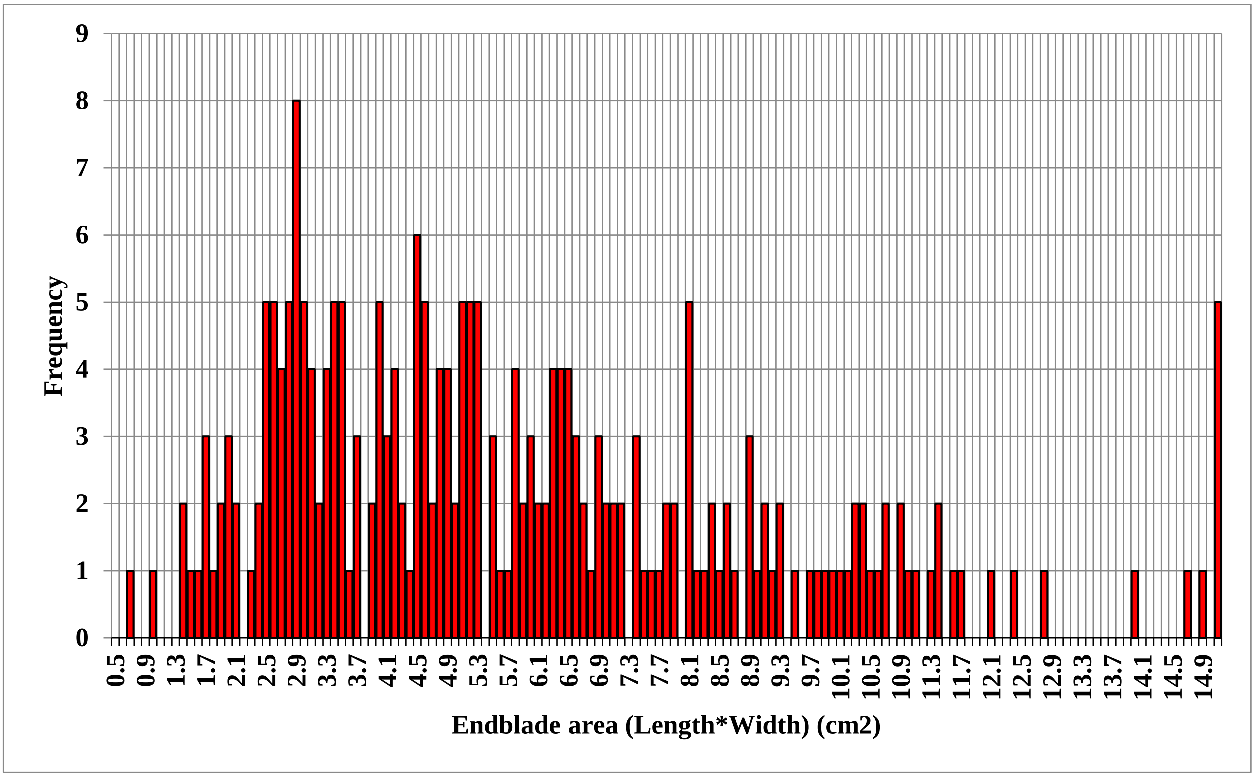

Figure 6.14: All endblade areas (cm^2). Note that the final value contains all endblades greater than 15cm^2. Only complete or near complete endblades are included (n=243).

Pearson's Correlation Coefficient	**Endblade Length**	**Endblade Width**	**Length*Width (cm^2)**	**Length of Basal Thinning**
Proximal	0.087	0.174	0.142	0.050
Medial	0.342	0.437	0.412	0.264
Distal	0.500	0.556	0.562	0.380
Maximum	0.711	0.609	0.660	0.512
Length of Basal Thinning	0.594	0.352	0.507	1.000

Table 6.9: Pearson's correlation coefficient comparing endblade basal and maximum thickness with the length, width, and rough size of each endblade.

Lastly, despite almost all endblades being made out of some variety of chert, there were 7 non-chert (and non-metal) endblades. This included 2 organic endblades (one of which has a securing hole), 2 were what seemed like quartz crystal, 1 was quartz, 1 was slate, and 1 was dolomite. When separating endblades based on their raw material type, again, there are no patterns in terms of endblade thickness. The majority of the non-chert specimens fall within the normal distribution of the chert endblades for both medial and distal thickness measurements (Figure 6.15 and Figure 6.16). Using Welch's t-test for comparing the endblades of Ramah chert and other types of chert, there is no significant statistical difference between their medial basal thicknesses but there is for the distal thicknesses (Table 6.10). Statistically, Ramah chert specimens tend to be slightly thicker than those made of other types of chert. Surveying the histograms with these statistics in mind, however, suggests that this difference is only of marginal importance to the research questions of this thesis. Non-chert types were not included in this analysis due to small sample size. Two of the non-chert endblades are thinner than average when compared to the chert specimens. They are made from quartz crystal and slate. The two organic endblades have a medial basal thickness of 2.42mm and 2.22mm, the former being the one with a visible securing hole.

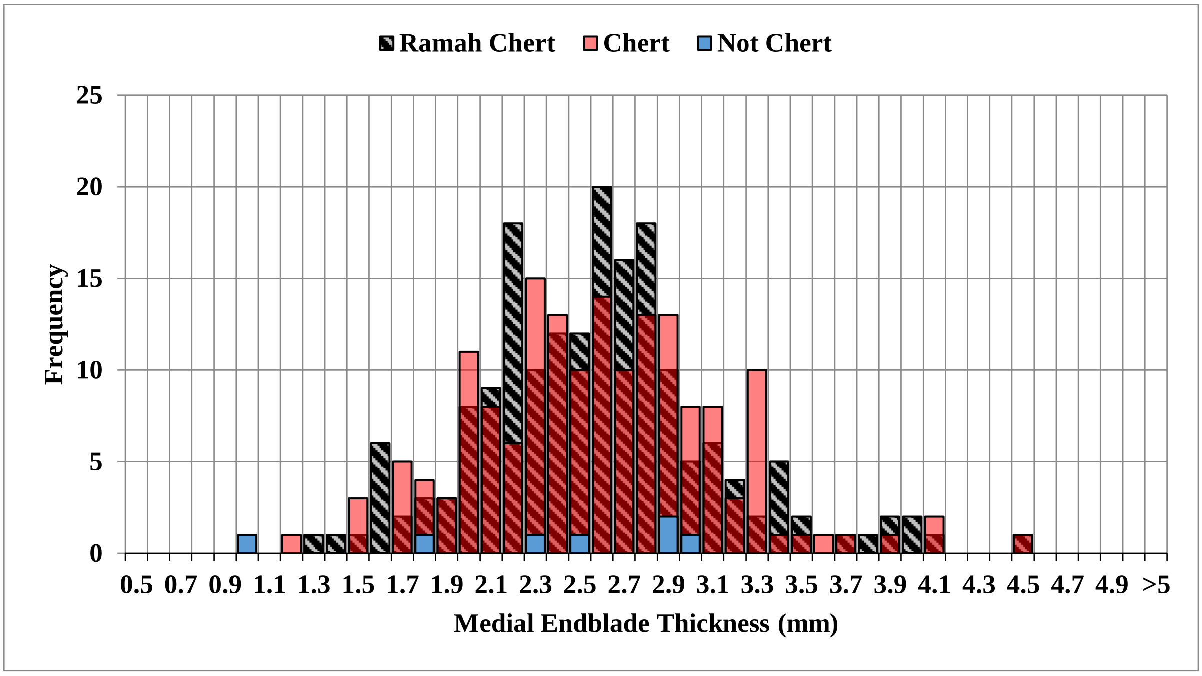

Figure 6.15: Medial basal endblade thickness with endblades made from Ramah chert (n=182), chert (n=166), and not chert (n=7).

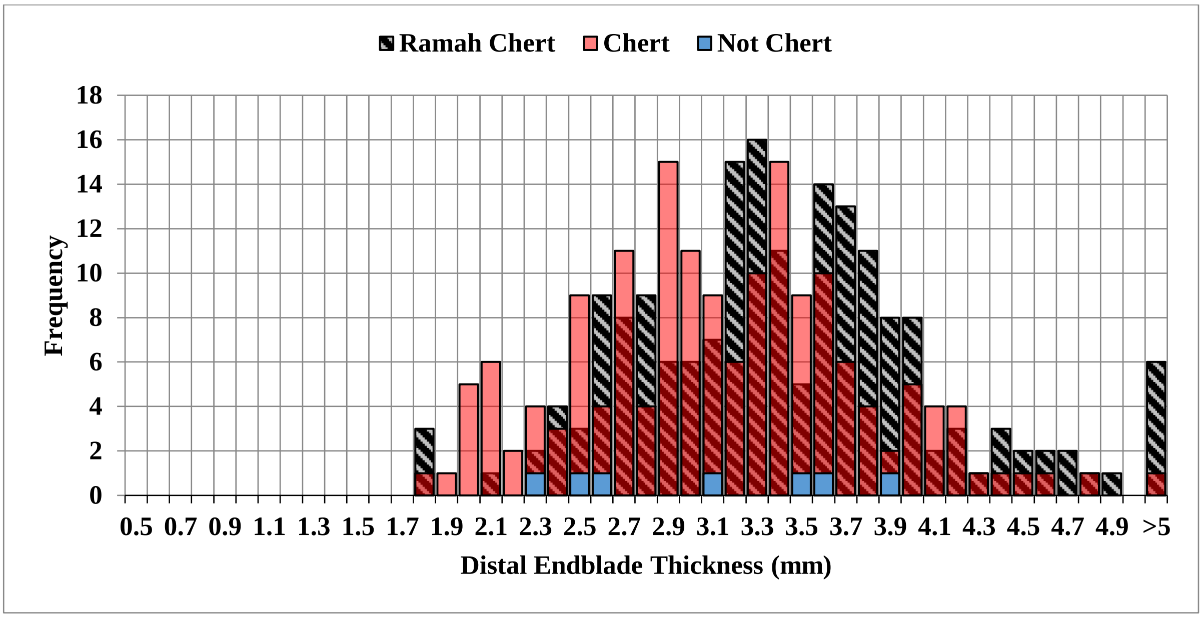

Figure 6.16: Distal basal endblade thickness with endblades made from Ramah chert (n=182), chert (n=166), and not chert (n=7).

Welch's t-Test (Raw Material)	Medial Basal Thickness	Distal Basal Thickness
t-Stat	0.26	3.96
t Critical (two-tail)	1.97	1.97
p-Value	0.80	$9.07*10^{-5}$

Table 6.10: Two sample Welch's t-test results for medial and distal basal thicknesses for endblades made of Ramah chert and other types of chert. The t-stat being greater than the critical value and the p-value being less than 0.05 indicates there is a significant statistical difference. In this case, endblades of other types of chert are statistically different in their distal basal thickness from those made of Ramah chert.

Despite all these tests, there are no significant differences or outliers that help separate the data aside from the marginal difference in distal basal thickness in endblades of Ramah chert. In any case, the overall medial and distal thickness distributions across the whole analysis has largely been typical normal distribution. In fact, there is no major difference between any of the attributes tested in regard to the research questions being posed here. Significantly, there appears to be no major change in basal thickness for endblades from Early/Middle Dorset to Late Dorset. Moreover, the two sites that have the thinnest overall means for basal thickness (JaDb-10 and NiHf-47) are sites with significant pre-Late Dorset presences. Despite the trend for Late Dorset harpoon heads having thinner blade slots (and more varied means of securing endblades) than their predecessors, Late Dorset endblades themselves did not.

6.3 Knives

There are 353 knives incorporated in this thesis. They come from 35 sites across the Arctic separated into the same regions as the endblades: Labrador, Baffin Island, Foxe Basin, Central Arctic, and High Arctic (Figure 6.17 and Table 6.11). While, typologically speaking, this is one of the most diverse tool categories included in this thesis, almost all the objects included here are thought to be used as knives or as lance or spear heads. Therefore, classifying these tools as “knives” is simply a generalisation and should not necessarily reflect their function. There are several common variables that will be tested. The presence of a stem, side notches and bifacial or unifacial flaking are present or absent on every example (Figure 6.18). In some site catalogues, objects included in this dataset were just broadly referred to as “bifaces” or “unifaces”.

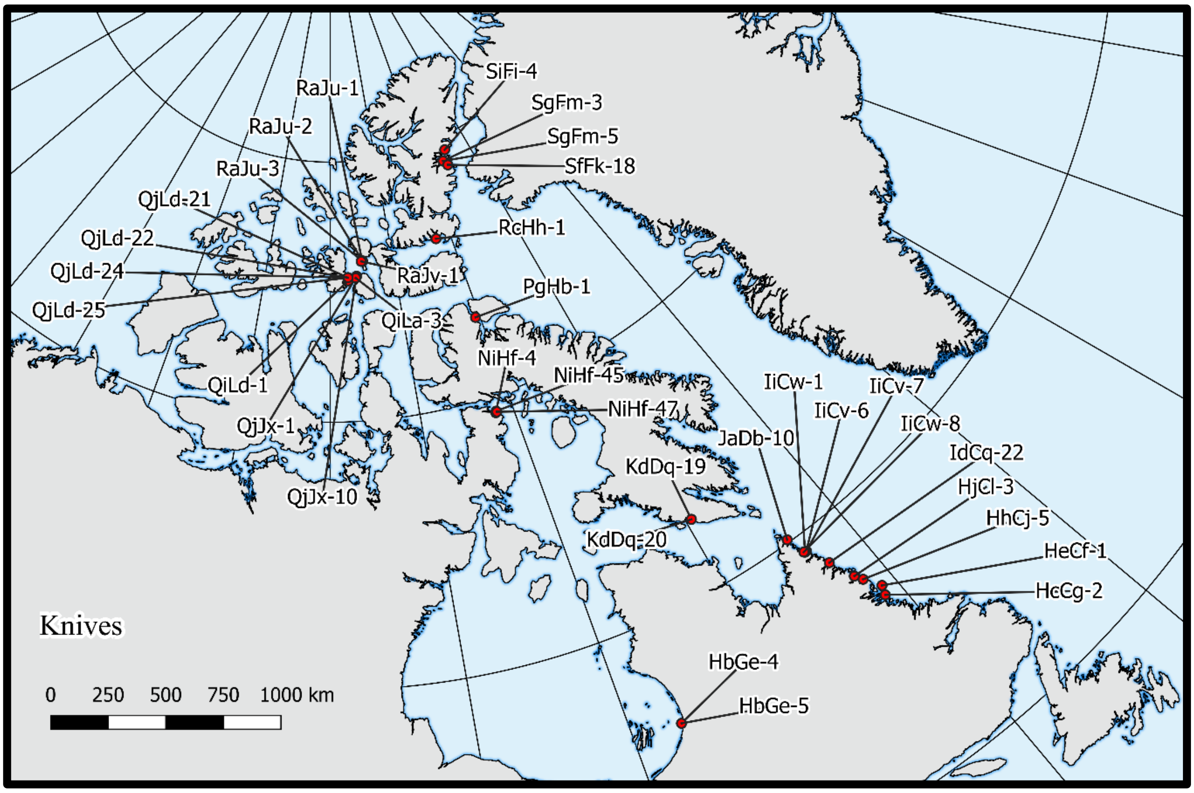

Figure 6.17: Geographic distribution of knives included in this thesis.

Region/Site	Number of Specimens
Labrador/Quebec	
JaDb-10	41
IdCq-22	26
HjCl-3	19
IiCw-8	13
HcCg-2	8
IhCw-1	8
IiCv-6	5
HeCf-1	3
HbGe-5	3
IiCw-1	3
HbGe-4	2
HhCj-5	1
Sub-Total	*132*
Baffin Island	
PgHb-1	57
KdDq-19	6
KdDq-20	2
Sub-Total	*65*
Foxe Basin	
NiHf-4	41
NiHf-45	13
NiHf-47	2
Sub-Total	*56*
Central Arctic	
RaJu-1	25
QjJx-10	11
QjJx-1	9
QiLd-1	5
QjLd-21	4
QjLd-22	4
QiLa-3	3
QjLd-24	2
QjLd-25	1
RaJu-2	1
RaJu-3	1
RaJv-1	1
RcHh-1	1
Sub-Total	*68*
High Arctic	
SgFm-3	24
SfFk-18	3
SgFm-5	3
SiFi-4	2
Sub-Total	*32*
Grand Total	**353**

Table 6.11: The number of lithic endblades separated by site and region.

Figure 6.18: A selection of knives. The top row all have notches and the bottom row all have stems. Top (left to right): SgFm-3:558, QjLd-22:73, PgHb-1:2844. Bottom (left to right): RaJu-1:294, SgFm-3:249, PgHb-1:284. Photo permission courtesy of the Government of Nunavut and the Canadian Museum of History.

Overall, knives have log normal or normal distribution at their proximal (Figure 6.19), medial (Figure 6.20), and distal (Figure 6.21) basal thicknesses. In addition to being slightly thicker on average than endblades, in each of the three measurement locations, there is considerably more range between the minimum and maximum measurement (Table 6.12). Each measurement location has a small number of specimens that are incredibly thin compared to the rest of the dataset but these are very much outliers to the much thicker remainder. In spite of this increased range of measurements, the actual variability is only slightly higher than the endblade data which is why the histograms appear slightly more “flat” than those for the endblades.

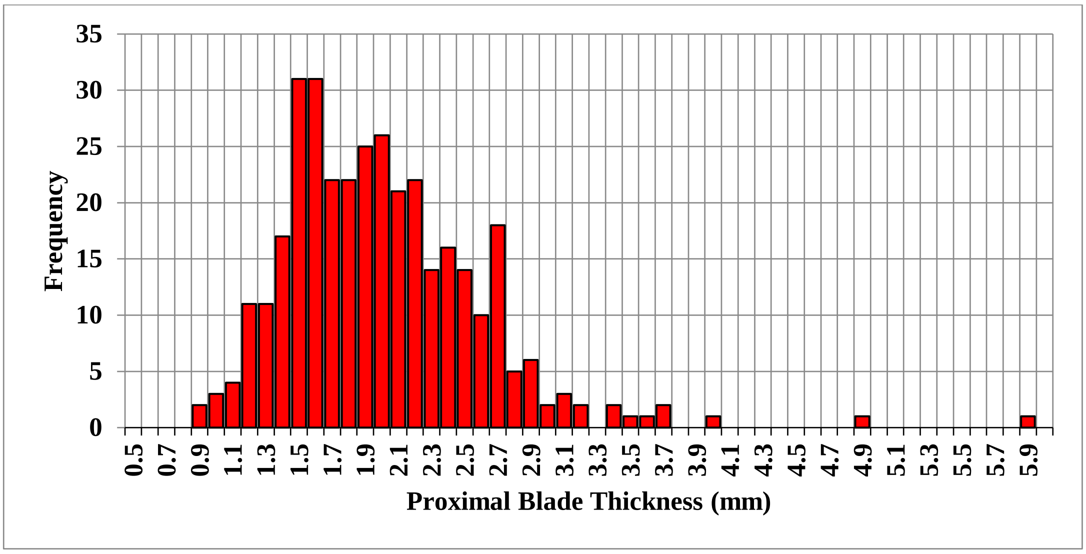

Figure 6.19: The proximal basal thickness of all knives included in this thesis (n=347).

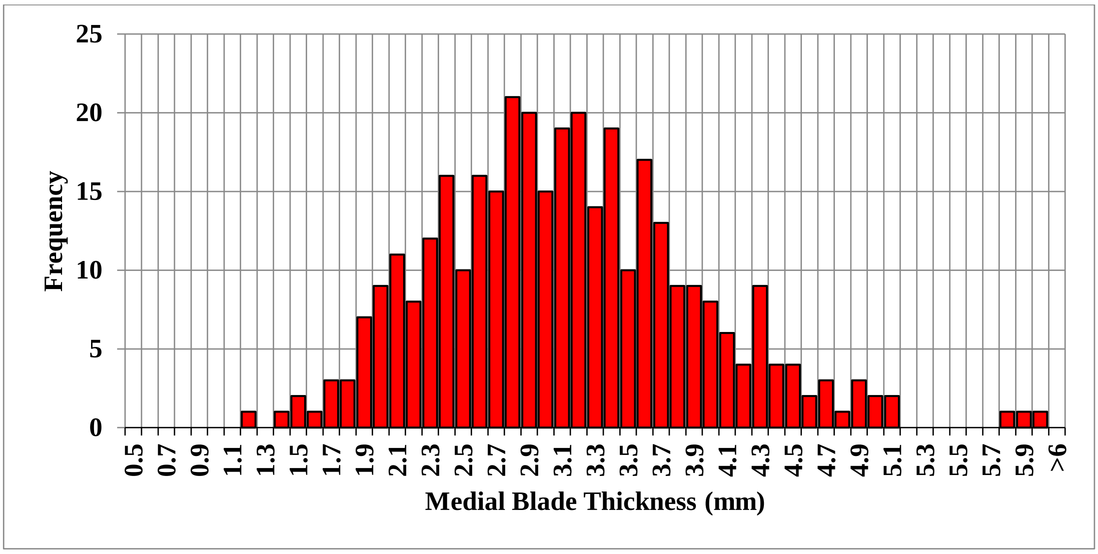

Figure 6.20: The medial basal thickness of all knives included in this thesis (n=352).

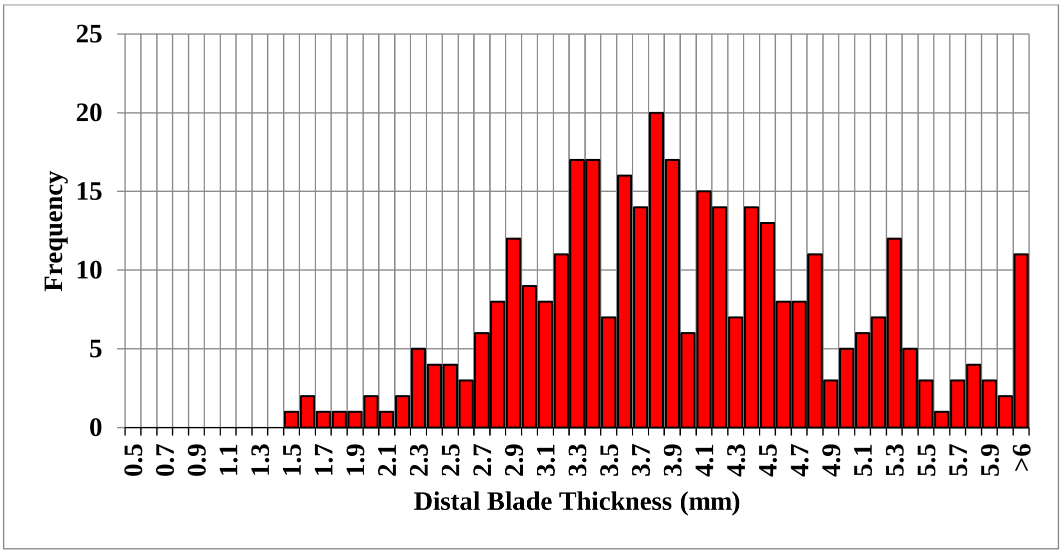

Figure 6.21: The distal basal thickness for all knives included in this thesis (n=350).

All Knives	Proximal	Medial	Distal
n	347	352	349
Mean	1.96	3.08	3.94
Median	1.90	3.02	3.81
Maximum	5.87	5.95	7.56
Minimum	0.84	1.14	1.46
Range	5.03	4.81	6.10
Standard Deviation	0.60	0.80	1.04
Coefficient of Variation	30.61	25.97	26.40

Table 6.12: Descriptive statistics for basal thicknesses at all three measurement locations of all knives included in this thesis.

There is also very little variation in knife basal thickness between regions (Figure 6.22). Furthermore, each region has a roughly normal or log normal distribution. An analysis of variance test also shows that there is no significant statistical difference in medial or distal basal thickness between any of the regions (Table 6.13).

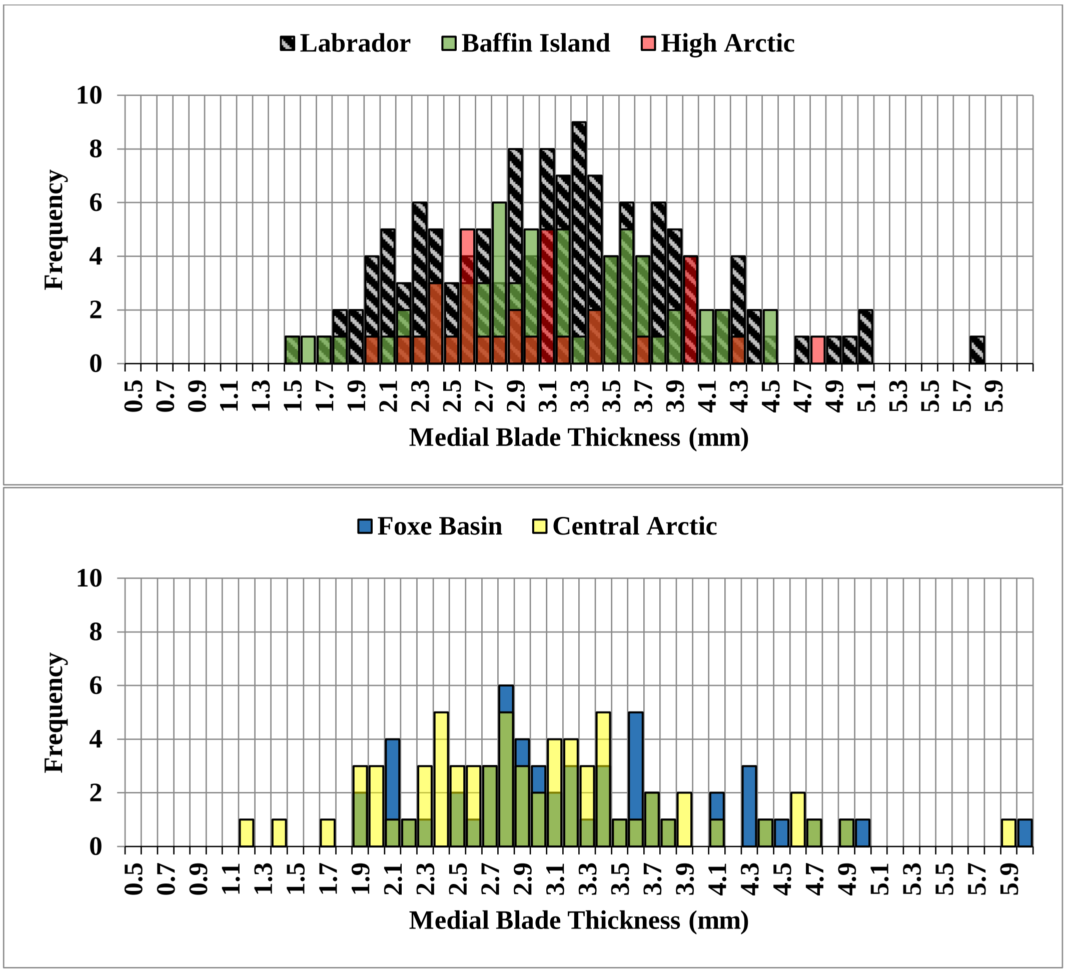

Figure 6.22: Medial basal thickness of all knives separated into 5 regions: Labrador (n=132), Baffin Island (n=64), Foxe Basin (n=56), Central Arctic (n=68), and High Arctic (n=32).

Single Factor ANOVA	**Medial Basal Thickness**	**Distal Basal Thickness**
F	1.18	2.02
F Critical	2.40	2.40
p-Value	0.32	0.091

Table 6.13: Single factor analysis of variance calculation comparing the means of medial and distal lithic knife thickness across different regions. If F stat is greater than F critical and the p-value is less than 0.05 then the means are significantly different. In this case, there is no significant difference between the medial and distal basal thicknesses of lithic knives across the different regions sampled.

Much like the endblades, knives have basal thicknesses that are only weakly correlated to the length, width, and overall size of the object (Table 6.14). It is slightly expected that of the three measurement locations, the distal basal thickness seems to correlate the strongest out of the group with the dimensions of the overall tool. Much like with endblades, the thickness of the hafting region of knives seems relatively independent of the overall size of the object.

Pearson's Correlation Coefficient	Knife Length	Knife Width	Length*Width (cm^2)
Proximal	0.258	0.231	0.315
Medial	0.333	0.392	0.493
Distal	0.360	0.458	0.521

Table 6.14: Pearson's correlation coefficient comparing basal thickness (at all three locations) with knife length, width, and rough size.

Bifaces and knives that have been bifacially and unifacially flaked are differentiated in terms of basal thickness. Despite the sample size difference, both the medial (Figure 6.23) and distal (Figure 6.24) basal thickness measurements for uniface tools are, on average, thinner than biface tools. Similar to the overall dataset, however, both flaking techniques produce a relatively broad range of basal thicknesses. Welch's t-test shows there is no significant difference in bifacial or unifacial medial thicknesses but, unlike the endblade data, there is a significant difference in distal thicknesses (Table 6.15).

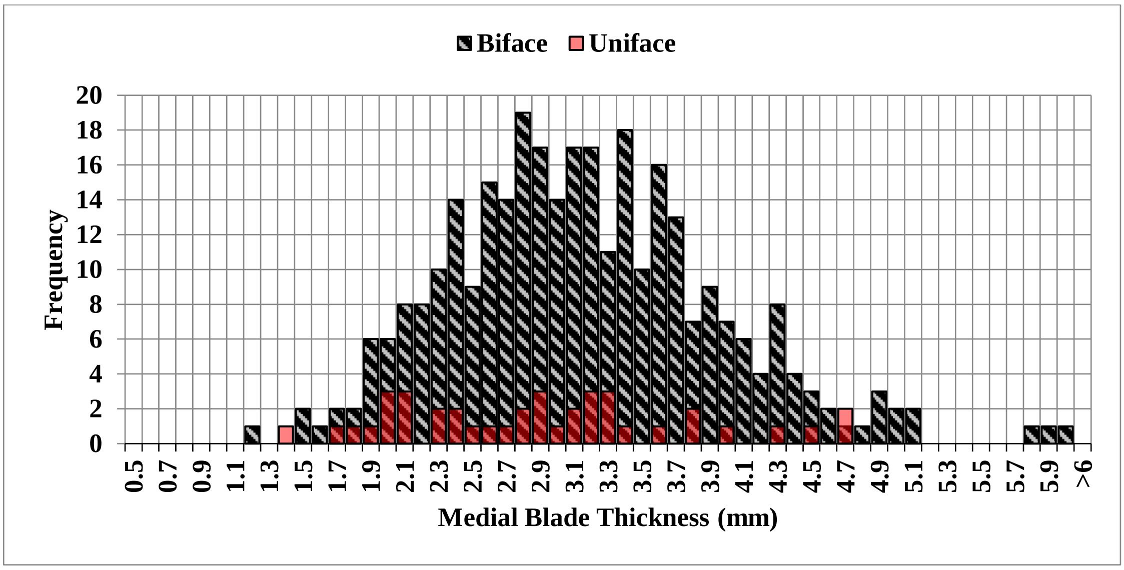

Figure 6.23: Medial basal thickness for bifacially (n=312) and unifacially (n=40) flaked knives.

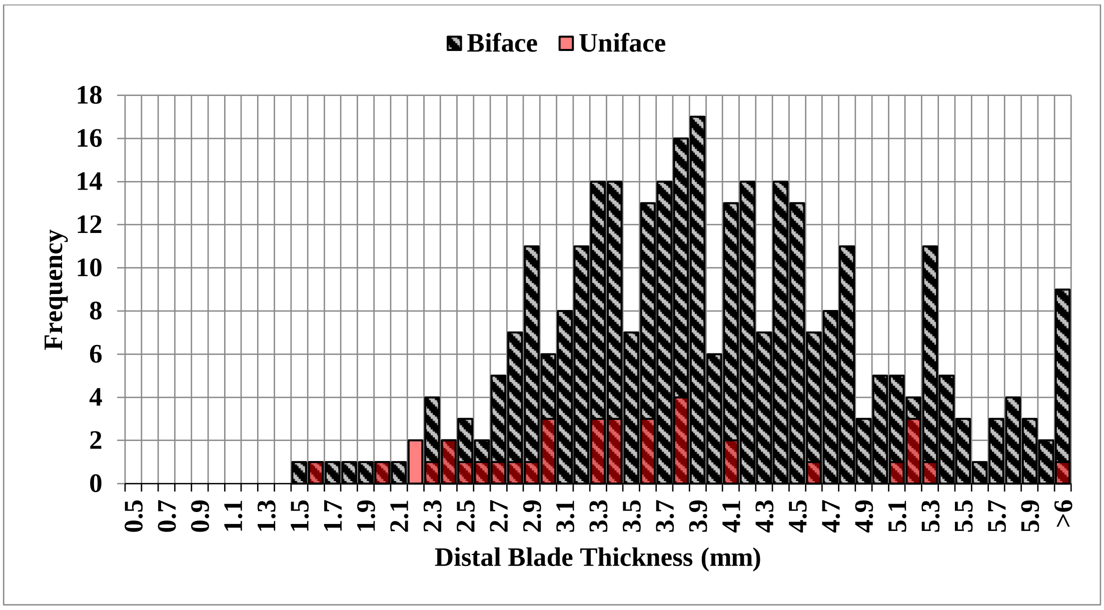

Figure 6.24: Distal basal thickness of bifacially (n=312) and unifacially (n=37) flaked knives.

Welch's t-Test (Unifacial vs. Bifacial)	Medial Basal Thickness	Distal Basal Thickness
t-Stat	1.79	2.87
t Critical (two-tail)	2.01	2.02
p-Value	0.08	0.0063

Table 6.15: Two sample Welch's t-test results for medial and distal basal thicknesses for unifacial and bifacial knives. The t-stat being greater than the critical value and the p-value being less than 0.05 indicates there is a significant statistical difference. In this case, unifacial and bifacial knives are significantly statistically different in distal basal thickness.

Almost all notched Dorset knives have pairs of notches that occur proximally on the object. Most frequently, only one pair of notches occurs but there are examples that have up to two or three pairs. While only a few have been found still in their handle, it seems that the notches would have likely been flaked in order to facilitate some sort of sinew or cord binding. Interestingly, almost all examples of end-hafted handles observed for this research had lashing grooves around their blade slot. Given the high prevalence of notched knives in Dorset assemblages, it seems possible that these two tool types were made for each other. Slight contrasts can be seen again among knives that have one or more lateral notches compared to those that are not notched at all. For both medial (Figure 6.25) and distal (Figure 6.26) basal thickness measurements, notched knives seem to be thinner than those that do not have a notch. Welch’s t-test confirms this observation showing that notched knives are significantly statistically different in terms of both medial and distal basal thickness than knives without a notch (Table 6.16). Those differences aside, both variations have specimens across the whole range of thicknesses.

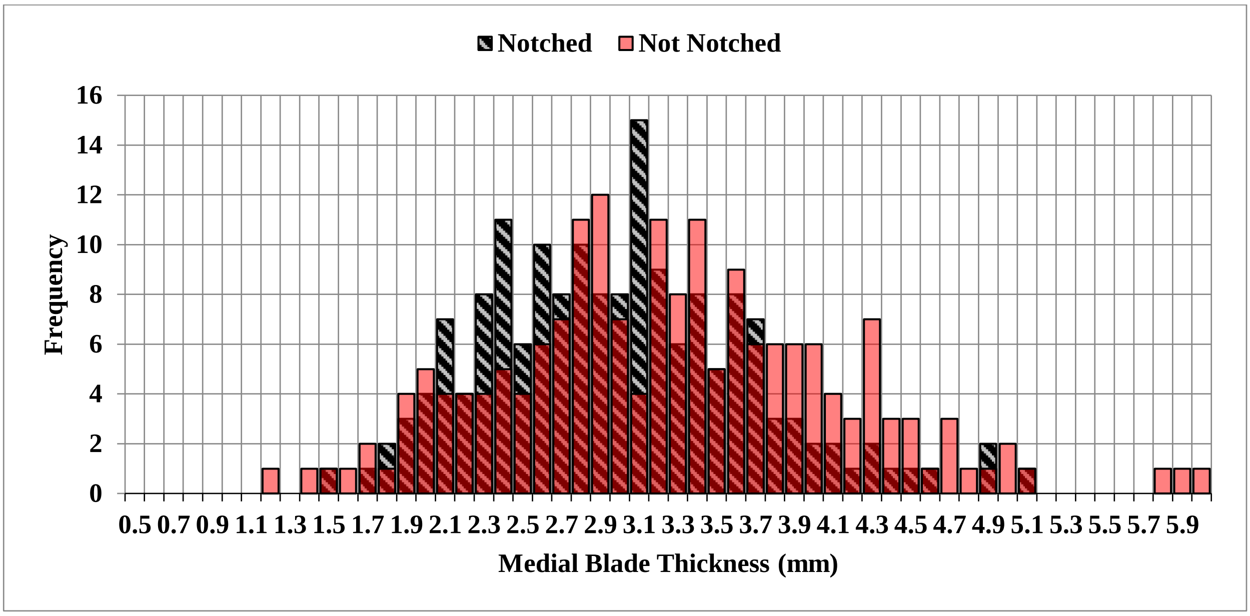

Figure 6.25: Medial basal thickness for notched (n=168) and unnotched (n=184) knives.

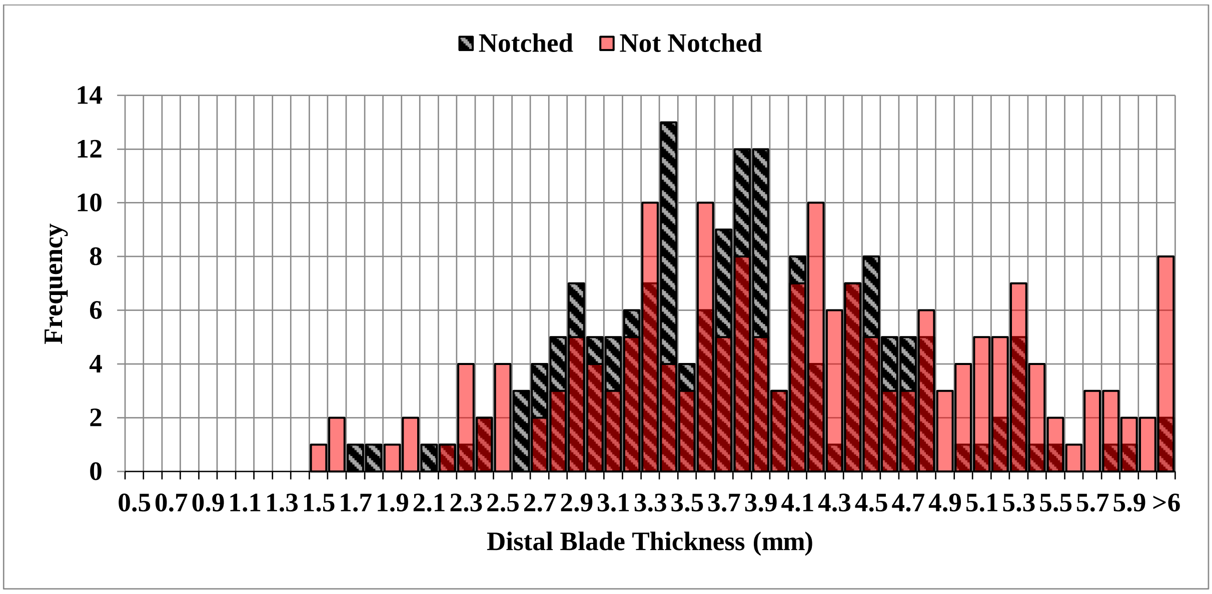

Figure 6.26: Distal basal thickness for notched (n=163) and unnotched (n=183) knives.

Welch's t-Test (Notch vs. No Notch)	Medial Basal Thickness	Distal Basal Thickness
t-Stat	3.23	3.08
t Critical (two-tail)	1.97	1.97
p-Value	0.0014	0.0022

Table 6.16: Two sample Welch's t-test results for medial and distal basal thicknesses for knives with and without a notch. The t-stat being greater than the critical value and the p-value being less than 0.05 indicates there is a significant statistical difference. In this case, there is a significant statistical difference between knives with and without a notch in terms of both medial and basal thickness.

A final common type of knife seen in Dorset assemblages is stemmed specimens. Despite seeming like the stemmed knives included in this dataset were slightly thicker than those without a stem in the medial basal thickness measurement (Figure 6.27), the distribution is nearly identical when observing the distal basal thickness measurement (Figure 6.28). This relationship is clarified by computing Welch's t-test which shows no significant statistical difference in the medial or basal thicknesses of knives with or without a stem (Table 6.17). Taken together, knives are similar to the endblade data analysed above in that there is little variation between the variables presented. Despite being tool forms found across the Arctic and having several different attributes, typological variation seems to have had little impact on the basal thickness of the object. No one single attribute of knife can account for any given portion of the distribution seen above. In saying that, the computed t-tests found some instances where there was a significant statistical difference. However, it is unlikely that these differences influenced the research questions posed in this thesis. These results are significant for other research regarding Dorset lithic manufacture and answering questions such as why there are statistical differences between uniface and biface knives but not uniface or biface endblades or how different lithic raw materials affect the manufacturing process of the stone object.

What this analysis does show in relation to this thesis is that no single type of knife was drastically thicker or thinner than others. Despite the typological variations not having a major impact, Dorset people clearly made a range of different thicknesses. Unlike what was hypothesised about the end-hafted handles, there do not seem to be two (or more) distinct blade sizes when it comes to knives but rather there is a continuum.

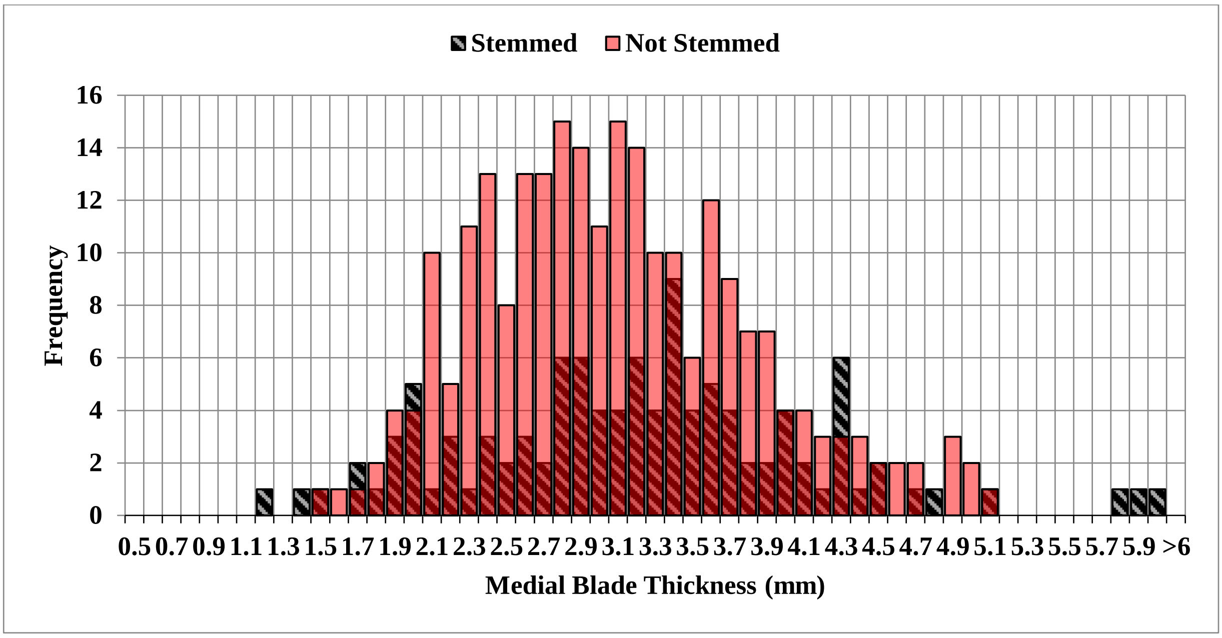

Figure 6.27: Medial basal thickness of knives with (n=107) and without (n=245) a stem.

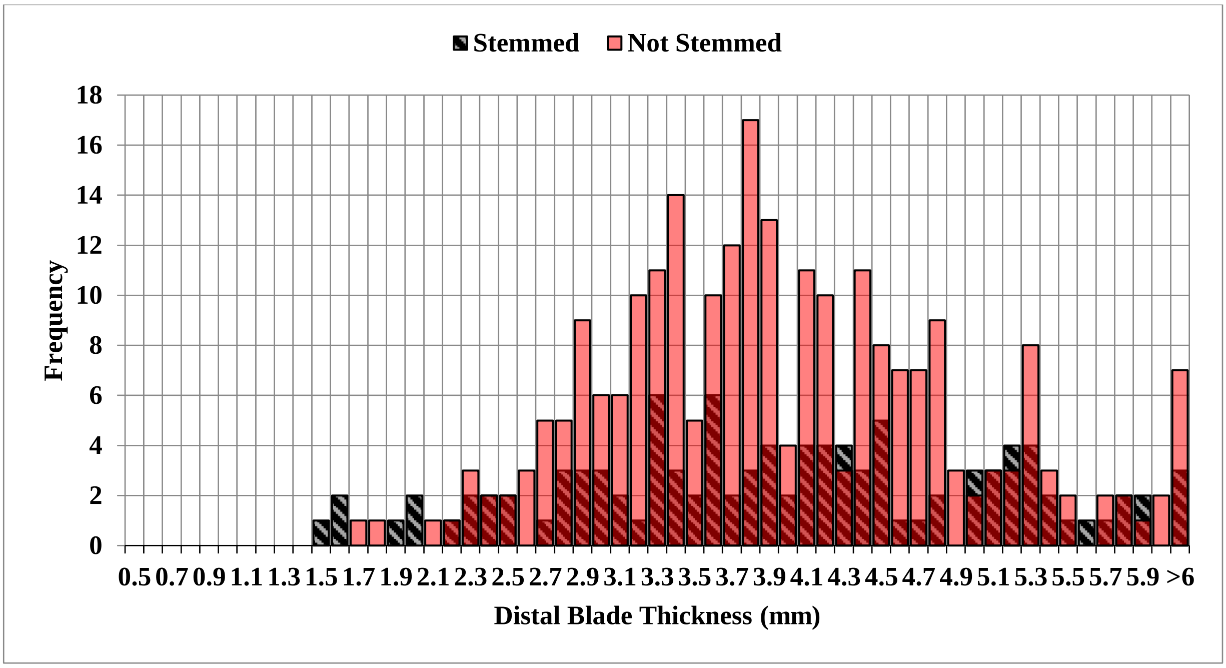

Figure 6.28: Distal basal thickness of knives with (n=104) and without (n=245) a stem.

Welch's t-Test (Stem vs. No Stem)	Medial Basal Thickness	Distal Basal Thickness
t-Stat	1.40	0.24
t Critical (two-tail)	1.97	1.97
p-Value	0.16	0.81

Table 6.17: Two sample Welch's t-test results for medial and distal basal thicknesses for knives with and without a stem. The t-stat being greater than the critical value and the p-value being less than 0.05 indicates there is a significant statistical difference. In this case, there is no significant statistical difference.

6.4 Scrapers

Scrapers are a common type tool found among Dorset collections. They effectively come in two main forms: endscrapers (with the working edge placed distally) and sidescrapers (working edge placed laterally) (Figure 6.29). Variation exists within both types, especially chronologically. Unlike endblades and knives, the hafting portion of scrapers exhibits very little amounts of basal thinning. As a result, only one thickness measurement was taken from effectively the same location on the tool as the "medial" measurements were taken for knives and endblades.

There are 115 scrapers included in this thesis from 22 sites across the Arctic (Figure 6.30 and Table 6.18). They come from both pre-Late Dorset and Late Dorset sites from Labrador, Baffin Island, Foxe Basin, the Central Arctic, and the High Arctic. Overall, basal thickness for scrapers is normally distributed and is generally slightly thicker than endblades and knives (Figure 6.31). Interestingly, almost all the lithic tools analysed thus far tend to have outliers that are thicker than the normal distribution, but there are comparatively fewer outliers that are thinner than the bulk of the specimens. Similar to knives and endblades there appears to be only a weak correlation between the basal thickness of a scraper and its overall size (Table 6.19). Despite the small sample size for most of the regions, there does not appear to be much inter-regional variation (Figure 6.32). In fact, each region is relatively well-distributed across the spectrum of potential basal thicknesses for scrapers, although, it is difficult to assess the regional differences here given the low sample size for some regions and the large differences between sample sizes.

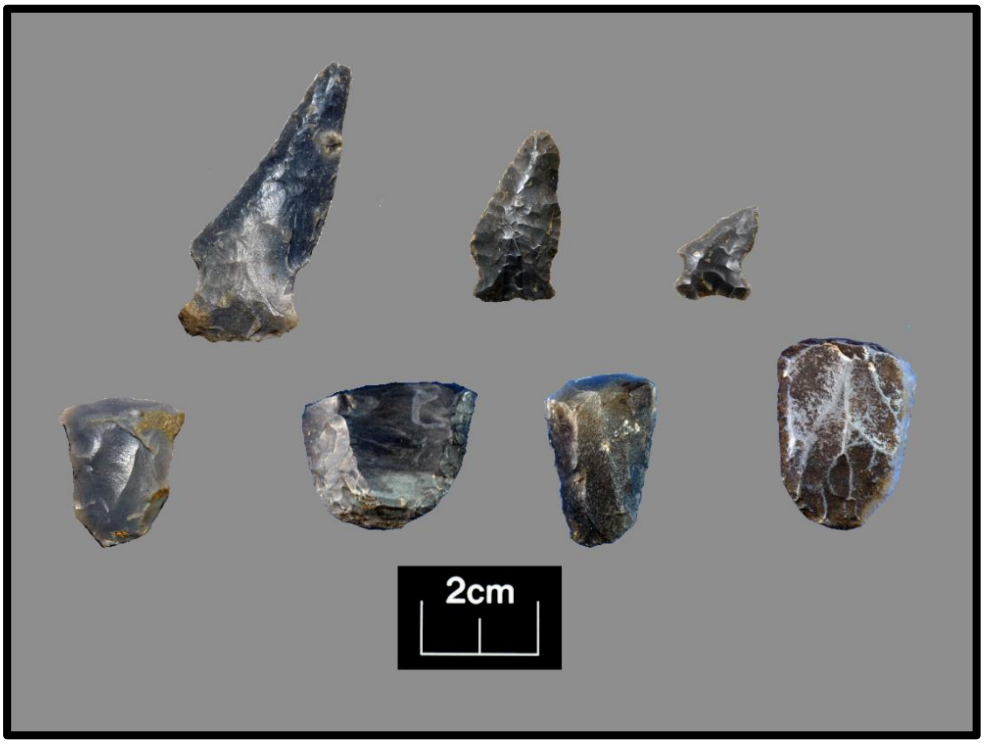

Figure 6.29: A selection of scrapers. The top row are all side-scrapers (or sometimes referred to as transverse) and the bottom row are all endscrapers. Top (left to right): SgFm-17:56, PgHb-1:2965, NiHf-4:1858. Bottom (left to right): SgFm-3:383, HcCg-2:905, HcCg-2:121, HcCg2:664. Photo permission courtesy of the Government of Nunavut, the Canadian Museum of History, and the Rooms Museum.

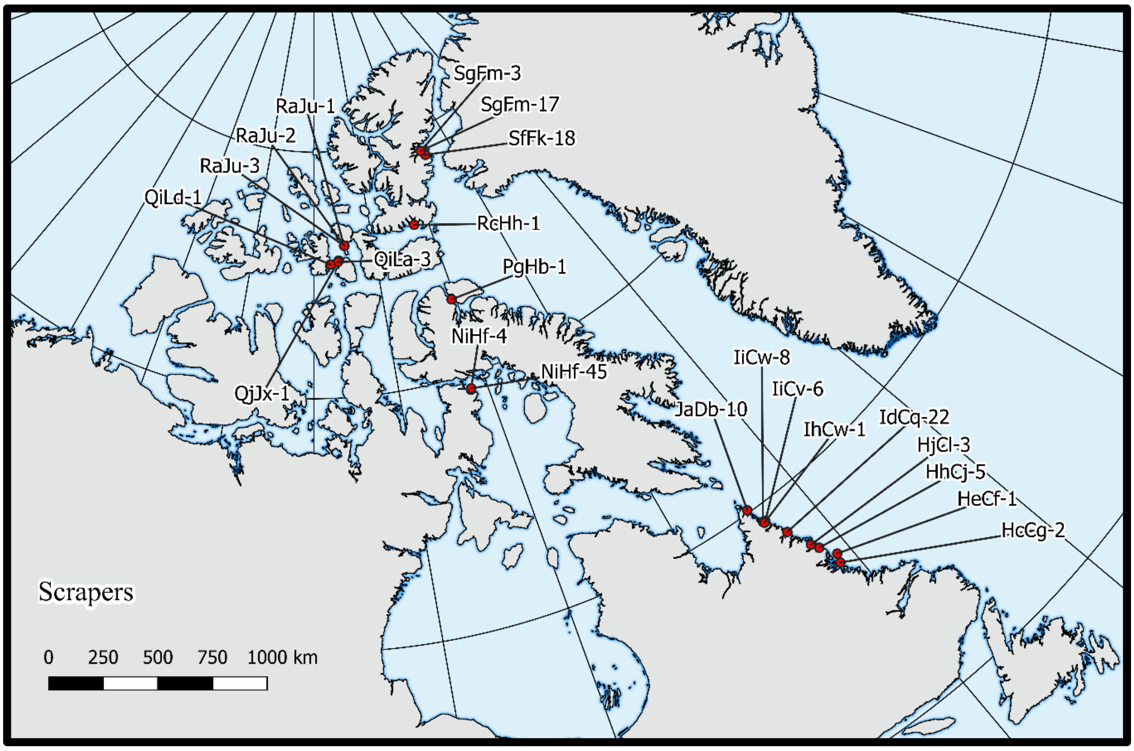

Figure 6.30: Geographic distribution of scrapers included in this thesis.

Region/Site	Number of Specimens
Labrador	
JaDb-10	25
IdCq-22	18
HjCl-3	12
IhCw-1	10
HcCg-2	7
IiCw-8	6
HeCf-1	5
HhCj-5	1
IiCv-6	1
Sub-Total	*85*
Northern Baffin Island	
PgHb-1	2
Sub-Total	*2*
Foxe Basin	
NiHf-4	7
NiHf-45	1
Sub-Total	*8*
Central Arctic	
RaJu-1	3
QjJx-1	1
QiLa-3	1
QiLd-1	1
RaJu-2	1
RaJu-3	1
RcHh-1	1
Sub-Total	*9*
High Arctic	
SgFm-3	8
SgFm-17	2
SfFk-18	1
Sub-Total	*11*
Grand Total	**115**

Table 6.18: Total number of scrapers included in this thesis separated by site and region.

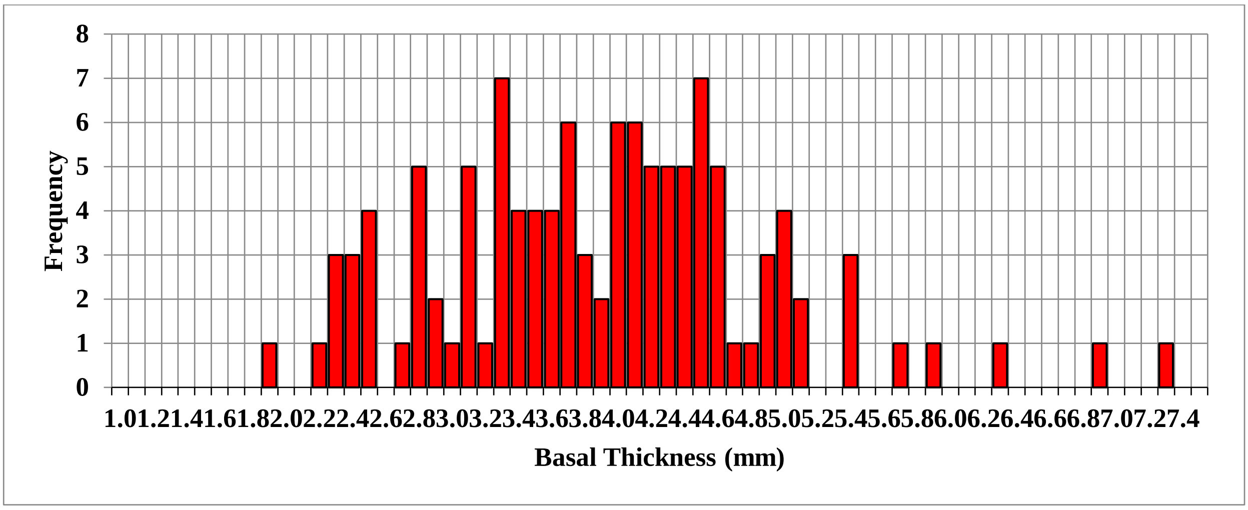

Figure 6.31: Basal thickness for all scrapers included in this thesis (n=115).

Pearson's Correlation Coefficient	**Scraper Length**	**Scraper Width**	**Length*Width (cm^2)**
Basal Thickness	0.225	0.375	0.423

Table 6.19: Pearson's correlation coefficient comparing scraper basal thickness with its length, width, and rough size.

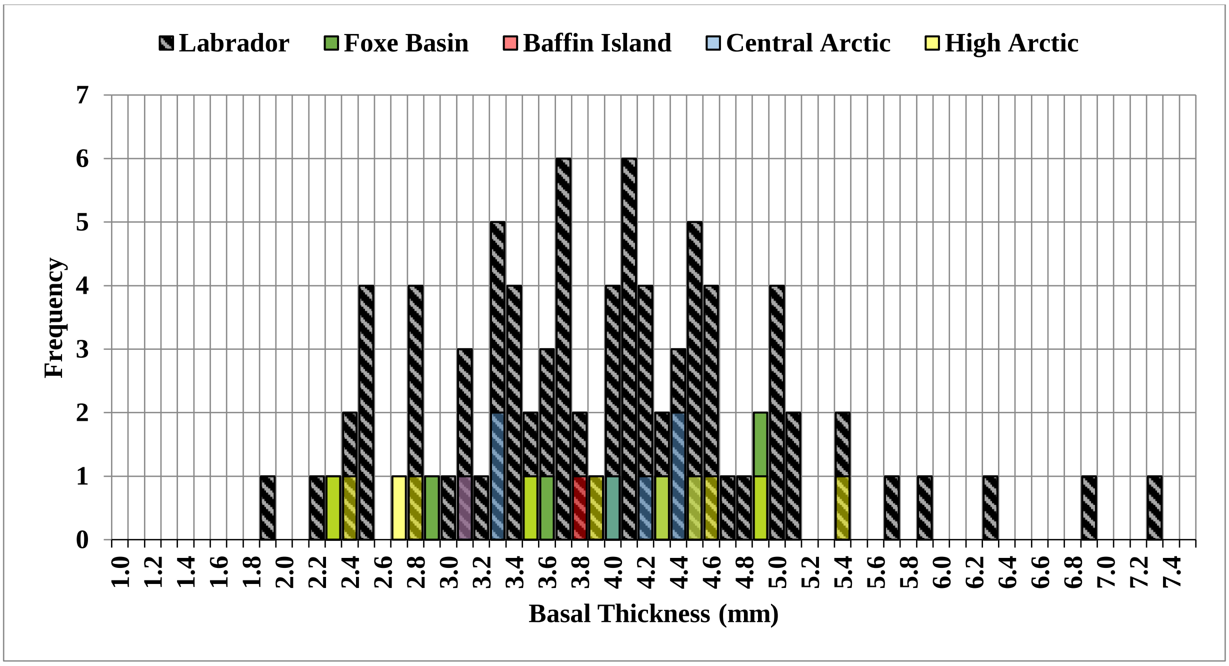

Figure 6.32: Scraper basal thickness separated into five regions: Labrador (n=85), Foxe Basin (n=8), Baffin Island (n=2), Central Arctic (n=9), and High Arctic (n=11).

There are clear differences in terms of basal thickness between endscrapers and sidescrapers included in this dataset. While sidescrapers are generally contained within the range of endscrapers, the bulk of sidescrapers are thinner than the majority of the endscrapers (Figure 6.33). Despite having similar ranges in terms of basal thickness, sidescrapers are more variable in addition to having thinner, on average, basal thicknesses (Table 6.20).

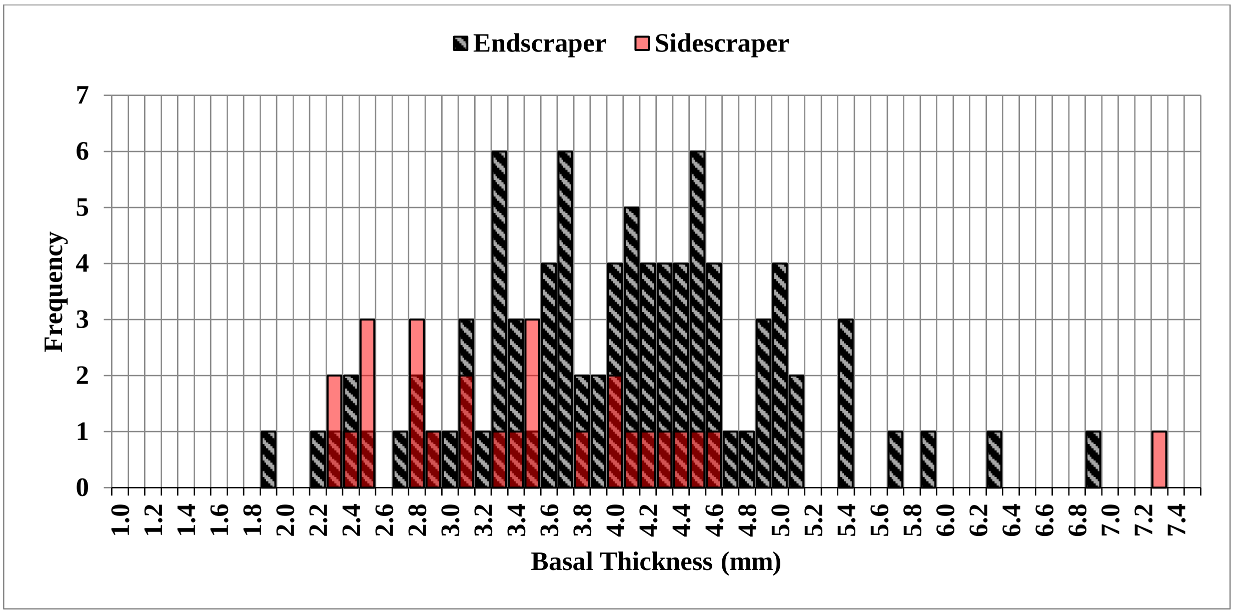

Figure 6.33: Endscraper (n=88) and sidescraper (n=27) basal thickness.

	Endscrapers	**Sidescrapers**
n	88	27
Mean	3.98	3.45
Median	4.05	3.39
Maximum	6.81	7.24
Minimum	1.85	2.27
Range	4.96	4.97
Standard Deviation	0.92	1.05
Coefficient of Variation	23.12	30.43

Table 6.20: Descriptive statistics for all scrapers.

6.5 Burin-Like-Tools

A sample of Burin-Like-Tools (BLTs) from Middle and Late Dorset sites were also analysed to assess whether they could fit into the handles included in this study (Figure 6.34). Spalled ("true" burins) and ground ("burin-like-tools") burin tools were produced throughout Pre-Dorset and Dorset periods but burins become increasingly ground with few spalled burins being found in Dorset sites (Desrosiers 2009:389-390). Late Dorset people stopped creating spalled burins and only produced ground burins (i.e. BLTs) (Desrosiers and Sørensen 2016:166). BLTs were likely multipurpose tools, but they likely played an important part in the manufacture of organic objects such as harpoon heads.

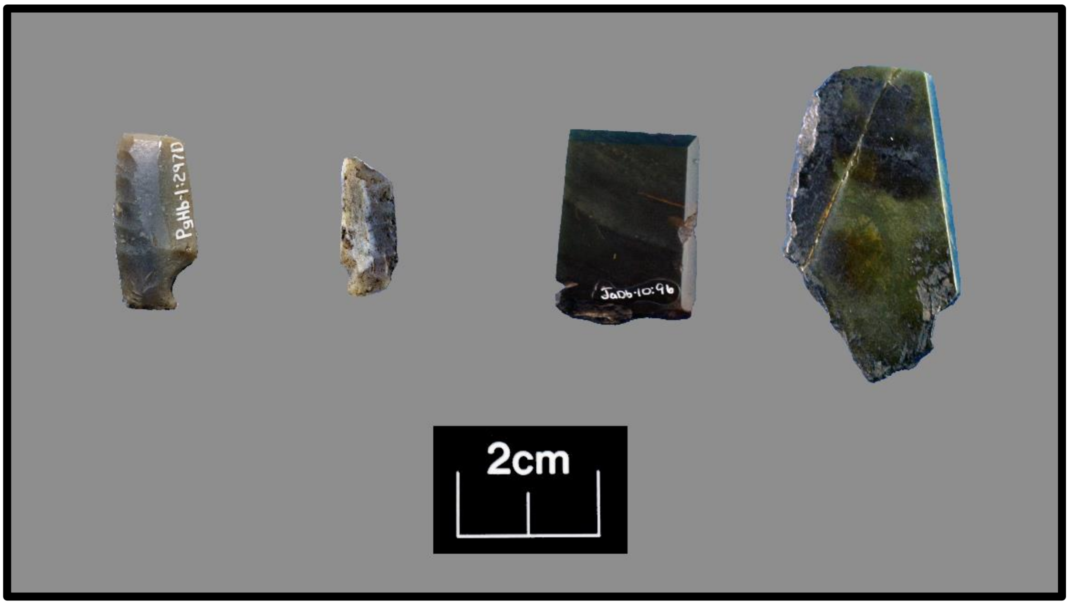

Figure 6.34: A selection of Burin-Like-Tools. From left to right: PgHb-1:2970, NiHf-4:1792, JaDb-10:96, JaDb-10:362. Photo permission courtesy of the Government of Nunavut, the Canadian Museum of History, the Prince of Wales Northern Heritage Centre, and the Rooms Museum.

There are only 29 BLTs included here from sites across the Arctic (Figure 6.35 and Table 6.21). The small sample size is partly due to the relative proportion of the tool type in Dorset collections but also due to the fact that many identified BLTs having missing proximal portions. Unlike the other lithic tools included in this thesis, BLTs are predominantly made from nephrite. The non-nephrite BLTs included in this dataset are made from chert, chalcedony, and slate. Most BLTs are side-notched with most having only a single side-notch below the working surface of the tool. This indicates that those BLTs were likely supported by a side-hafted handle. However, some of the BLTs have a pair of notches which could mean that they were occasionally supported by end-hafted handles. These BLTs are very much in the minority. Additionally, much like the scrapers discussed above, BLTs have relatively little basal thinning. As a result, thickness measurements were taken from a single location at the proximal portion of the tool. These were checked against the lateral measurements and there was very little variation between the two compared to other tools. For simplicity, only the measurement near the proximal end of the tool will be considered.

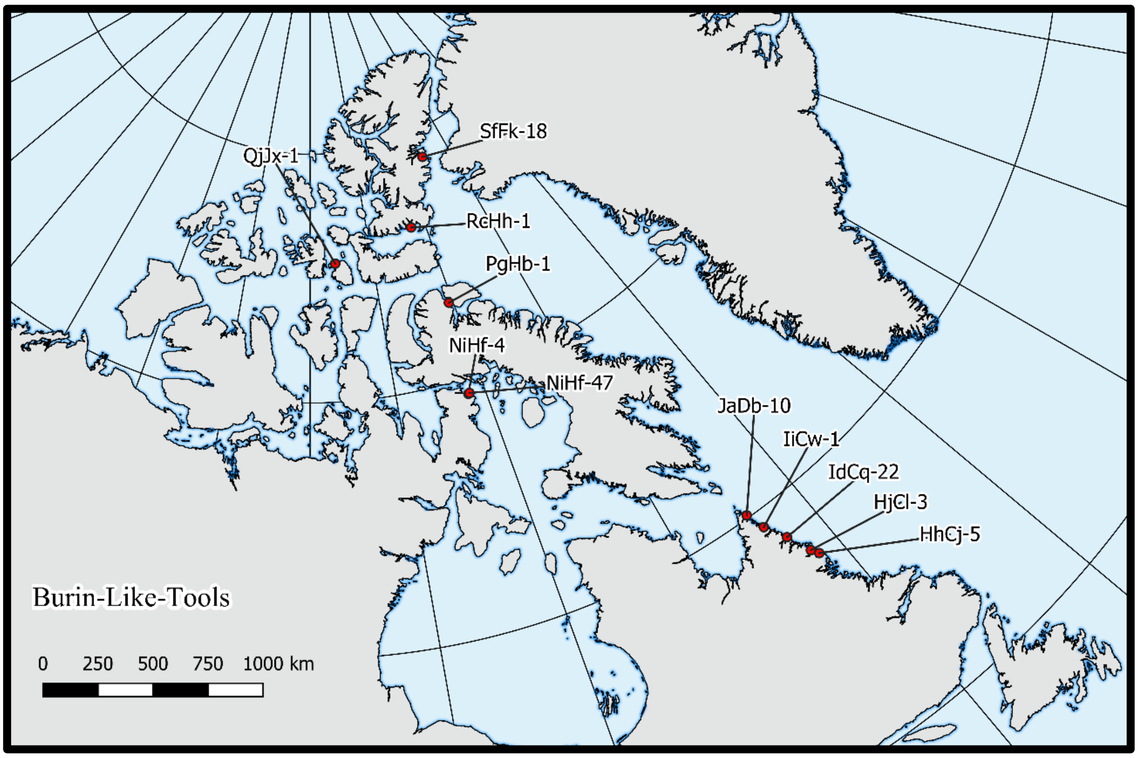

Figure 6.35: Distribution of all BLTs used in this thesis.

Region/Site	Number of Specimens
JaDb-10	6
NiHf-4	5
PgHb-1	5
HjCl-3	4
IiCw-1	3
HhCj-5	1
IdCq-22	1
NiHf-47	1
QjJx-10	1
RcHh-1	1
SfFk-18	1
Grand Total	**29**

Table 6.21: All BLTs included in this thesis separated by site.

Other than some endblades, BLTs have some of the thinnest basal portions of any lithic tool category included in this thesis. Overall, their distribution is relatively normal, if not slightly positively skewed (Figure 6.36). Furthermore, their basal thickness is not correlated with the overall dimensions of the tool (Table 6.22). There also appears to be slight differences in terms of basal thickness between the raw material types of BLTs (Figure 6.37 and Table 6.23). This makes them one of the only lithic tool categories analysed thus far that seem to have clear differences in basal thickness due to raw material type. While the sample size is too small and spread out over too many sites to confidently compare the objects between regions, BLTs are fairly thin and were possibly hafted in both side- and end-hafted handles.

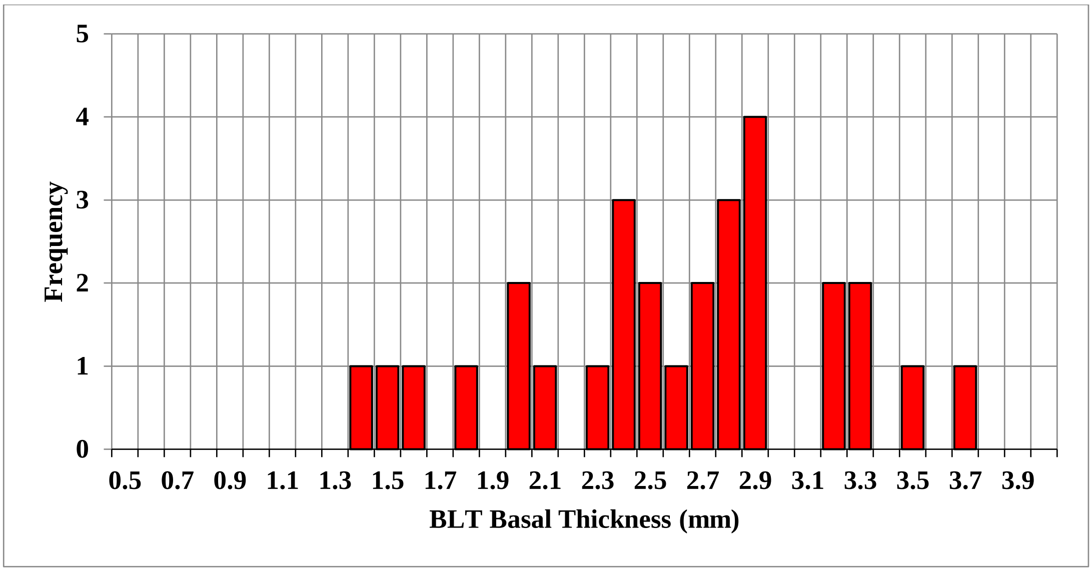

Figure 6.36: Basal thickness for all BLTs included in this thesis (n=29).

Pearson’s Correlation Coefficient	BLT Length	BLT Width	Length*Width (cm^2)
Thickness	0.160	0.030	0.044

Table 6.22: Pearson's correlation coefficient comparing BLT basal thickness to its length, width, and rough size.

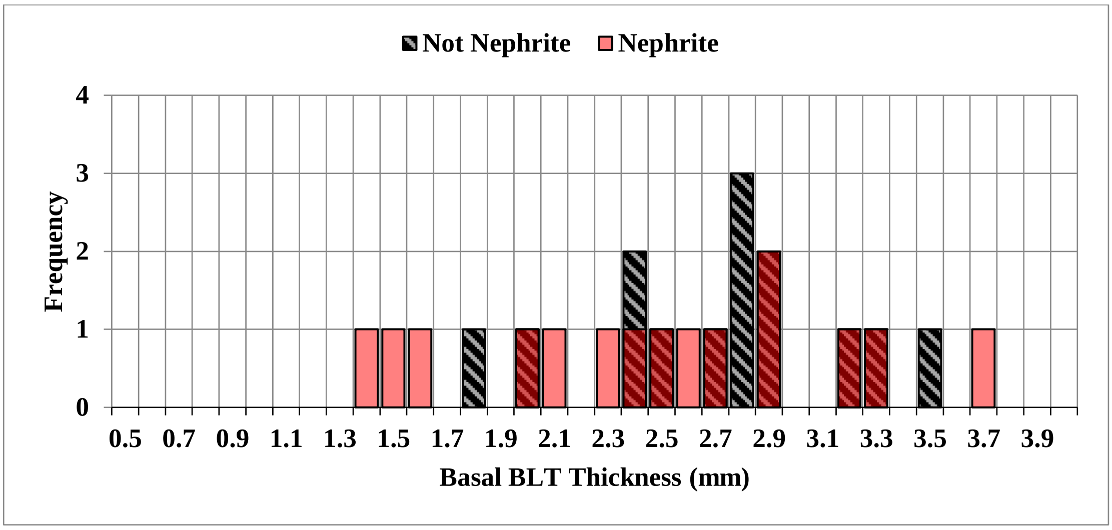

Figure 6.37: Basal thickness for nephrite (n=15) and non-nephrite (n=14) BLTs.

BLTs	Nephrite	Not Nephrite	Total
n	15	14	29
Mean	2.43	2.66	2.54
Median	2.42	2.73	2.61
Maximum	3.64	3.45	3.64
Minimum	1.31	1.76	1.31
Range	2.33	1.69	2.33
Standard Deviation	0.68	0.49	0.59
Coefficient of Variation	27.98	18.42	23.23

Table 6.23: Descriptive statistics for BLTs in this thesis.

6.6 Microblades

Microblades are often found in Dorset sites although their overall frequency compared to other tool forms decreases into the Late Dorset period (Cox 1978:111; Maxwell 1985:224; Owen 1988:99). Additionally, there are few diagnostic features of Dorset microblades which makes separating pre-Late Dorset and Late Dorset specimens difficult in multi-component collections. Complicating matters, very few microblades are totally intact with many being broken. This may have been done intentionally to acquire a desired size or to resharpen the object which makes it difficult, if not impossible, to determine if any given microblade or microblade fragment was a finished tool put into use without undertaking use-wear analysis. Ultimately, due to the frequency of microblade fragments in site collections, only a representative sample was used (Figure 6.38).

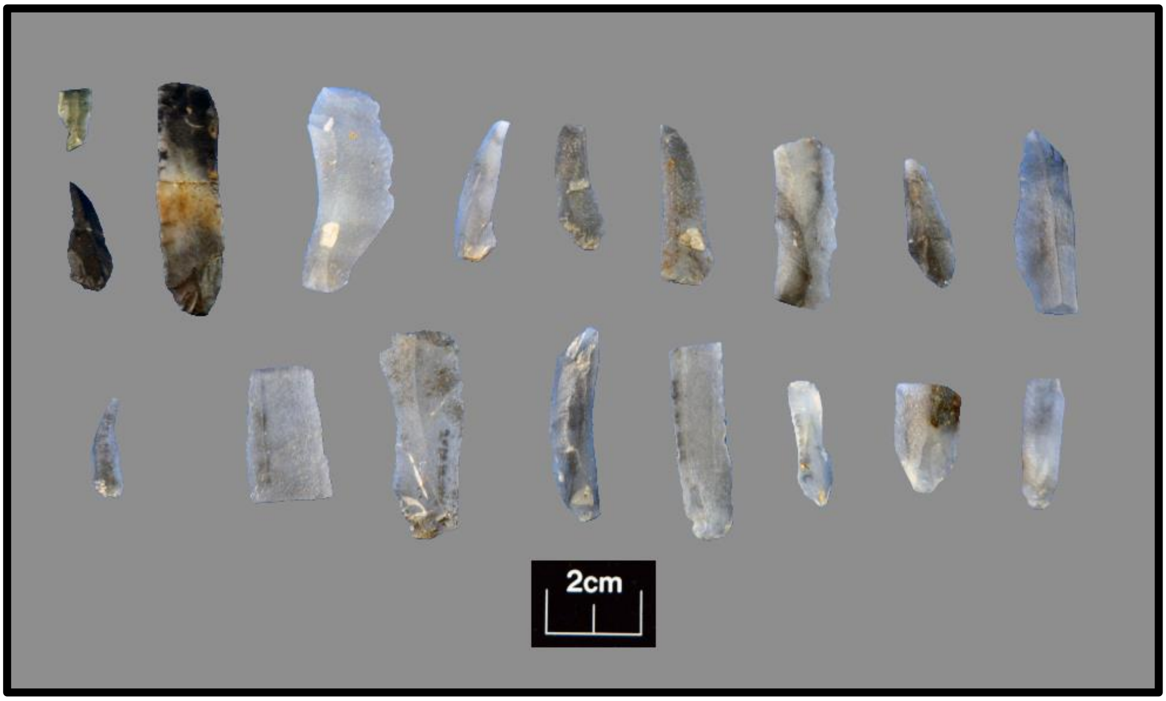

Figure 6.38: A selection of microblades from JaDb-10 (Avayalik Island 1). Photo permission courtesy of the Rooms Museum.

In total, this represents 140 microblades (or microblade fragments) from 19 sites across the Arctic (Figure 6.39 and Table 6.24). Microblades come in a variety of forms and, ultimately, sizes with some being over 50mm and less than 20mm in length. Microblades were also made from a variety of raw materials including chert, quartz, and quartz crystal (Appelt et al. 2016:785). Much like the metal tools which will be discussed in Chapter 7, microblades could have been either end- or side-hafted with some specimens having prepared stems or basally thinned portions to facilitate hafting. Therefore, unlike other lithic tools, the measurement locations for the hafting thickness of microblades was adjusted. Each microblade was measured at the proximal portion of the tool and a medial portion, along the lateral edge of the object. These two measurements would represent the likely end- and side-hafting location of the microblade. Additionally, maximum length, width, and thickness were also measured. With the few examples that had a defined proximal stem, only the proximal hafting thickness measurement was taken.

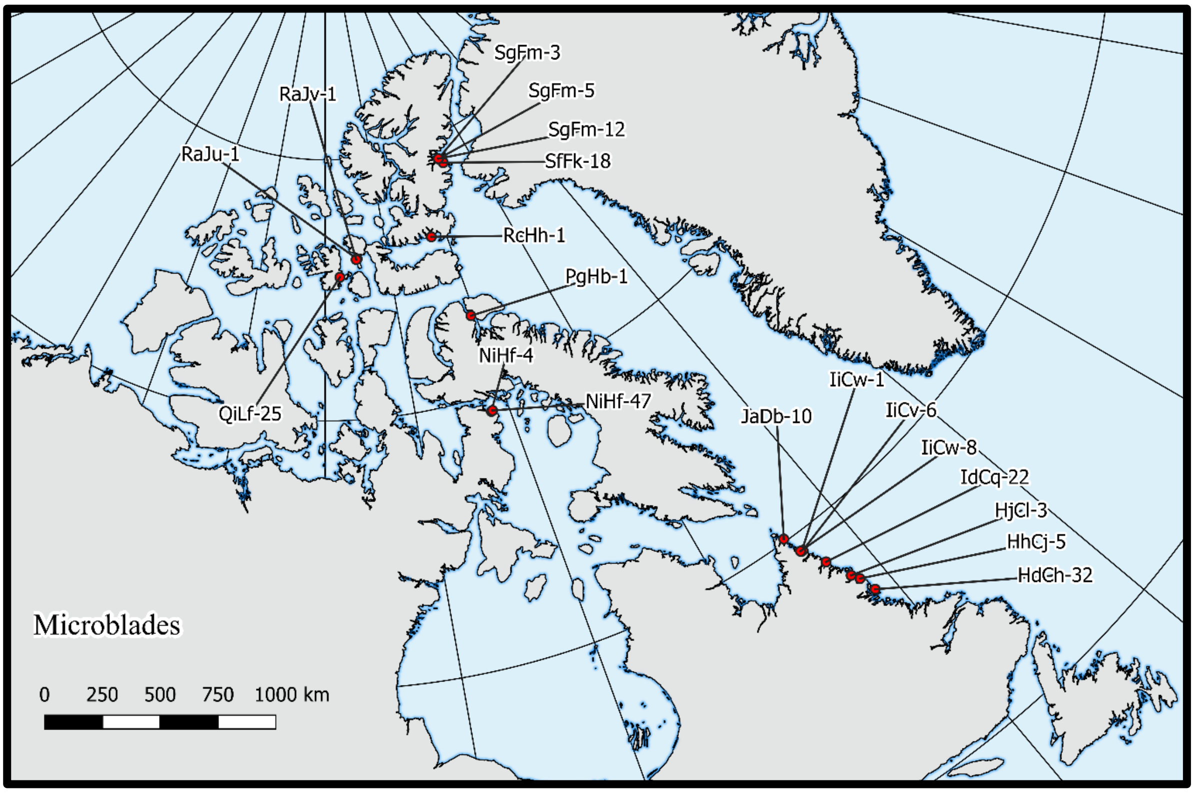

Figure 6.39: Location of all sites that have microblades included in this thesis.

Overall, the lateral hafting location thickness was slightly thinner, on average, than the proximal hafting location thickness (Figure 6.40). Although, the thickest hafting location measurements were all from lateral locations. The mean thickness for the lateral location is 2.18mm and the mean thickness measurement for the proximal location is 2.35mm (Table 6.25). In general, the slight difference between the two locations is most likely due to the form of the object itself with most microblades having thin lateral edges and slightly thicker medial portions. While many of the microblades were broken and were likely not representing their complete length, there is a moderate correlation between the overall length, width, and thickness of the object with its hafting location thickness (Table 6.26). Unsurprisingly, the strongest correlation is between the maximum thickness and lateral hafting location thickness measurements.

Region/Site	Number of Specimens
Labrador	
IdCq-22	24
JaDb-10	20
HjCl-3	10
IiCw-8	10
IiCw-1	9
HhCj-5	3
IiCv-6	3
HdCh-32	2
Sub-Total	*81*
Foxe Basin	
NiHf-4	6
NiHf-47	1
Sub-Total	*7*
Northern Baffin Island	
PgHb-1	7
Sub-Total	7
Central Arctic	
RaJu-1	12
QiLf-25	3
RaJv-1	3
RcHh-1	1
Sub-Total	*19*
High Arctic	
SgFm-3	13
SfFk-18	9
SgFm-12	3
SgFm-5	1
Sub-Total	*26*
Grand Total	**140**

Table 6.24: Total number of microblades included in this thesis separated by site and region.

The full implications of these data along with the other lithic tool types will be fully discussed in Chapter 9. However, microblades represent the thinnest lithic tool type with only the proximal and medial thickness measurement of endblades being comparable. While it is not impossible that microblades could be hafted in a harpoon head, they were most likely supported by end-hafted or side-hafted handles. When comparing the blade slot lengths of all handles and harpoon heads with the maximum length of all microblades, it is clear that the pattern of microblade lengths most closely matches the blade slot lengths of side-hafted handles (Figure 6.41). However, given that all the end-hafted handles and harpoon heads have blade slot lengths are less than the maximum microblade length, it is possible, if unlikely, that they were hafted in those supports. With these data in mind, while it may be physically possible to haft a microblade in any type of organic support, side-hafted handles are the most likely candidate based on these quantitative results. A more direct comparison of blade slot thicknesses with microblade hafting thicknesses will be discussed in Chapter 9.

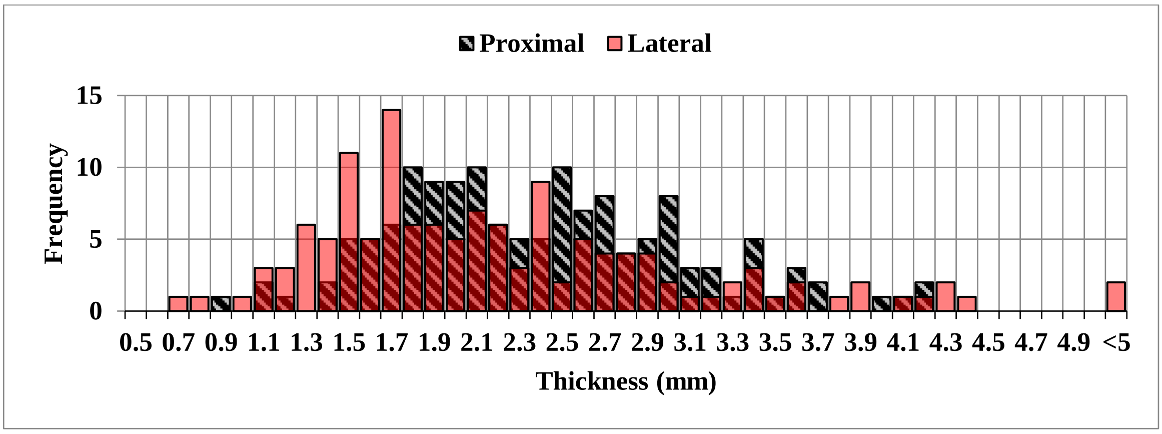

Figure 6.40: Thickness of microblades at proximal (n=140) and lateral (n=133) hafting locations.

Microblades	Proximal	Lateral
n	140	133
Mean	2.35	2.18
Median	2.27	1.98
Maximum	4.17	5.23
Minimum	0.90	0.65
Range	3.27	4.58
Standard Deviation	0.68	0.88
Coefficient of Variation	28.94	40.37

Table 6.25: Summary Statistics for proximal and lateral hafting location thickness measurements for all microblades.

Pearson’s Correlation Coefficient	Maximum Length	Maximum Width	Maximum Thickness
Proximal	0.455	0.624	0.583
Lateral	0.544	0.524	0.744

Table 6.26: Pearson's correlation coefficient comparing microblade hafting location thickness with the maximum length, width, and thickness of the object.

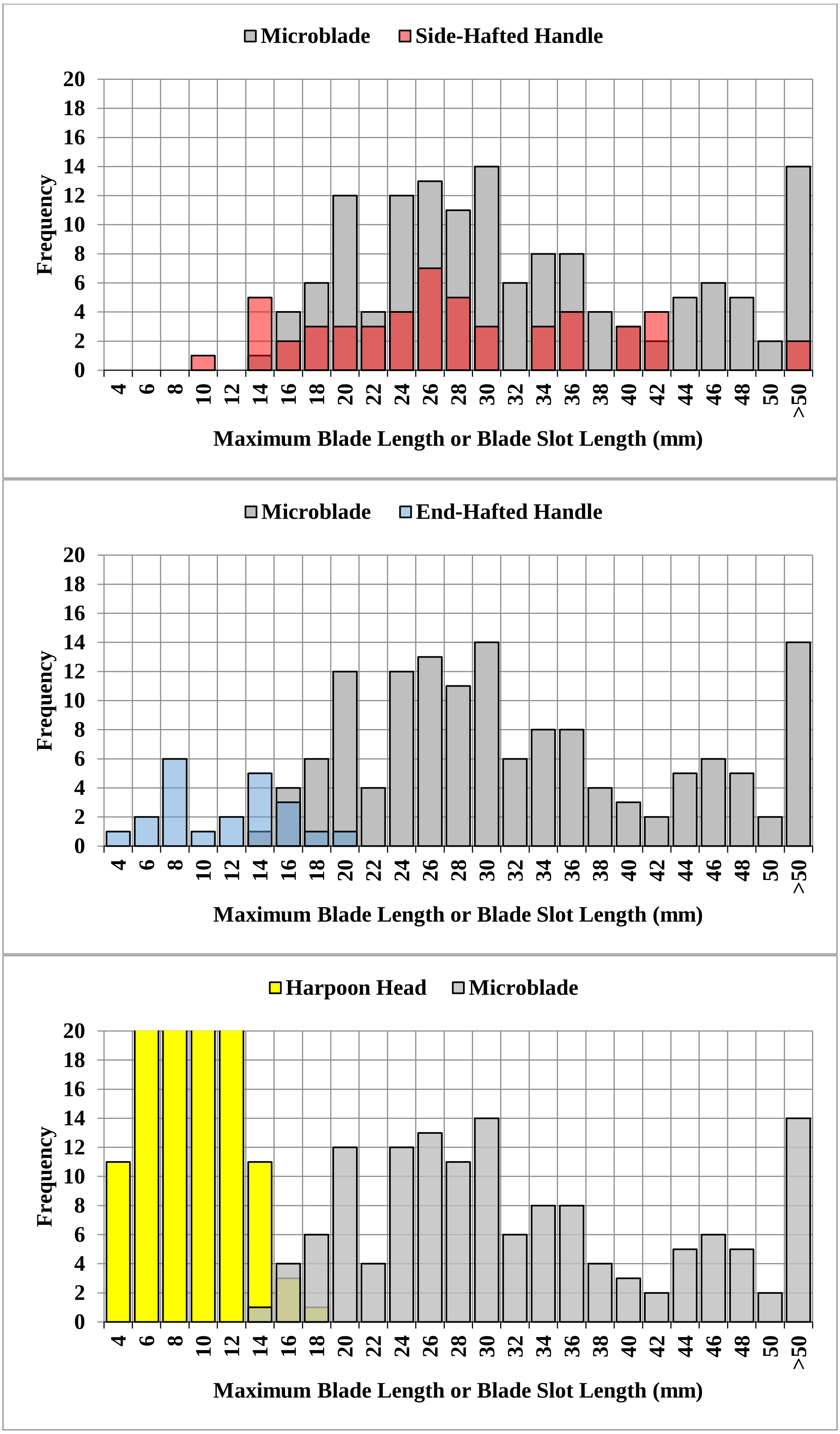

Figure 6.41: Comparison of side- (n=52) and end-hafted (n=22) handle and harpoon head (n=183) blade slot length with maximum length of all microblades (n=140). Note frequencies for some harpoon head groups exceed 20 counts.

Chapter 7

Results: Metal Artefacts

7.1 Overview

This chapter will describe the metal objects included in the metric analysis of this thesis. While metal has been found in relatively limited quantities in Late Dorset sites (e.g. Harp 1974; LeMoine et al. 2003; Plumet 1989; Schledermann 1990), excavations from sites on Little Cornwallis Island have produced the largest known collection of metal artefacts, at least in terms of raw counts (LeMoine 2005; LeMoine et al. 2003). Despite the quantity of individual metal finds, few from the Little Cornwallis Island sites (e.g. QjJx-1, QjJx-10) are complete objects. The only other site with a comparably large amount of metal objects is SiFi-4 (Franklin Pierce) located on Ellesmere Island. SiFi-4 only has a single radiocarbon date which places between cal. AD 671-875 (two-sigma). While this site was partially described by Schledermann (1990:261) it was only fully excavated in 1995 which means much of the site data has remained unpublished. This later excavation produced a large quantity of metal objects representing nearly the full range of manufacturing states from lumps of raw material to preforms and completed tools. Moreover, the range of tool types found at SiFi-4 and the completeness of those tools is arguably greater than the Little Cornwallis Island sites. For these reasons, only the objects from SiFi-4 will be described in this chapter.

While only complete objects or those with intact proximal portions were included in the metric analysis, a number of preforms or lumps of raw material were recovered. These can range from un- or minimally worked lumps to iron that has been hammered into flat sheets. In terms of identifiable tool types, there are three categories that will be discussed: (1) Endblades (2) Stemmed Endblades, and (3) Side-Hafted Blades. Interestingly, this corresponds well with the organic tool types analysed in this thesis with objects being both end- and side-hafted. Significantly, iron was the only identified metal type. However, copper is known to have been exchanged into this region in the last half of the first millennium as seen by the copper bar found at SgFm-3 (Longhouse Site) (Schledermann 1990:216). The composition of the SiFi-4 material has not been quantitatively analysed, however, it is likely that most, if not all, is derived from the Cape York meteorite spread given its proximity.

Despite the biases that may be present from such a small sample size, given the completeness and range of the tools themselves, SiFi-4 is a perfect candidate for beginning to understand Late Dorset metal use in a more quantitative way. Much like the lithic tools, maximum length, width, and thickness measurements were taken as well as three basal thicknesses at the proximal portion of the object were measured using the same methodology as the lithic material. While the below discussion will focus individually on the complete tools from each category, reference to near-complete preforms will also be made when appropriate.

7.2 Endblades

This category represents endblades that are visually similar to lithic triangular endblades (see Chapter 6.2). In total there are four complete objects (or that have surviving proximal portions) that have been classified as "endblades". While they are not all finished tools or are all similar sizes, they all have either a slightly convex or flat base. None have any sort of visible securing traces except for one which has small basal side notches.

7.2.1 SiFi-4:103

SiFi-4:103 has been interpreted as a near-finished endblade. It has one finished straight side while the other is bowed and still has evidence of cold-hammering marks, suggesting that the tool was discarded before it was completed. Likewise, the tip has hammering marks as does the base which suggests that while the rough form was produced, there were a number of additional steps left before the tool itself could be used. Additionally, there is another faint manufacture mark which is found on the object. It appears that the edges, after having been roughly hammered into shape were then grooved to create a straight-edge and then broken off, in a fashion similar to that reported in Subarctic material (Franklin et al. 1981:36) (Figure 7.1). It has a maximum length of 29.08mm and a maximum width of 20.79mm. Its maximum thickness is 2.85mm, making it, by far, the thickest metal object included in the dataset. This along with its unfinished edges and tip supports it being interpreted as a preform.

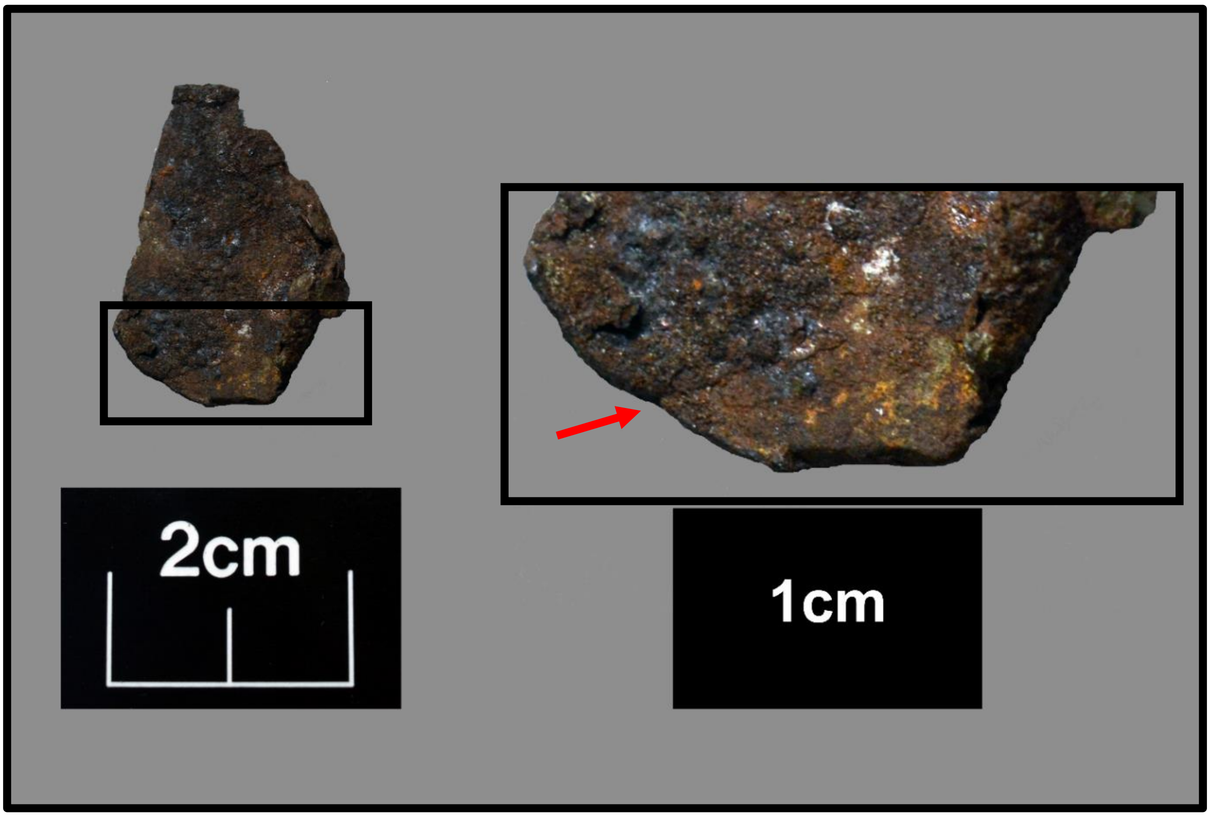

Figure 7.1: View along base of SiFi-4:103 that shows attempts at grooving to help finish the edge of the object. Note the different scales. Photo permission courtesy of the Government of Nunavut and the Canadian Museum of History.

7.2.3 SiFi-4:115

SiFi-4:115 is only a partially surviving fragment of what appears to be the proximal portion of an endblade. While the tip has not survived, the surviving portion appears to be the full length of the proximal edge along with the shoulders of the object and only the proximal-most portions of the cutting lateral edges. The similar angle found on both lateral edges is partially why this piece may represent an endblade fragment rather than just manufacturing waste. It has a maximum width of 15.33mm and a maximum thickness of 2.25mm which makes it broadly similar to other endblades, in particular SiFi-4:120 (discussed below). However, the object is very fragmentary making the interpretation less certain.

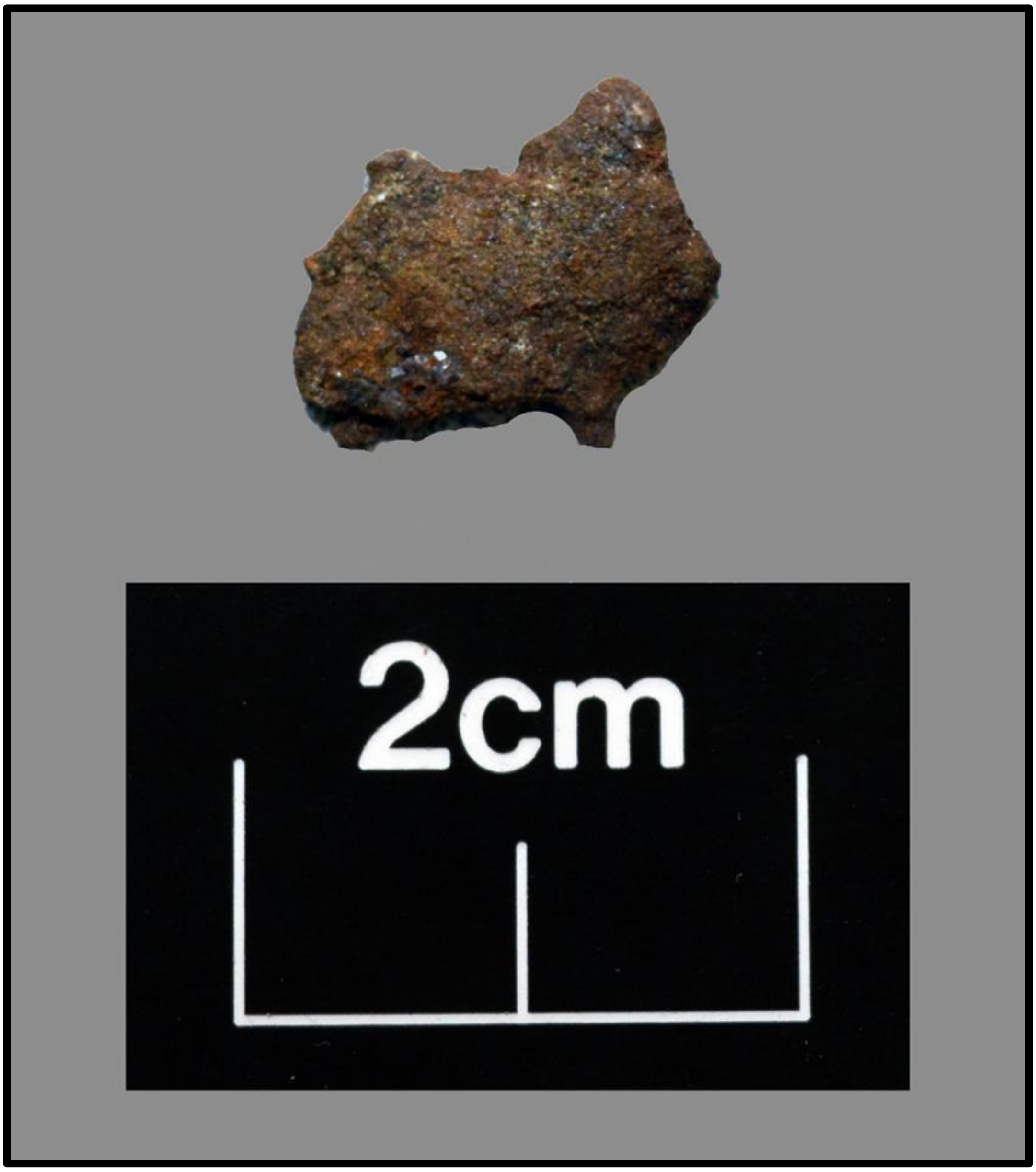

Figure 7.2: SiFi-4:115 endblade with its only surviving proximal portion. Photo permission courtesy of the Government of Nunavut and the Canadian Museum of History.

7.2.3 SiFi-4:116

This endblade is by far the most complete endblade included in this dataset. It has triangular shape with a slightly concave base. Unlike its lithic counterparts the shoulders of this endblade are shortened and do not have the spurs seen elsewhere. Additionally, it has parallel side notches found along the proximal lateral portions of the tool likely to facilitate securing it to a harpoon head. It has a maximum length of 31.45mm, a maximum width of 19.25mm and a maximum thickness of 1.36mm, making it one of the longest, widest but also thinnest endblades. While some slight hammer marks are visible along the base of the object, there are no manufacturing marks on the rest of the endblade.

Figure 7.3: SiFI-4:116 side-notched endblade. Photo permission courtesy of the Government of Nunavut and the Canadian Museum of History.

7.2.4 SiFi-4:120

SiFi-4:120 is the proximal half of an endblade and seems to be missing only its tip. While it has one edge which appears to be mostly finished, the other lateral edge has hammer marks on it suggesting it was not finished before discard. The base of the endblade has a slightly concave portion, similar to SiFi-4:116. However, the overall size of this endblade is closer to SiFi-4:115. It has an overall, although incomplete, length of 22.4mm, a maximum width of 15.88 (which is incredibly close to that of SiFi-4:115), and a maximum thickness of 2.14. While it is not impossible that this object is simply a manufacturing fragment, its general shape and size similarities with other objects identified as endblades suggests it is a preform of a standard tool type.

Figure 7.4: SiFi-4:120 endblade missing its tip. Note the visible hammer marks along the unfinished lateral edge. Photo permission courtesy of the Government of Nunavut and the Canadian Museum of History.

7.3 Stemmed Endblades

Five objects from SiFi-4 are described as “stemmed” endblades. While this category tends to be slightly smaller in size than the endblades described previously, the presence of what appears to be two lateral cutting edges suggests that these were also secured on either harpoon heads or end-hafted knife handles. They all have what appears to be a stem of some kind which is what distinguishes them from unmodified endblades.

7.3.1 SiFi-4:100

This endblade has a small stem and two almost parallel lateral edges which distinguishes from the other three stemmed endblades. While it is unclear if what has been interpreted as stem actually functioned in this way or if it is only what is surviving of the objects stem, it is possible that this object is not finished as there are hammer marks around all edges including the tip. Its maximum length is 23.66mm, maximum width is 9.28mm, and its maximum thickness is 3.16mm. The thickness of the object also suggests it may have not been completed although the thickness of the stem is much thinner than the blade itself, which will be discussed at the end of this chapter.

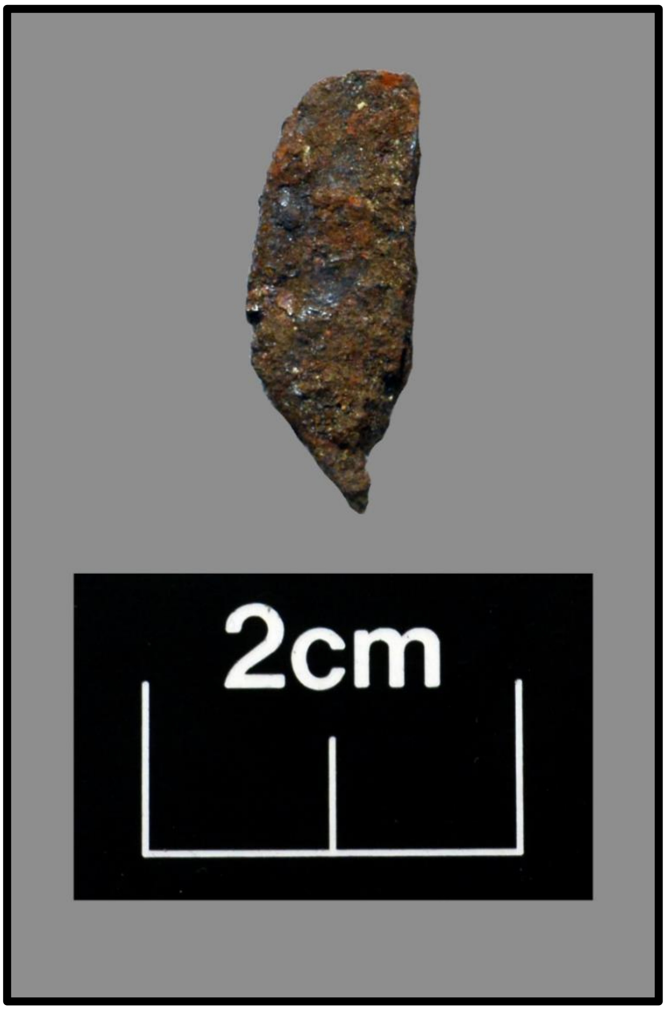

Figure 7.5: SiFi-4:100 stemmed endblade. Note its small, off-centre stem and its nearly parallel lateral cutting edges. Photo permission courtesy of the Government of Nunavut and the Canadian Museum of History.

7.3.2 SiFi-4:102

This stemmed endblade is mostly complete with only its distal-most portion missing. It has almost parallel lateral cutting edges and has a relatively wide stem at its base. As it appears now, it has a concave base but it is possible that it originally had a convex base. It has a maximum length of 15.48mm, a maximum width of 11.64mm and a maximum thickness of 1.70mm. While it has a similar maximum width as SiFi-4:100, it is considerably thinner. Moreover, it has no visible hammer marks except potentially around the proximal edge of the object. This is similar to SiFi-4:116 which only had hammer marks along its base which suggests both objects were finished and may have actually been mounted in an organic support. While SiFi-4:102 is considerably more narrow than what would be expected of a traditional lithic triangular endblade, its general form matches closely lithic stemmed or side-notched bifaces which could mean it was mounted in an end-hafted knife handle (similar to JaDb-10:2732, Figure 5.53).

Figure 7.6: SiFi-4:102 stemmed endblade. Note its wide stem and the general similarity with lithic bifaces. Photo permission courtesy of the Government of Nunavut and the Canadian Museum of History.

7.3.3 SiFi-4:104

This stemmed endblade is the most complete specimen in the dataset. It has two lateral cutting edges and has a wide and very short stem. Unlike previously discussed examples, this object has been bent in profile. Additionally, while it is complete, the tip has been bent back towards the body of the endblade. Also much like other finished specimens few, if any, hammer marks are visible along its edges except possible around the proximal-most edge. It has a maximum length of 23.18mm (although that is shortened due to it being bent), a maximum width of 12.39mm, and a maximum thickness of 1.84mm. Due to its slightly smaller size than the unmodified endblades discussed in Chapter 7.2, it is possible that it was hafted in an end-mounted knife handle as opposed to a harpoon head.

Figure 7.7: SiFi-4:104 stemmed endblade. Note its short and wide stem and the lack of visible hammer marks. Photo permission courtesy of the Government of Nunavut and the Canadian Museum of History.

7.3.4 SiFi-4:105

SiFi-4:105 is a stemmed endblade with broadly parallel lateral cutting edges and a wide stem. This object most closely resembles SiFi-4:102 and SiFi-4:106 (described below). Much like other specimens, it is missing its distal-most portion. Furthermore, it has only very faint hammer marks around the proximal portion of the object which suggests it may have been finished. It has a maximum length of 22.39, a maximum width of 17.13mm and a maximum thickness of 1.64mm.

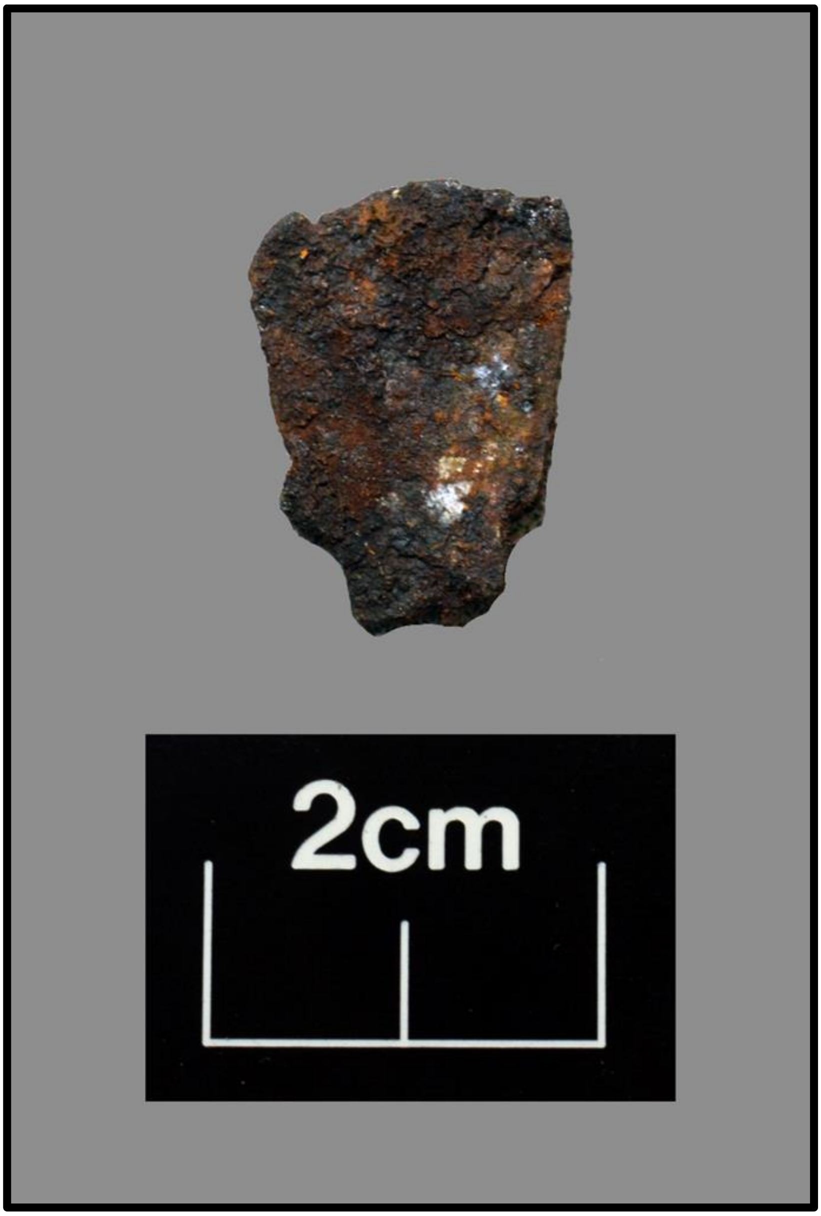

Figure 7.8: SiFi-4:105 stemmed endblade. Note its similar shape as SiFi-4:102. Photo permission courtesy of the Government of Nunavut and the Canadian Museum of History.

7.3.5 SiFi-4:106

This stemmed endblade has only its proximal half surviving. However, it appears to have almost parallel lateral cutting edges and a wide stem with what appears to be a slightly concave base. It broadly resembles SiFi-4:102 and SiFi-4:105. It has faint hammer marks along its cutting edges and base which suggests it may not be a finished tool although the manufacturing marks themselves are much less easily seen than with other, clearly unfinished specimens in the dataset. It has a maximum length of 14.17mm, a maximum width of 14.54mm, and a maximum thickness of 1.86mm. However, much like SiFi-4:102 and SiFi-4:105, its stem is significantly thinner than its cutting surface. Given its visual similarity to lithic bifaces, it is possible that it would be supported in an end-hafted handle rather than a harpoon head.

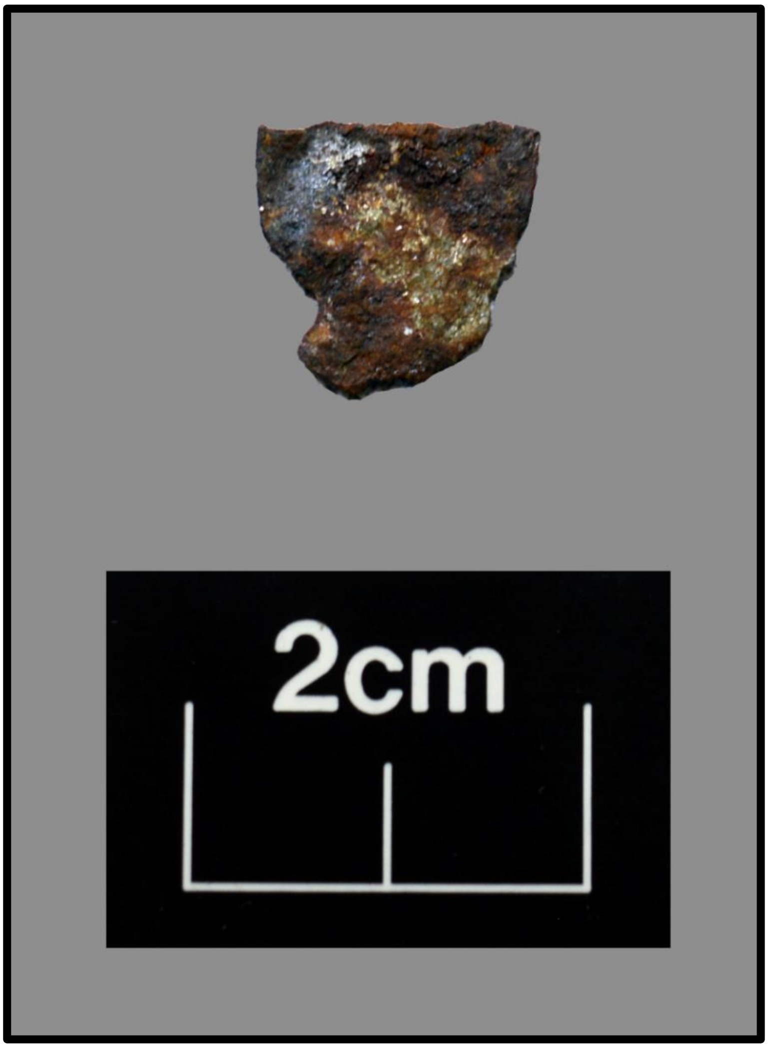

Figure 7.9: SiFi-4:106 stemmed endblade. Note its similarity to SiFi-4:102 and SiFi-4:105. Photo permission courtesy of the Government of Nunavut and the Canadian Museum of History.

7.4 Side-Hafted Blades

Two objects from SiFi-4 have been interpreted as side-hafted blades. This final identifiable tool category represents the metal blades that would have most likely been supported in a side-hafted handle. While the evidence for these blades being mounted along their lateral edge as opposed to the proximal edge is diverse, they almost all have notches near the distal or proximal portions of the blade which would have facilitated some sort of securing line. Similar marks, either in the form of visible grooves or gouged holes, are found on side-hafted handles discussed earlier.

7.4.1 SiFi-4:112

This likely side-hafted blade has two broadly parallel lateral edges with one edge being slightly convex while the other being nearly straight. There appear to be two notches, one slightly longer notch near the likely distal end of the convex lateral edge with another shorter notch being located on the proximal portion of the straight lateral edge. While the longer notch on the convex edge is likely to facilitate fitting the blade into the handle, the smaller notch on the straight edge was likely used to secure the blade to the handle itself with a sinew line. However, it is not impossible for blade to have been fitted the other way around with the longer notch on the convex edge facilitating a brace while the smaller notch on the straight edge fitted around the distal portion of the handle. The former interpretation is favoured simply because many side-hafted handles did not have flat bases to their blade slots but rather had slightly concave blade slots which would have fitted a slightly convex blade back. The maximum length is 42.31mm, the maximum width is 15.2mm, and the maximum thickness is 2.17mm. Interestingly, only 2 complete side-hafted handles (5.1%) had blade slot lengths longer than the maximum length of SiFi-4:112. The length of the convex edge excluding the long distal notch is 28.88mm which is shorter than 16 (41.0%) of the complete side-hafted handles. This also supports the interpretation that the convex edge was likely the one that was fitted into the blade slot. There are no visible hammer marks except near the distal notch and the potential blade attachment edge is much thinner than the maximum thickness of the object.

Figure 7.10: SiFi-4:112 side-hafted blade. Note the different morphologies of both lateral edges as well as their associated notches. Photo permission courtesy of the Government of Nunavut and the Canadian Museum of History.

7.4.2 SiFi-4:118

SiFi-4:118 has been interpreted to be a side-hafted blade. While it has two straight lateral edges, their angles are slightly asymmetric with the edge that has the more acute angle being the cutting edge. Unlike SiFi-4:112, it appears to only have one notch near the proximal portion of the blade. However, it seems possible that the blade itself has a stem which might suggest it could have also been supported by an end-hafted handle. It has a maximum length of 28.87mm, a maximum width of 10.06mm, and a maximum thickness of 1.2mm.

Figure 7.11: SiFi-4:118 side-hafted blade. Note the notch near the proximal portion of the object and the potential stem which indicates it may have also been end-hafted. Photo permission courtesy of the Government of Nunavut and the Canadian Museum of History.

7.5 Discussion

While direct comparison of the thickness of these metal tools with the lithic and organic datasets will take place in Chapter 9, there are some patterns that do emerge when observing the metal data alone. When observing all specimens in a scatter plot (with the x-axis being the medial thickness measurement location and the y-axis being the distal thickness measurement location), there are effectively two groupings: one group of objects with medial thicknesses less than 1.6mm and distal thicknesses less than 2.0mm and a second group with medial thicknesses roughly larger than 1.8mm and distal thicknesses roughly larger than 2.0mm (Figure 7.12). Interestingly, while two distinct endblade types were identified, this did not seem to affect the thickness of the objects. However, when the objects are separated into finished and unfinished tool categories, it becomes clear that almost all the unfinished tools are thicker in both measurement locations than the finished tools (Figure 7.13). This indicates that the tools with the least amount of visible manufacturing marks are generally thinner in their respective hafting regions than those that have numerous manufacturing marks. While it is possible that the objects were hammered down to the desired thickness, it is also possible that the material was ground after the desired shape had been obtained. Grinding the objects to their desired thickness after completing the shaping process may also remove manufacturing traces as well. Overall while the sample size for metal objects is small for this dataset, the 11 identifiable tools from SiFi-4 provide a good, if preliminary, starting point for understanding the variability of metal blades and their associated blade thicknesses. Despite there being a small amount of metal objects not included in this dataset, such as the blades from the Little Cornwallis Island sites among a few others, the SiFi-4 material likely represents a good proportional sample for known Late Dorset metal blades. Until more finished (and complete) metal tools are recovered, the dataset presented here represents the most comprehensive collection of metal tools that have been quantitatively analysed.

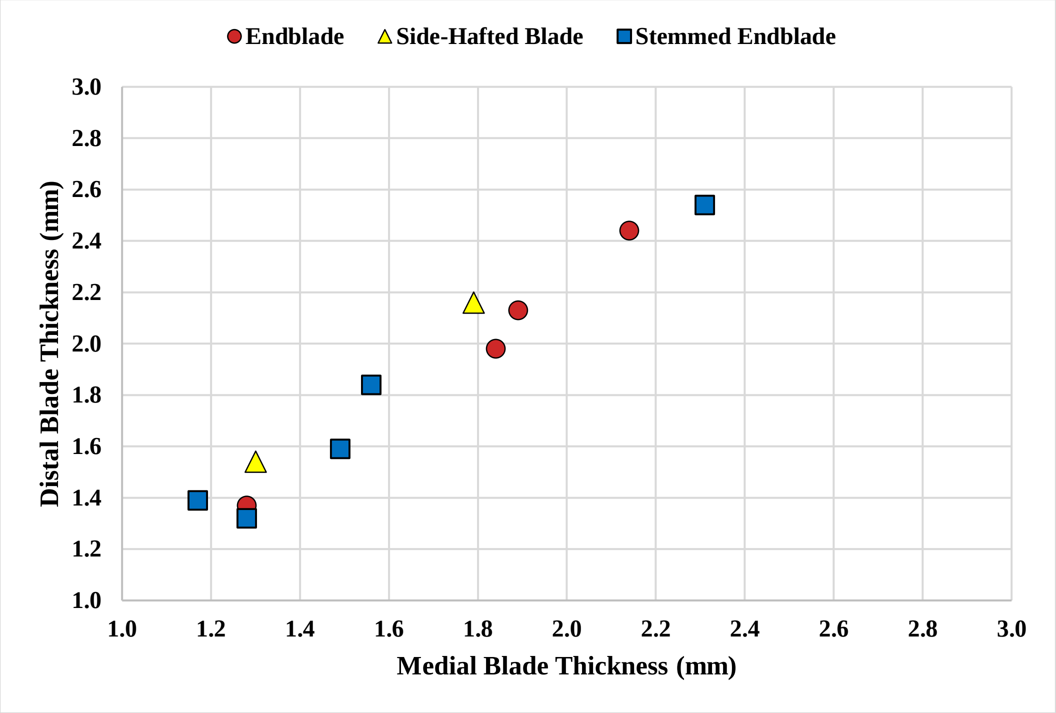

Figure 7.12: Scatter plot comparing the medial blade thickness measurements against the distal blade thickness measurements (n=11).

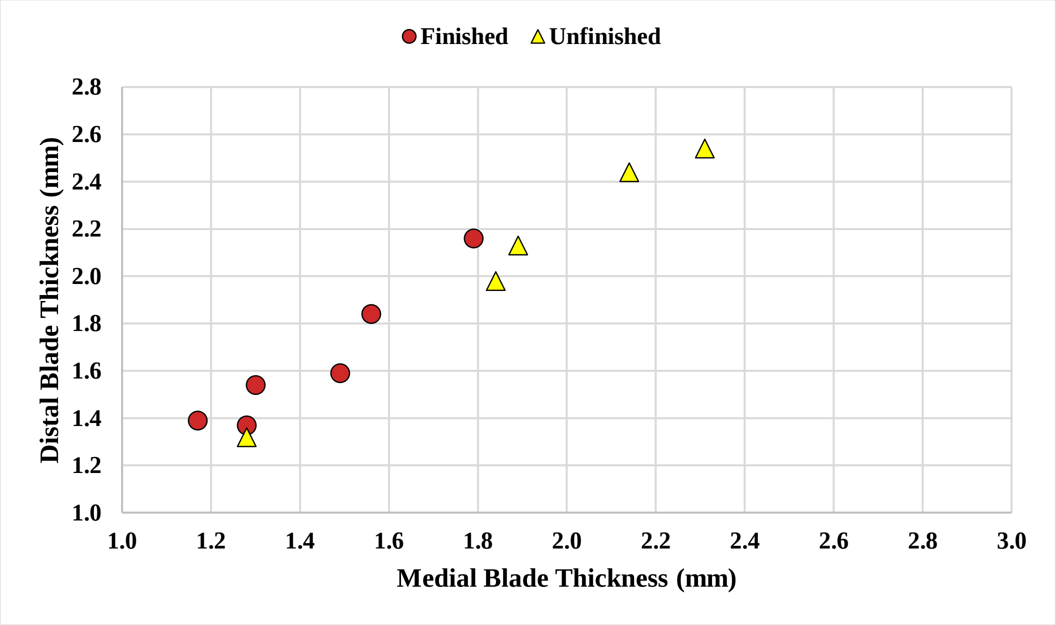

Figure 7.13: Scatter plot comparing the medial blade thickness measurement against the distal blade thickness measurement of finished and unfinished tools (n=11).

Chapter 8

Results: Microscopy

8.1 Introduction and Overview

In addition to the metric analyses presented in Chapter 5-7, all organic objects included in this thesis and a small collection of organic objects not included in the metric analysis were observed under a digital microscope. The material that was analysed with the microscope but not included in the quantitative analysis above were either harpoon heads or knife handles that did not have both portions of the blade slot surviving but had enough of one blade bed that could be observed. As stated in Chapter 3, the purpose of this approach was to note if any residues were left behind on the organic objects that might relate to hafting the blade/endblade. It was expected that the range of possible residues could result from sea mammal fat, tree resin, red ochre, iron oxide or hydroxide (rust), or copper chloride or carbonate (verdigris). However, there were no residues on any of the objects that could be confidently interpreted as copper chloride or carbonate. While native copper was undoubtedly used at least as frequently as iron by the Late Dorset, the microscopy results did not produce any new data on this question. This is result was somewhat surprising as Appelt et al. (2014:17) report that Meldgaard had noted green staining, possibly verdigris, on knife handle blade slots from the Igloolik/Foxe Basin area.

The two main deposits identified are rust and red ochre. Rust is created when iron comes into contact with moisture or oxygen. Through a complex chemical process, corrosion products are created and iron oxide concretions can form directly onto non-ferrous materials that come into contact with the iron (Selwyn 2004:294). Red ochre is a naturally occurring iron oxide and is generally found in iron-rich deposits or rocks such as hematite. It has been used across the globe by human populations throughout time and has been widely identified in Arctic contexts (e.g. Jordan 1980:615; Mary-Rousselière 1976:52; Sutherland 2001:140; Sutherland 2003:198). Despite being frequently identified, there are no published systematic studies on Dorset red ochre use. Part of the reason might be cause of its friability. For example, Mary-Rousselière (1976:52) notes that red ochre applied to objects tends to fade and even disappear after a relatively short time after excavation. Another deposit that was identified on the material included in this chapter is what has been tentatively identified as fat or plant resin. Given the lack of comparative data from the Arctic for fat or plant resin residues (e.g. Edwards et al. 2009), their identification here are preliminary and should only be considered as indicative. Moreover, considering the complexity of identifying residues of any kind without the aid of quantitative compositional analysis or an extensive library of experimental objects (e.g. Edwards et al. 2009; Langejans and Lombard 2014:60; Wadley and Lombard 2007), the results for both iron oxide and red ochre presented here are exploratory but, nevertheless, offer one of the first attempts at approaching this problem with Late Dorset material.

There are six main challenges to the microscopy. First, the conservation history of each object (especially any field conservation) is effectively unknown. As a result, the negative identification of a residue may be because the object was washed too roughly and removed the trace of the residue. On the other hand, some objects were not washed at all and the blade slot still contained soil. In some of those cases, this soil obscured the microscope's view into the blade bed. Second, the raw material of the object seemed to correlate with the positive identification of a residue. For example, residues on ivory objects tended to be more difficult to identify when compared to bone or antler. Given ivory is frequently less porous than other organic materials, this might have made it more susceptible to overly-rigorous cleaning. Alternatively, this could be a meaningful distinction in the data whereby smaller harpoon heads and knife handles, which were preferentially made of antler/bone, would more likely have supported a metal object while the larger ivory objects would have held stone blades. Third, given the geographic scope of the dataset, individual soil samples could not be collected and compared with the identified residues. This means that, in some cases, the identified residues may be the result of the surrounding soil matrix naturally staining the object and not related to the object's use. Fourth, not all objects were preserved similarly or consistently. Therefore, many objects did not demonstrate the presence of a residue likely because of the weathering on the object. Another associated factor is that residues on the objects are subject to the same taphonomic processes as the object itself which could make the identification more challenging. Fifth, many of the objects have natural discolouration which, in some cases, resembles weathered residues. To account for this, the object was observed in several different locations to confirm if the discolouration relates to the raw material itself or an actual residue. In most cases, this reduced the certainty of the identification. Sixth, some complete blade slots are incredibly narrow. Since the microscope primarily focuses at surfaces perpendicular to the lens, a thin blade slot would prohibit the object being rotated sufficiently for the blade bed to be in focus.

With these limiting factors in mind, the identified residues should be seen as a minimum rather than an absolute figure. Significantly, many of the identified residues could not be identified easily with the naked eye. Those that could had to be confirmed with the microscope as almost none of the residues discussed were unambiguous without it. Only iron oxide (Figure 8.1) and red ochre (Figure 8.2) were confidently identified on a small number of objects without the use of the microscope. These, in addition to ivory and antler/bone objects without any evidence of residues, were used as control specimens to assess the potential residues.

In order to account for possible uncertainty, residues will be classified as “certain”, meaning there is little doubt about its identification, or as “possible”, which indicates it could be a number of potential substances. Objects having very unlikely or no visible residues will not be discussed. For transparency, a residue was considered “certain” when both the colour and placement of the residue matched expectations (e.g. matching the “control” examples in terms of colour and are placed on the inside or base of the blade slot) and that did not resemble other discolouration on the object. A residue was classified as “possible” when the placement and discolouration were suggestive of a residue but was either faded or was similar to discolouration elsewhere on the object away from the blade slot. In some “possible” cases, the presence of a residue is clear but identification was less certain (e.g. it could be either ochre or iron oxide). Importantly, nearly all the examples were from Type G or Late Dorset parallel harpoon heads. A handful of pre-Late Dorset harpoon heads contained some residue evidence that was clearly either tree resin or sea mammal fat but none had as clear evidence for the presence of iron oxide as Late Dorset specimens.

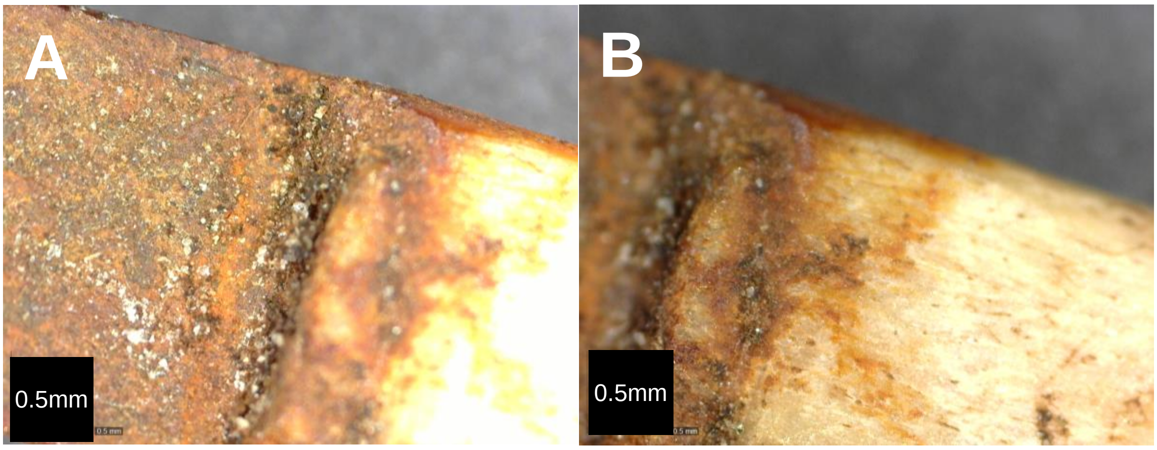

Figure 8.1: A small handle (SgFm-5:57) with clear iron oxide concretion (110x). A. Note the blade bed on the left side of the image and the deep orange-red and bright orange colouration. Almost none of the underlying blade bed material is visible. B. Note the faded iron oxide stains on the portion of the handle adjacent to the blade bed.

Figure 8.2: Both faces of RaJu-1:14 (left) and RaJu-1:15 (right). Each shows evidence of being coated with what appears to be red ochre. Photo permission courtesy of the Government of Nunavut and the Canadian Museum of History.

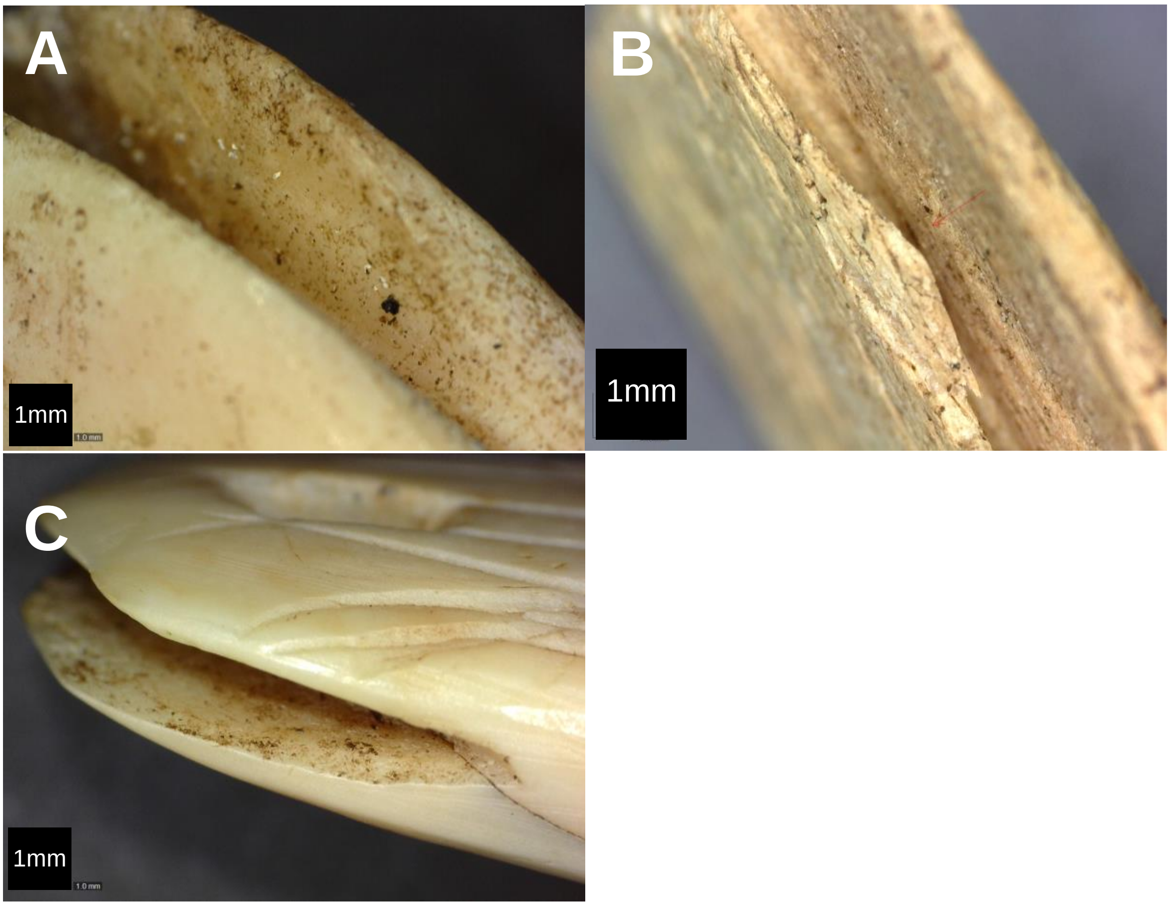

Figure 8.3: Objects showing no evidence of residues around the blade slot. A. Ivory preform of a Dorset Parallel harpoon head (RaJu-3:7) that has a completed blade slot but was likely never used nor ever supported an endblade. Magnified 40x. B. Antler knife handle (QiLd-1:1607). Magnified 60x C. Ivory Type G harpoon head (SgFm-5:90) with a securing hole. Magnified 40x.

This chapter is organised slightly differently than the previous results chapters. Since harpoon heads were, by far, the more common object to exhibit a residue, the material will be discussed on a site-by-site basis in reverse alphabetical order based on the Borden number of each site. The following chapter (Chapter 9) will synthesise these results across the different sites and with the other data presented earlier. A table summarising all objects with possible or certain residues can be found in Appendix III.

8.2 SiFi-4 (Franklin Pierce), Ellesmere Island

SiFi-4 (Franklin Pierce) is a single dwelling site located on Ellesmere Island. Schledermann (1990:261-265) originally excavated the site but returned later in the 1990s to investigate it more. It is from this later work that produced the large collection discussed in Chapter 7. Apart from the metal collection, the rest of the assemblage from the site is relatively small. Of the four harpoon heads included in the metric analysis, two contained certain traces of iron oxide deposits (SiFi-4:87, SiFi-4:92), one had a possible trace (SiFi-4:93), and the fourth had no discernible traces (SiFi-4:91). Additionally, one harpoon head was examined not included in the metric analysis that also contained a certain trace of iron oxide (SiFi-4:63) (Figure 8.4 and Figure 8.5). Additionally, two side-hafted handles were examined (four total were examined in the metric analysis) with one having possible iron oxide traces (SiFi-4:30) and one having a possible but very unlikely evidence of iron oxide (SiFi-4:81). Importantly, both handles were heavily stained by their surrounding soil matrix making identification of other, function-related, residues very difficult (Figure 8.6). In total, of the six objects from SiFi-4 with potential residues left, three are certain iron oxide stains while three are only possible residues related to metal endblade use.

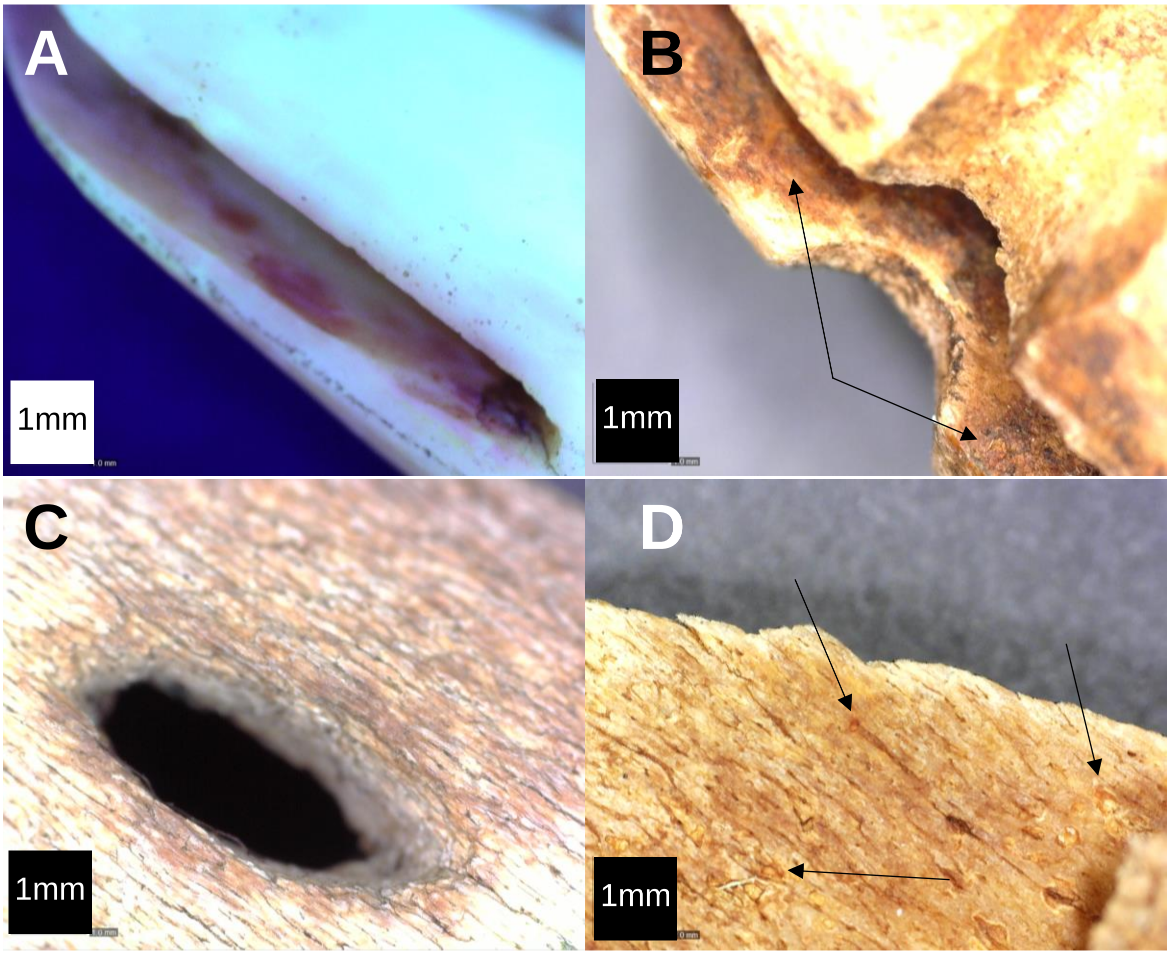

Figure 8.4: A. SiFi-4:87 (under ultraviolet illumination) showing distinct and discrete red-orange discolouration on blade bed surface and at the base of the blade slot not seen on the exterior of the object. B. SiFi-4:92 has obvious discolouration across the interior and exterior of the blade slot but there is distinct iron oxide colouration just above and below the lashing groove on the blade bed (marked). C. and D. SiFi-4:92 has potential iron oxide deposits around the securing hole (C) and wide-spread but very diffuse discolouration across the blade bed which might relate to iron oxide with a few localised spots (marked) being more certain than others due to a brighter orange colour. All magnified 50x.

Figure 8.5: SiFi-4:91 showing no convincing traces of iron oxide residue despite some brown discolouration being visible across the blade slot which could be the result of the soil matrix in which it was deposited. Magnified 50x.

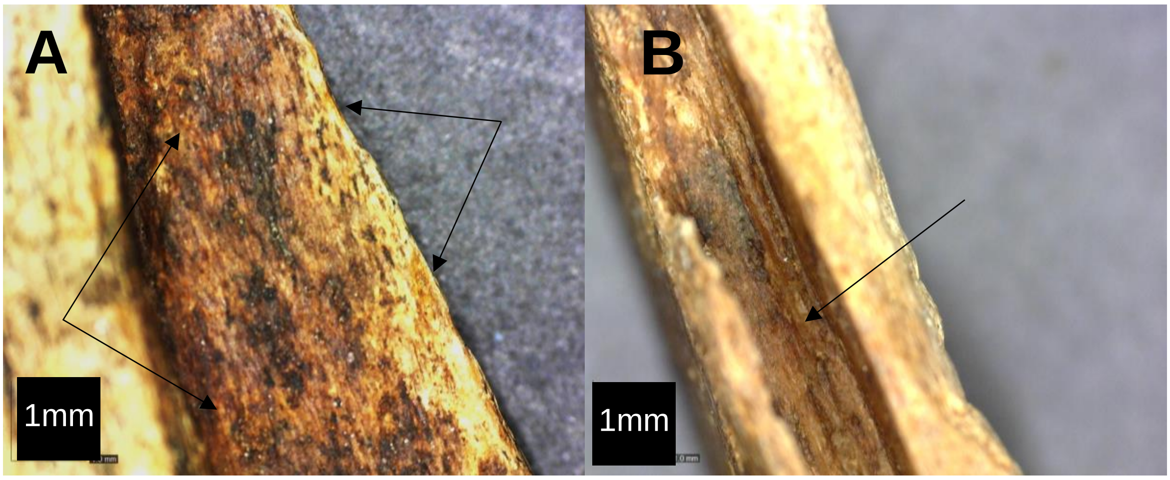

Figure 8.6: A. SiFi-4:30 side-hafted handle showing a few possible deposits related to iron oxide. Note arrows on left mark bright orange discolouration near the edge of the blade bed while arrows on right mark what seems to be bright orange discolouration underneath a natural dark brown soil stain. B. SiFi-4:81 side-hafted handle showing possible, if unlikely, traces of iron oxide (marked). Both magnified 50x

8.3 SgFm-3 (Longhouse Site), Ellesmere Island

SgFm-3 is a longhouse site located on the Knud Peninsula on eastern Ellesmere Island (Schledermann 1990:203-219). The site is situated within an area with a number of different archaeological features that relate to Late Dorset as well as Early Dorset and Pre-Dorset activity, from lithic scatters and dwellings to caches and hearth rows (Schledermann 1990:159). Despite fourteen harpoon heads SgFm-3 (seven Dorset Parallel and seven Type G) being included in the metric analysis, only two had certain iron oxide residues, both being Type G (SgFm-3:335 and SgFm-3:349) (Figure 8.7). This represents 14.03% of all harpoon heads included in the metric analysis and 28.6% of Type G harpoon heads found at this site. Additionally, SgFm-3:338, also a Type G harpoon head, has traces of definite residue not created due to taphonomic reasons but its placement and colour makes it difficult to determine if it is iron oxide or perhaps red ochre (Figure 8.8). The red colouration is found both inside and around the blade slot but not elsewhere on the harpoon head. The harpoon head itself was differentially preserved, leaving one side better preserved than the other which is why SgFm-3:338 appears differently in both figures. Likewise, SgFm-3:349 may have also been derived from red ochre as opposed to iron oxide. However, the placement of the deposit as well as the discolouration being slightly more similar to other iron oxide concretions makes it more likely to be the result of an iron endblade than one coated in ochre. The discolouration found in its securing hole, however, seems to have been derived from red ochre based on it colour alone (Figure 8.7e).

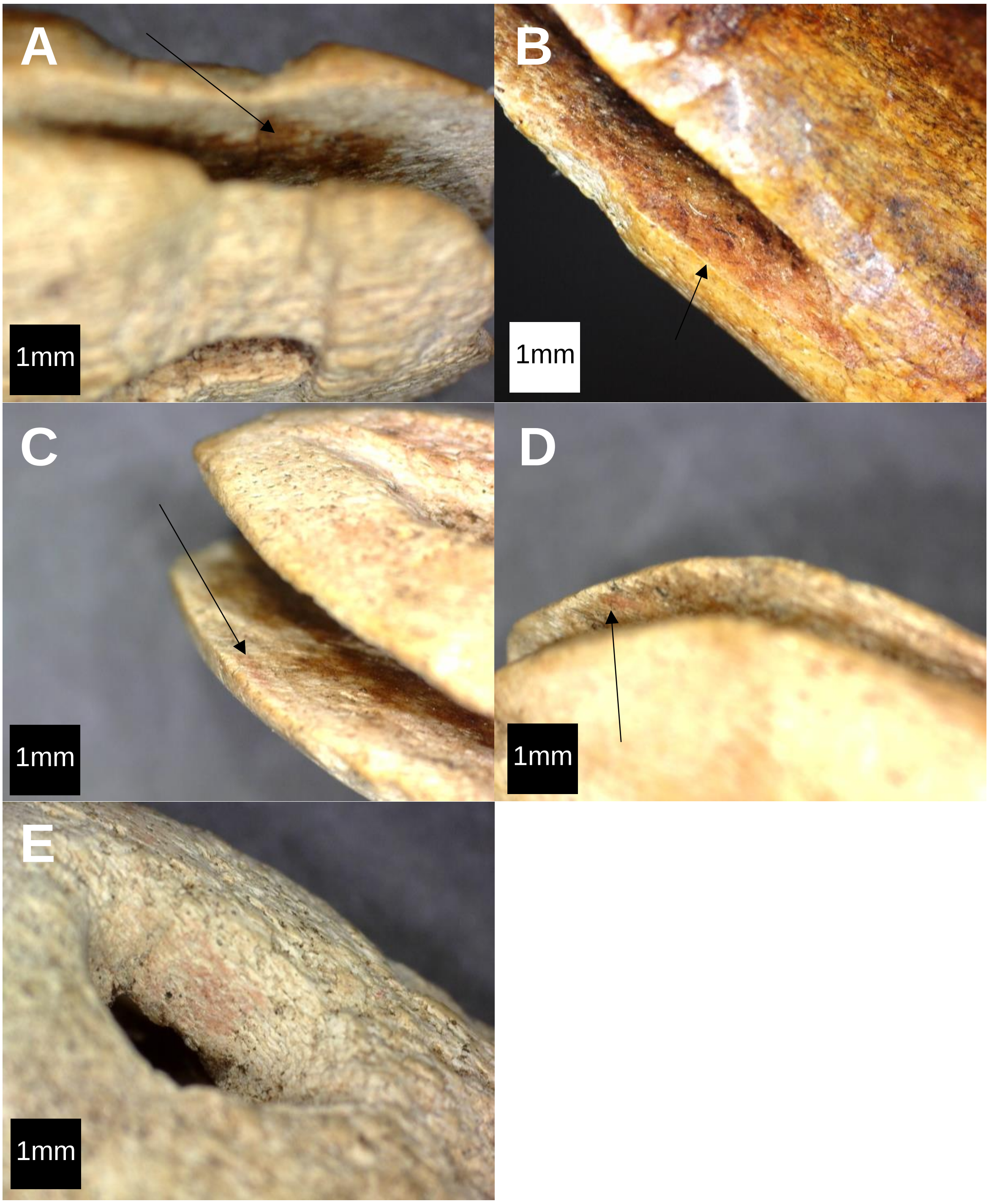

Figure 8.7: A. SgFm-3:335 Type G harpoon head with a clear discolouration found only on the interior of the blade bed that is in a semi-circular shape starting at the base of the slot (marked). While the discolouration is faded (similar to SiFi-4:92), its placement supports it being related to contact with a metal endblade as opposed to natural discolouration. B. SgFm-3:338 Type G harpoon head showing possible iron oxide residue on the interior of the blade bed near the base of the blade slot (marked). C., D., and E. SgFm-3:349 Type G harpoon head showing slight but obvious traces of what appears to be iron oxide near the edge of the blade slot (C and D) and what appears to be red ochre in the securing hole (E). The presence of the discolouration in multiple places along the blade beds increases the likelihood of it not being discolouration from a natural source. It is possible that the blade slot and securing hole deposits are derive from either a metal endblade or an endblade coated in red ochre. Magnified 40x.

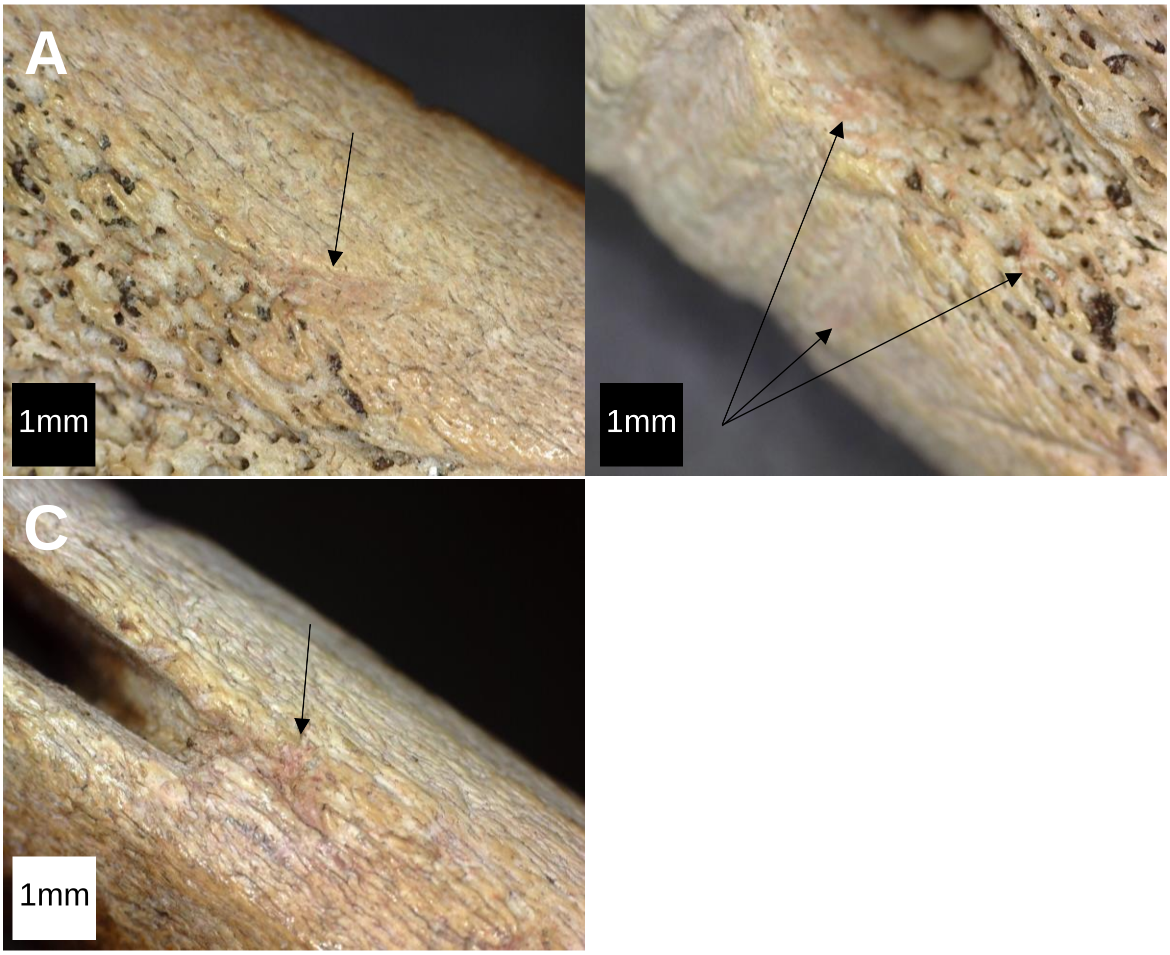

Figure 8.8: SgFm-3:338 Type G harpoon head showing reddish deposits located on the exterior of the harpoon head above the double line hole (A), around the securing hole and lashing grooves (B), and just below the blade slot itself (C). These placements are more suggestive of red ochre use. Magnified 40x.

8.4 SgFm-5 (Cove), Ellesmere Island

SgFm-5 is another longhouse site located on the Knud Peninsula on eastern Ellesmere Island roughly 200m east of SgFm-3 (Longhouse) (Schledermann 1990:243-252). Six harpoon heads from SgFm-5 were included in the metric analysis with one of them, a Type G, having certain iron oxide concretion (SgFm-5:165) and another, a Dorset Parallel, having possible iron oxide concretion (SgFm-5:18) (Figure 8.9a, b). While the deposit visible on SgFm-5:165 is both obvious and wide-spread across the exposed blade bed but not on the exterior of the object, SgFm-5:18 has a deposit that is far more localised but is found only on the inside of the blade slot and has similar colouration as other identified iron oxide residues. For this reason, it was classified as only a “possible” residue. Furthermore, the pattern of the discolouration across the blade bed of SgFm-5:165 is similar to that found on SgFm-3:335 which again supports that these two residues are likely to be related to contact with a metal endblade.

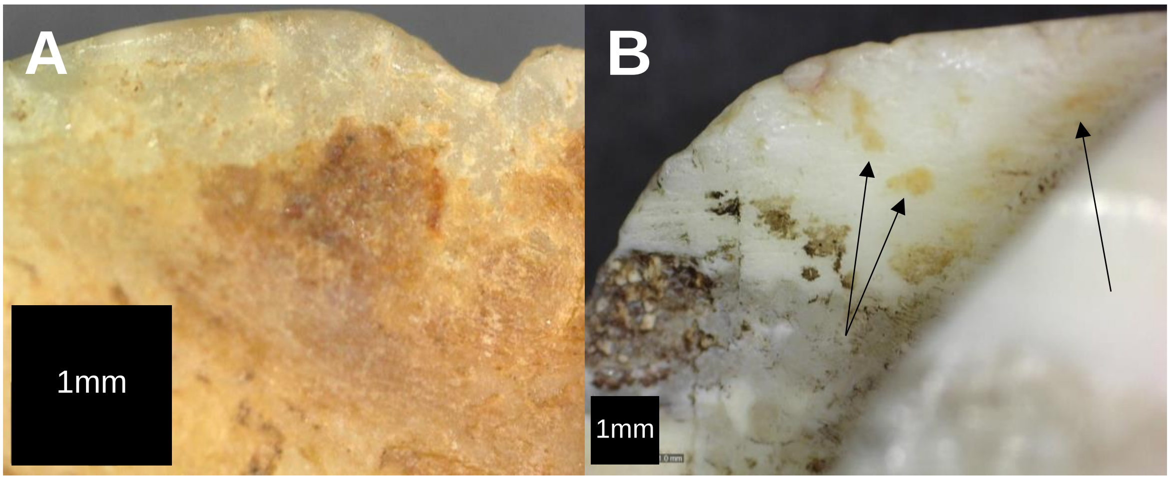

Figure 8.9: A. SgFm-5:165 Type G harpoon head with a wide-spread iron oxide concretion that stops just before the edge of the blade bed. Magnified 100x. B. SgFm-5:18 Dorset Parallel harpoon head with much more localised residue which is possibly iron oxide (marked). Magnified 40x.

8.5 RcHh-1 (Lee Point), Ellesmere Island

RcHh-1 (Lee Point) is a multi-component site that spans Pre-Dorset to Inuit periods with a number of Late Dorset winter houses located on southeastern Ellesmere Island. Unfortunately, information about this site has not been published. However, more than 170 features located between 1m and 6m above sea level. James Helmer excavated at the site in 1986 and 1987 and found mostly material that most closely resembles other Late Dorset objects (Hanna 1989:60). Only one side-hafted handle (RcHh-1:341) from that collection was included in the dataset for this thesis and it contained what appear to be possible iron oxide residues (Figure 8.10). The natural colour of the antler handle is relatively dark which makes characterising the visible residue difficult. Moreover, the blade slot thickness is thicker than the majority of side-hafted handles (see Chapter 5.3.1) which also makes the interpretation of the residue far from certain.

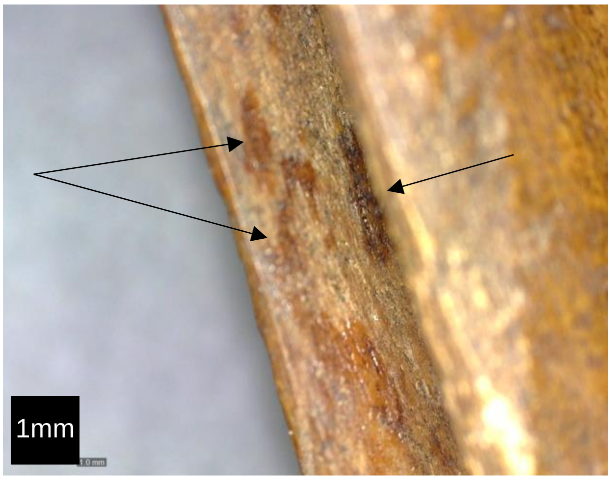

Figure 8.10: RcHh-1:341 antler side-hafted handle with a possible, if uncertain, residue on the interior but not the exterior of the blade slot. Unfortunately, the dark colour of the handle itself makes the determination much more difficult. Magnified 40x.

8.6 QjJx-1 (Arvik), Little Cornwallis Island

QjJx-1 (Arvik) is one of the two Late Dorset sites (the other being QjJx-10) that has a large collection of metal objects (LeMoine et al. 2003). Surprisingly, of the six handles and eleven harpoon heads included in the metric analysis, only one side-hafted handle (QjJx-1:220) had visible residues around their blade slot (Figure 8.11). While the harpoon heads contained examples with securing holes and thin blade slots, no visible iron oxide residues were recorded. There are a number of possible interpretations for this unexpected outcome. First, the presence of visible iron oxide residues is not necessarily a prerequisite for an organic support having held a metal blade. While it will never be fully known if any given object held a metal blade, the combination of the existing large metal assemblage found at the site as well as thin blade slots must mean that metal was used relatively widely at the site. Therefore, this highlights how the survival of iron oxide residues is heavily affected by taphonomic processes. Second, given the lack of any identified copper verdigris on any of the material included in this thesis, this could mean that the Late Dorset of Little Cornwallis Island used copper endblades more frequently than iron, thus leaving fewer visible traces (but still requiring relatively thin blade slots). Third, this may also demonstrate a methodological bias by privileging objects with residues visible near the edge of the blade bed and biasing against those that have thin blade slots which obscure large portions of the blade bed.

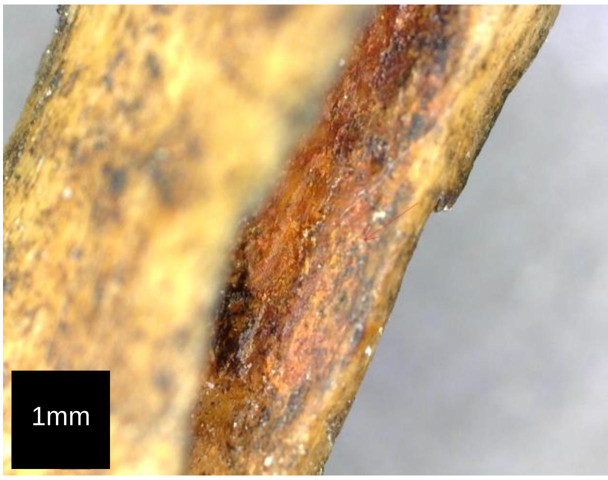

Figure 8.11: QjJx-1:220 side-hafted handle with clear iron oxide residue across the entirety of the blade bed. Magnified 60x.

8.7 QiLd-1 (Brooman Point)

QiLd-1 (Brooman Point) is a multi-component site with a significant early Inuit winter village (with underlying Late Dorset components) as well as at least eight Late Dorset features including a longhouse (McGhee 1984; 1985; 1997; Park 2003). McGhee (1997) had argued that both Inuit and Dorset components were occupied at a similar time. Of the forty-six harpoon heads (all except one are likely Late Dorset) included in the metric analysis, sixteen (34.8%) have certain or possible iron oxide residues. Of these, fifteen are Type G representing (42.9% of all Type G specimens included in the metric analysis from QiLd-1) and only one is Dorset Parallel (10% of all Dorset Parallel included in the metric analysis from QiLd-1). Additionally, one Type G harpoon head with both securing hole and longitudinal groove (QiLd-1:1069) not included in the metric analysis had possible iron oxide residue. Interestingly, the one single line hole harpoon head (QiLd-1:1645) has possible iron oxide residue. While the form is unlike other Late Dorset harpoon heads, the lack of basal spurs makes it unlike pre-Late Dorset harpoon heads as well (Figure 8.12).

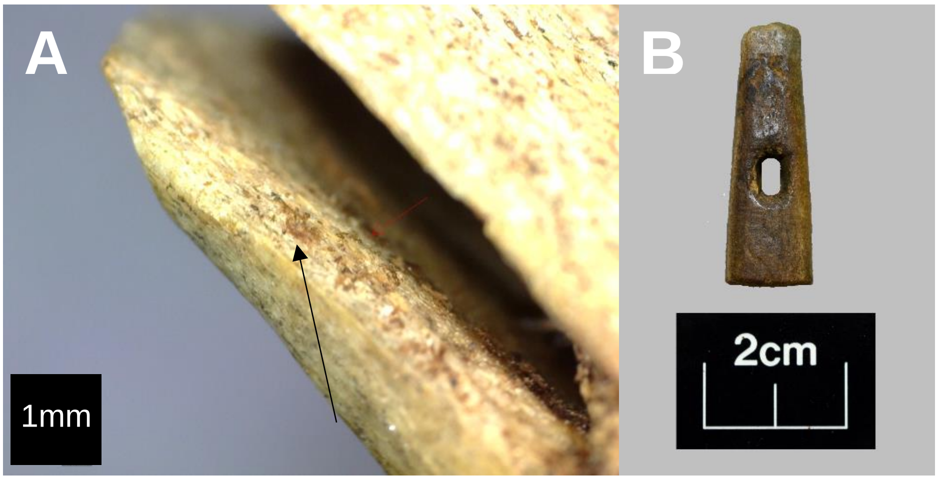

Figure 8.12: A. QiLd-1:1645 single line hole harpoon head with a possible iron oxide residue on the inside of the blade slot (marked). The discolouration is similar to that found elsewhere on the harpoon head which has decreased the certainty of its identification. Magnification 60x. B. Photograph showing the whole harpoon head.

Of the remaining sixteen harpoon heads with possible iron oxide residues, three have certain iron oxide residues, all of which are included in the metric analysis, while twelve have possible iron oxide residues with only one not being included in the metric analysis. The harpoon heads displaying the most likely iron oxide residues are all on Type G harpoon heads with visible lashing grooves but no securing hole or notch. QiLd-1:474 has numerous, although localised, iron oxide residues found across the blade slot (Figure 8.13a, b). Their discolouration matches closely other harpoon heads with certain iron oxide residues. QiLd-1:2233 has similarly coloured residues that are spread across the best preserving blade bed (Figure 8.13c, d). Lastly, QiLd-1:2478 has localised iron oxide residues along the very base of its blade slot (Figure 8.13e). Its similar colour to the other certain iron oxide residues and its placement, despite being localised to that region, is likely a location of prolonged contact between the endblade and organic support. None of these harpoon heads have similar discolouration located elsewhere, outside of their respective blade slots.

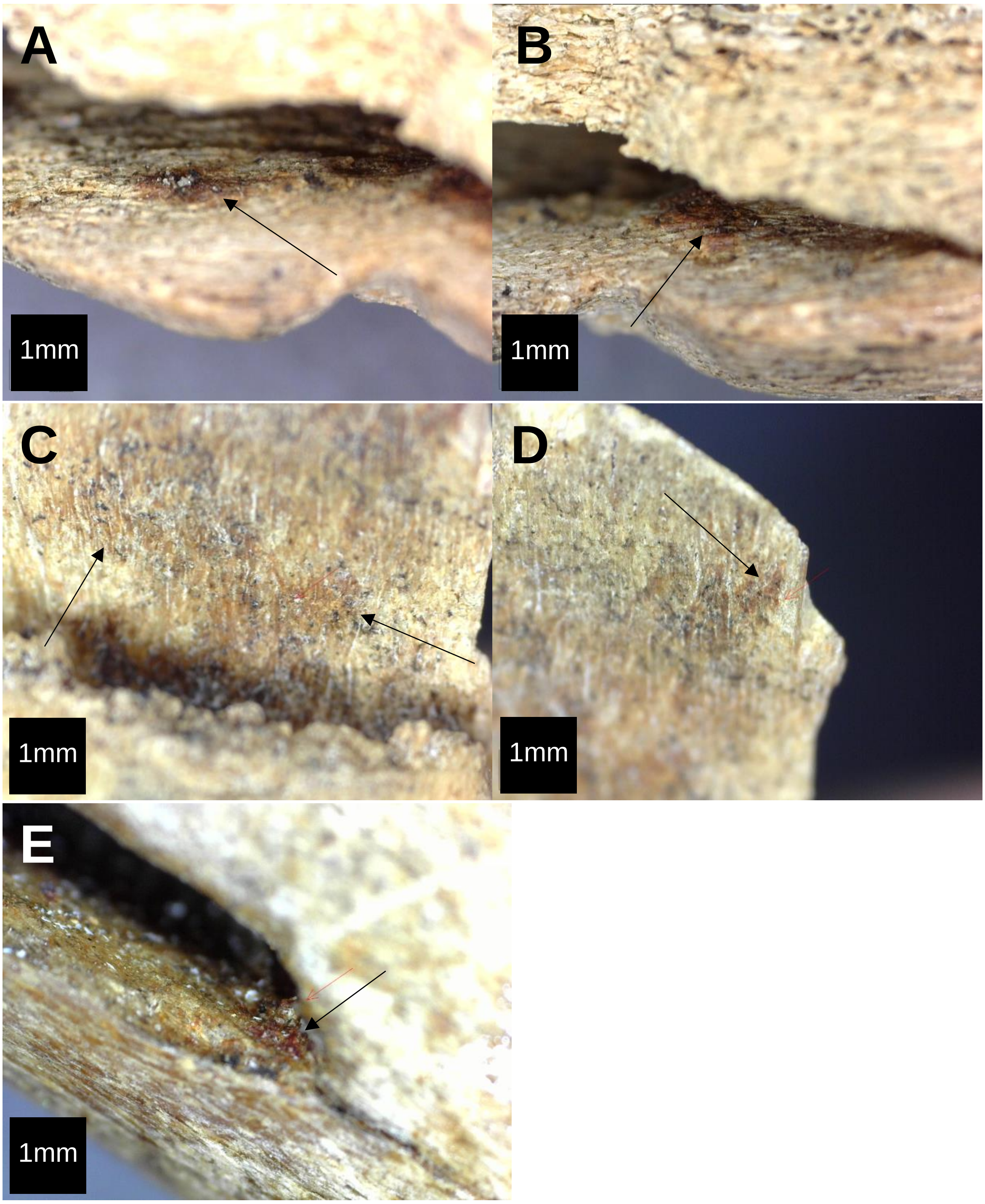

Figure 8.13: A. and B. QiLd-1: 474 Type G harpoon head with certain iron oxide residues above and below lashing grooves (marked). C. and D. QiLd-2233 Type G harpoon head with certain iron oxide residues across the blade bed (marked). E. QiLd-1:2478 harpoon head with certain iron oxide concretion near the base of the blade slot (marked). All magnified 60x.

Two harpoon heads, both Type G, with residues classified as “possible” iron oxide residues were nearly classified as certain based on their colouration being similar to the harpoon heads discussed above. However, the residues found on both harpoon heads were relatively faint and much more localised, being found really only in one location, than the harpoon heads with “certain” iron oxide residues. QiLd-1:931 has a very faint possible iron oxide residue found in a linear distribution across a single blade bed (Figure 8.14a). Interestingly, QiLd-1:931 has a securing notch. Additionally, QiLd-1:955 has a more prominent possible iron oxide residue but is, again, localised to only one specific location along the interior of a single blade bed (Figure 8.14b). While no securing hole or notch is visible, QiLd-1:955 has lashing grooves.

The remaining eleven harpoon heads from QiLd-1 all have possible iron oxide residues and will be discussed in numeric order according to their official catalogue number. The reason for both the decreased certainty of the iron oxide identification (and why it is potentially distinguished from natural discolouration) will be discussed with each example.

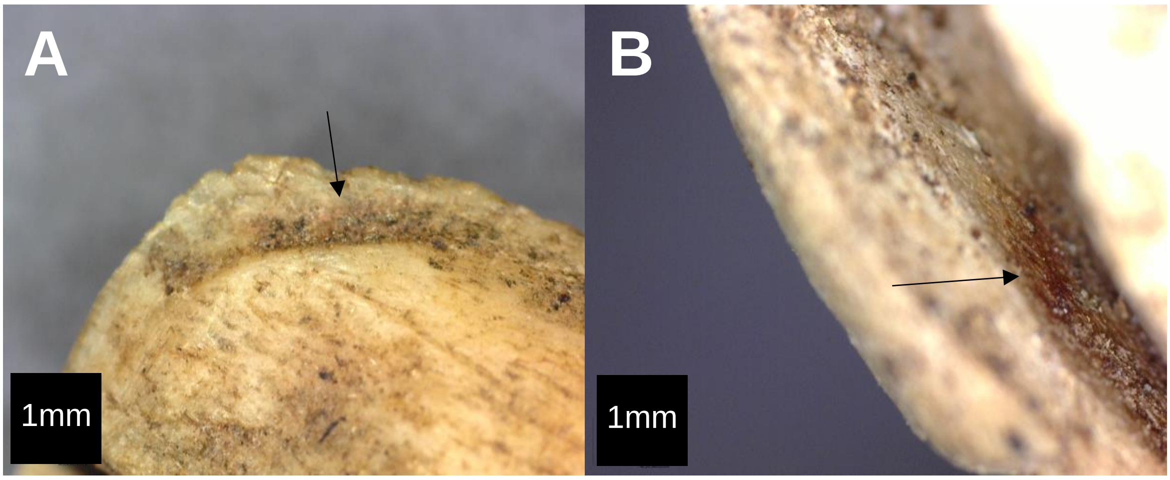

Figure 8.14: A. QiLd-1:931 Type G harpoon head with localised possible iron oxide residue along the interior of the blade slot. The faint, despite promising, discolouration and isolated location decreases the certainty of its identification. B. QiLd-1:955 Type G harpoon head with a possible iron oxide residue located inside its blade slot. While the discolouration is promising, it is only found in a single location. Both magnified 60x.

In many cases for harpoon heads that have identifiable residues around their blade bed, it was difficult to determine if they were faded iron oxide residue, organic residues (i.e. tree resin or sea mammal fat), or simply natural discolouration of the raw material. QiLd-1:342

has a faded orangish stain directly on the blade bed. However, other residues, likely sea mammal fat or tree resin, are present on other portions of the object with a discolouration similar to that of the potential iron oxide residue (Figure 8.15a, b). Likewise, QiLd-1:1069 has a similar orangish stain on its exposed blade bed which becomes much clearer when illuminated with UV light (Figure 8.15c, d). The clearer boundaries of the residue as seen under UV light makes it tempting to suggest that it (and similar residues) is the result of an iron endblade contacting the blade bed but, like QiLd-1:342, the faded nature of the residue makes its positive identification as iron oxide uncertain.

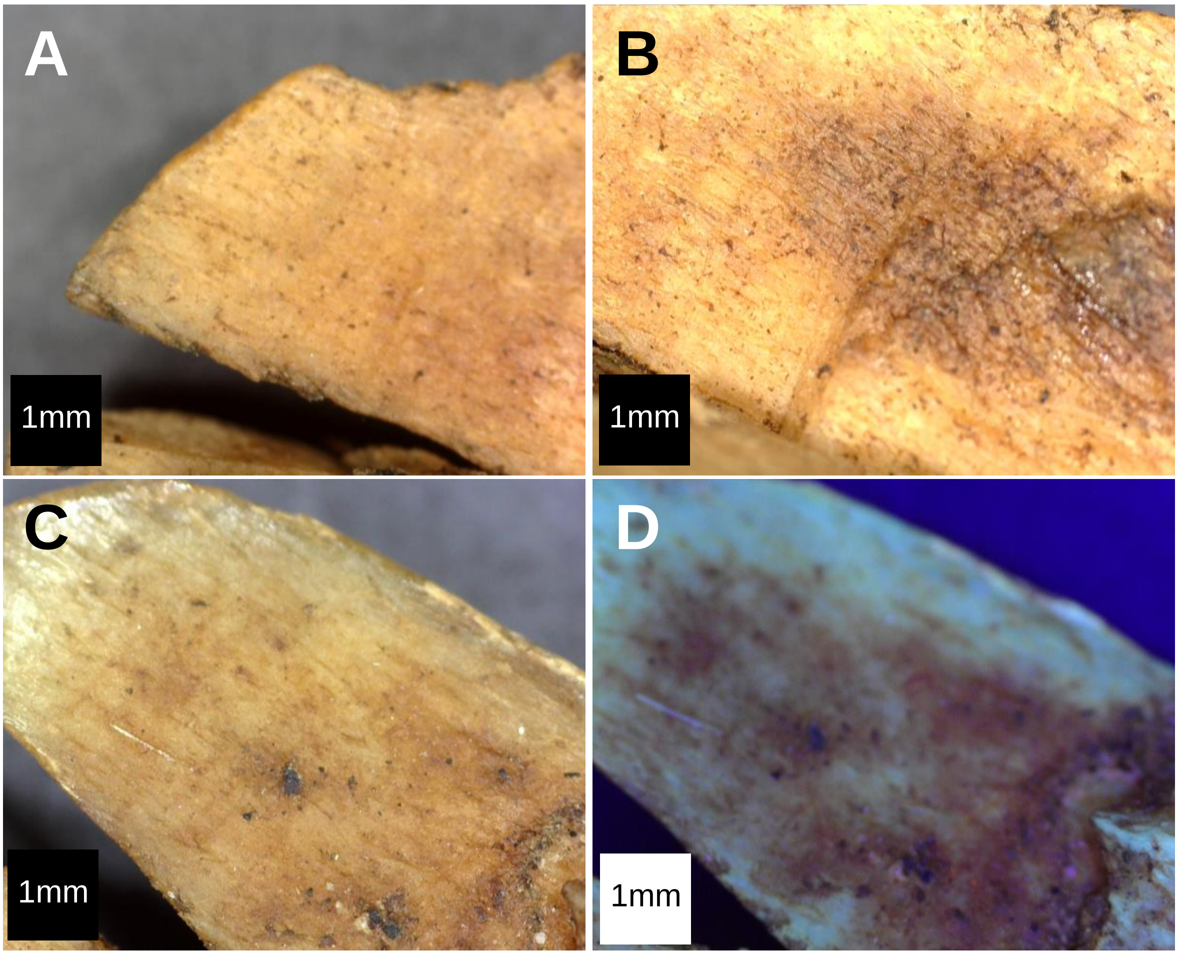

Figure 8.15: A. QiLd-1:342 harpoon head showing a faded orangish residue on its blade bed. B. QiLd-1:342 harpoon head with what appears to be an organic residue located along the break of the blade bed at its base which suggests this occurred after breakage. C. QiLd-1:1069 harpoon head with a similar orangish stain on its exposed blade bed as QiLd-1:342. D. The same view as C but illuminated with UV light, showing more clearly the boundaries of the residue. Note that the residue is much clearer near the base of the blade bed, decreasing distally. No such residue is found on the rest of the harpoon head. All images magnified 60x.

QiLd-1:602 is a Type G harpoon head that has an orangish colouration across its blade bed that is not seen on the outside of the harpoon head which is possibly iron oxide (Figure 8.16a). Additionally, there are localised residues along the outside of the blade bed that is not seen elsewhere on the harpoon head which, when compared to the residues previously discussed, resembles most closely those that have iron oxide residues (Figure 8.16b). However, clearly the location of this would not have been the result of the blade itself being held in the blade bed. Interestingly, a similar, although faded residue is found along the distal edge of the blade bed.

QiLd-1:1466 also has an orangish residue on its blade bed that is possibly iron oxide. Interestingly, similar to QiLd-1:1069, the residue is only really found on the proximal half of the blade bed and is almost non-existent on the distal portions of both blade beds (Figure 8.16c).

QiLd-1:1467 is a Type G harpoon head that has a possible iron oxide stain along the edges of the proximal portion of the blade beds (Figure 8.17a). Similar to the previously discussed harpoon heads, the residue is most easily seen in the proximal half of the blade bed. Additionally, like QiLd-1:602, a similar residue is found on the outside of the blade slot towards the distal end of the harpoon head (Figure 8.17b). Given the similarity between these two residues, it is difficult to positively attribute it to contact between an iron endblade and the harpoon head or some other phenomenon despite the colour being similar to harpoon heads classified with a “certain” iron oxide residue.

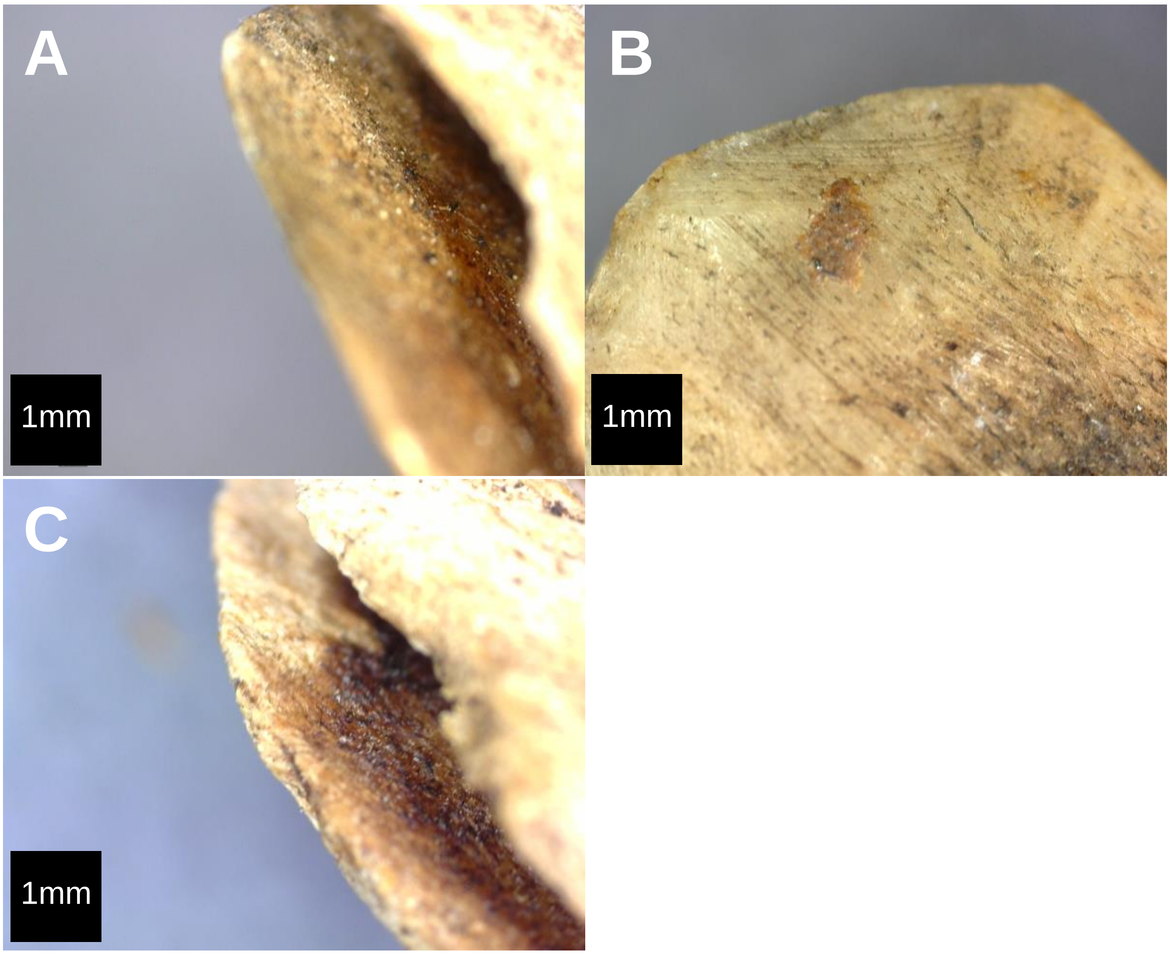

Figure 8.16: A. QiLd-1:602 Type G harpoon head with a possible iron oxide stain along the blade bed, more obvious towards the proximal portion of the blade slot. B QiLd-1:602 harpoon head with a residue along the exterior distal portion of the blade slot. Although its discolouration is similar to other positively identified iron oxide residues, its placement was likely not the result of it directly holding an iron endblade. C. QiLd-1:1466 Type G harpoon head with a possible iron oxide residue that, much like QiLd-1:602, is more prevalent towards the proximal portion of the blade slot. All magnified 60x.

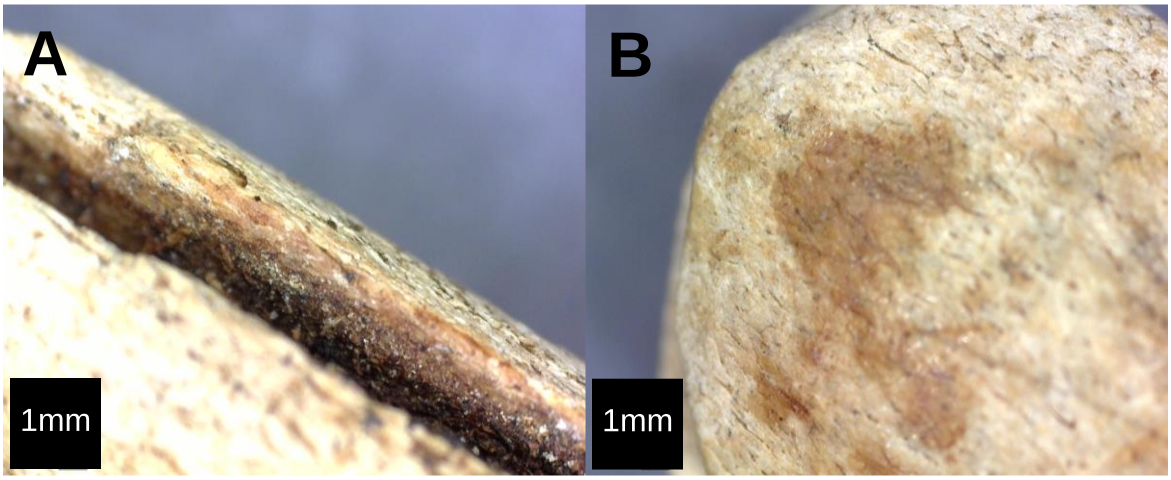

Figure 8.17: A. QiLd-1:1467 Type G harpoon head with a possible iron oxide residue along the edges of its blade beds. However, similar coloured residues found elsewhere on the object weaken its positive identification. B. QiLd-1:1467 harpoon head with, like QiLd-1:602, a similar residue found on the outside of the blade slot towards the distal portion of the object. Magnified 60x.

QiLd-1:1466 is a Type G harpoon head with a possible iron oxide on the interior edge of its blade slot (Figure 8.18a). The residue is fairly localised without it being clearly found in other places on the blade bed. However, a similar residue is found on the outside of the harpoon head around its blade slot (Figure 8.18b). Due to this, it makes determining if the residue is iron oxide due to contact between an iron endblade and blade slot much less certain.

QiLd-1:1467 is a Type G harpoon head with possible iron oxide residues found in localised spots across the blade bed (Figure 8.18c). While the discolouration is similar to the certain iron oxide residues described above, the localised nature of the residue decreases the certainty of its identification. However, a similar residue is not found on the exterior of the blade slot. QiLd-1:1551 is the only Dorset Parallel harpoon head from QiLd-1 that has identifiable iron oxide residues. Much like other harpoon heads discussed, the possible iron oxide residue is concentrated along the centre proximal portion of the blade bed (Figure 8.19a). The harpoon head is made out of ivory which less frequently showed evidence of iron oxide residues compared to antler/bone harpoon heads.

QiLd-1:1756 is a Type G harpoon head with a very faint possible iron oxide residue which becomes much clearer when illuminated under UV light (Figure 8.19b, c). It seems that the residue is most visible along the edges of the blade bed but it does penetrate across the whole proximal portion of both blade beds. The certainty is decreased simply because of the difficulty seeing the full extent of the residue under normal light.

QiLd-1:1816 is a Type G harpoon head with a faint but consistent possible iron oxide residue spread across its blade bed (Figure 8.19d). The certainty of this identification is decreased due to the residue having similar discolouration as found elsewhere on the harpoon head.

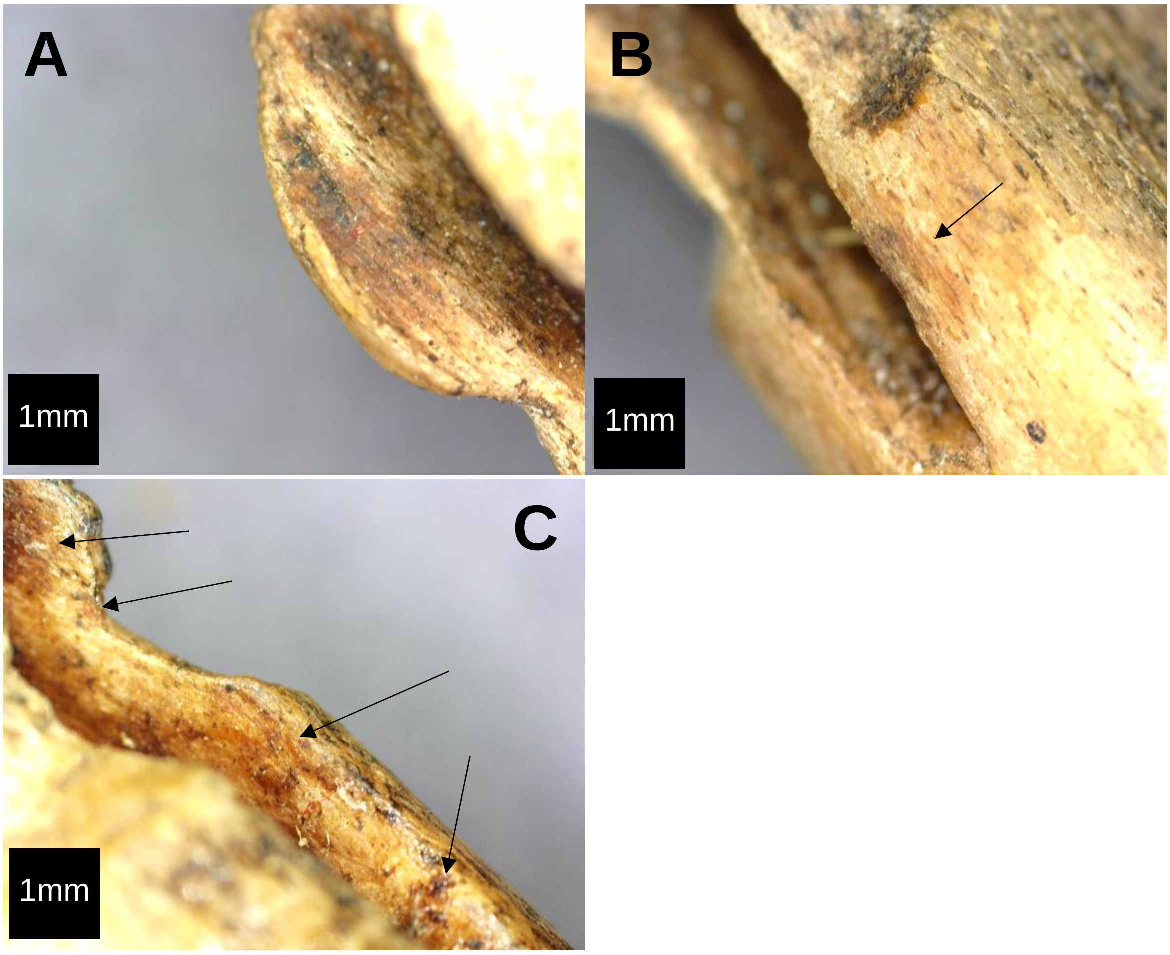

Figure 8.18: A. QiLd-1:1466 Type G harpoon head with localised possible iron oxide residue along the interior of the blade bed. B. QiLd-1:1466 harpoon head with similar possible iron oxide residue on the exterior of the blade slot. C. QiLd-1:1467 Type G harpoon head with a series of localised possible iron oxide residues across the blade bed. Magnified 60x.

QiLd-1:2226 is a Type G harpoon head with a very localised possible iron oxide residue (Figure 8.19e). While the discolouration is nearly identical to other certain iron oxide residues, it is found in only a single spot along the whole interior of the blade slot. Like the other harpoon heads discussed above, the residue is found along the edge of the blade bed.

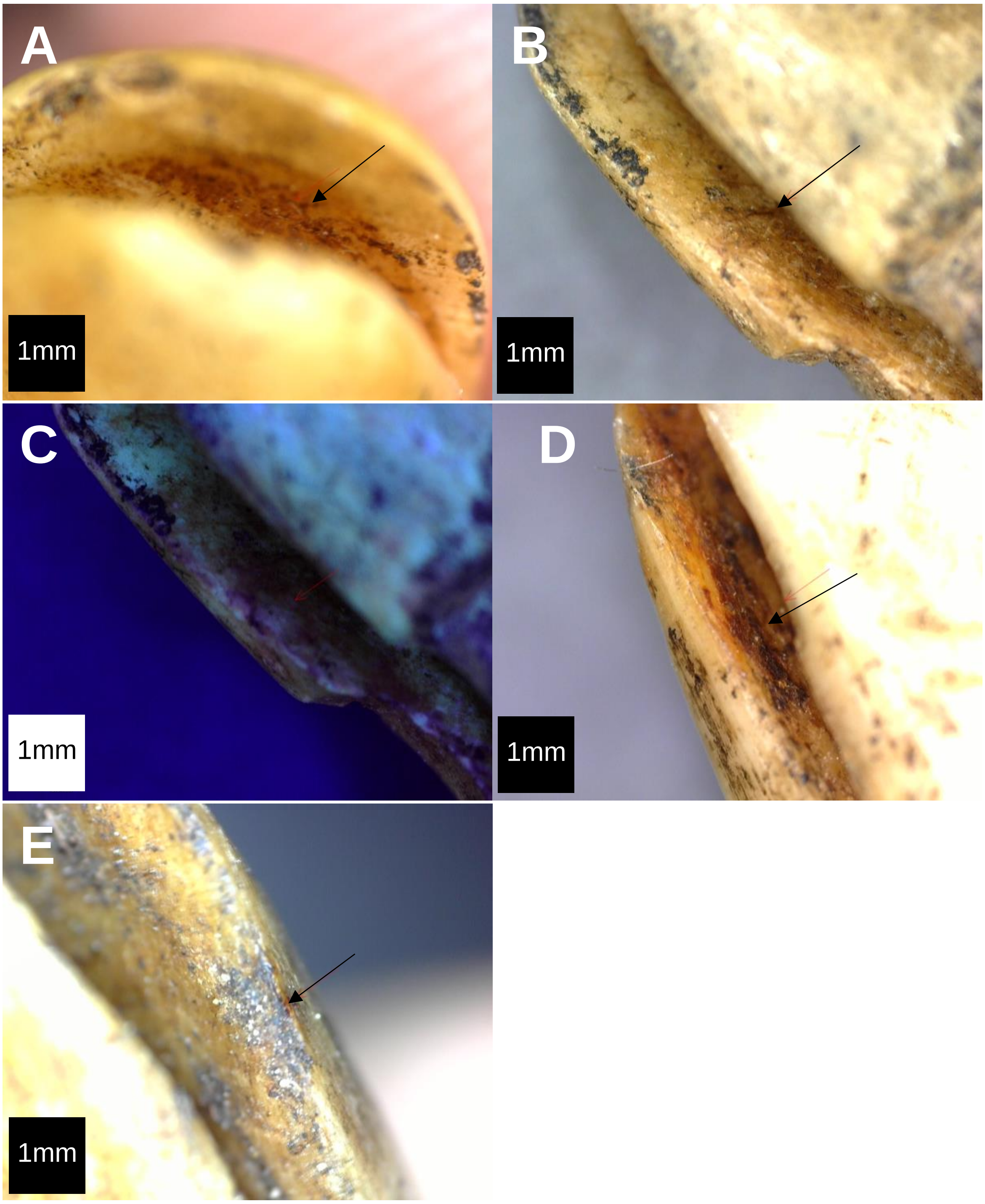

Figure 8.19: A. QiLd-1:1551 Dorset Parallel harpoon head with a faint possible iron oxide residue along the proximal interior of its blade bed. B. QiLd-1:1756 Type G harpoon head with a possible iron oxide residue that is very faint under normal lighting. C. QiLd-1:1756 harpoon head with a possible iron oxide residue becomes much clearer under UV light. D. QiLd-1:1816 Type G harpoon head with a possible iron oxide residue that is found along the proximal interior portion of the blade bed but with similar residues found on other parts of the harpoon head. E. QiLd-1:2226 Type G harpoon head with a small localised iron oxide stain found on the edge of its blade bed. All magnified 60x.

In total, eleven side-hafted handles from QiLd-1 were included in the metric analysis, two of which (18.2%) had potential iron oxide residues. There were no side-hafted handles not included in the metric analysis that had identifiable residues. QiLd-1:32 had possible iron oxide residues located along the very base of the blade slot (Figure 8.20a, b). While the discolouration is promising, similar residue was not found elsewhere in the blade slot which decreases the confidence of its identification. QiLd-1:1526 has certain iron oxide residues found along both blade beds as well as on the immediate exterior of the blade slot (Figure 8.20c). Additionally, it had a greasy organic residue, likely sea mammal fat, located on the exterior of the handle that has a much darker, more brown discolouration than the iron oxide residue found on either QiLd-1:1526 or the possible iron oxide residue on QiLd-1:32 (Figure 8.20d). No end-hafted handles from QiLd-1 had any possible iron oxide residues nor were any suitable to be included in the metric analysis.

Figure 8.20: A. and B. QiLd-1:32 knife handle with possible iron oxide residues (marked). The possible concretion in B is particularly small. C. QiLd-1:1526 knife handle with certain iron oxide residue on the interior and, less so, on the exterior blade slot (marked). D. QiLd-1:1526 with an unknown organic residue, possible sea mammal fat or some sort of tree resin, on exterior of handle. All magnified 60x.

8.8 QjLd-25

QjLd-25 is a small site located on Karluk Island in the Central Arctic situated in the Crozier Strait between Bathurst Island to the west and Little Cornwallis Island to the east. Karluk was visited by Helmer in late 1970s with a number of Dorset sites being identified. No formal peer-reviewed publication discusses QjLd-25 but it is described as a tent ring with an associated midden. Furthermore, no radiocarbon dates were produced from the site but the harpoon head (QjLd-25:191) that is included in both the metric and microscopic analysis for this thesis resembles a Type G harpoon head which suggests the site may be a summer Late Dorset site. The harpoon head itself has a prominent securing notch and has a number of certain iron oxide residues across the blade beds. In particular, the exposed blade bed has a discolouration similar to other certain iron oxide residues discussed above (Figure 8.21a) but it also has isolated traces of what appears to be iron oxide along the edges and the proximal portion of the blade slot (Figure 8.21b, c). Similar discolouration is not found elsewhere on the harpoon head either which supports the positive identification of the residues as iron oxide. While there is only a single harpoon head from this site, it is an important indication that metal, and at least iron, was being taken along to even small, seasonally used sites such as QjLd-25 and was not something that was only brought to architecturally large winter sites or longhouse aggregation sites which, as previously stated in the thesis, are the most common site type included in this study.

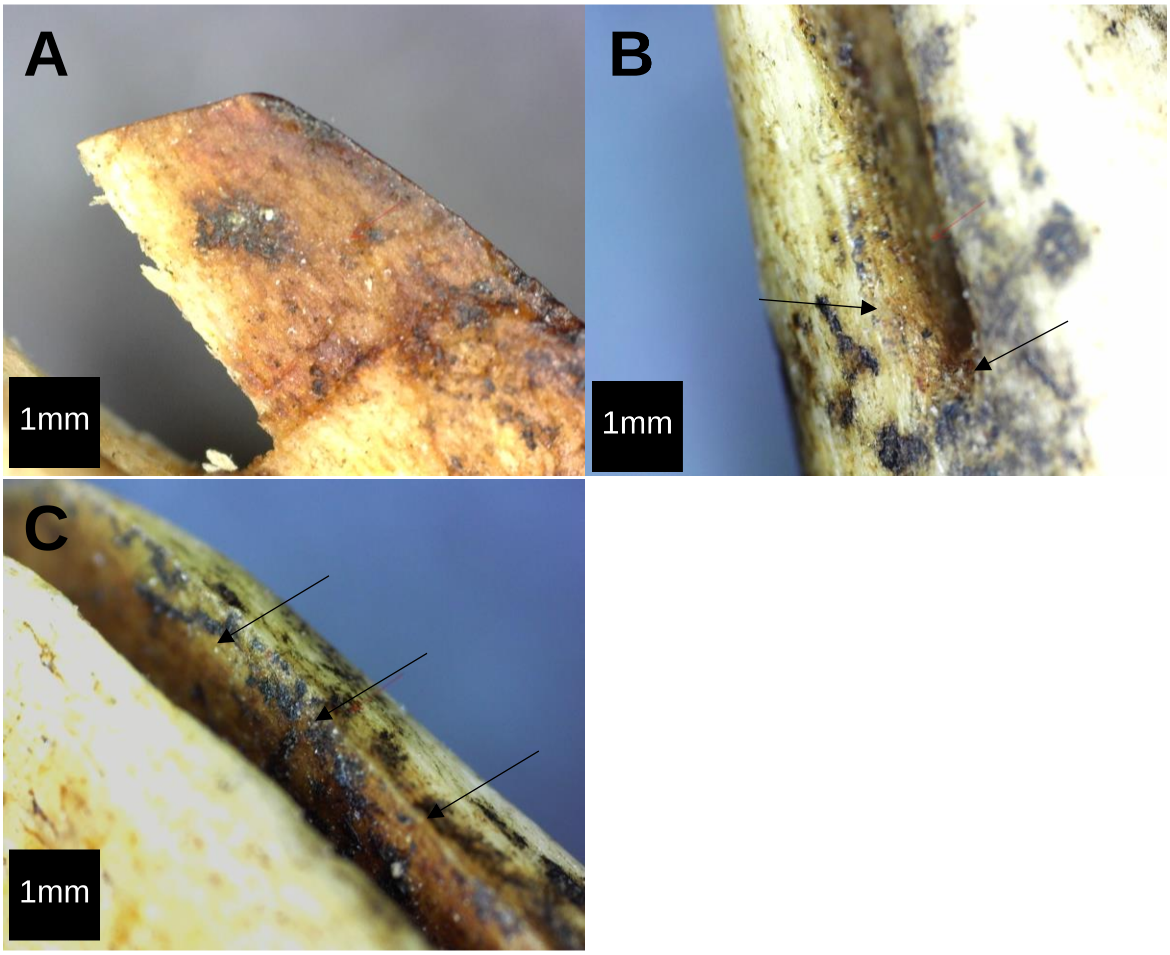

Figure 8.21: A. Exposed bladed bed of QjLd-25:191 showing a wide-spread certain iron oxide residue. B. Small localised iron oxide residues around the base of the blade slot of QjLd-25:191 (marked). C. Localised spots of iron oxide are found along the whole edge of the blade slot of QjLd-25:191 with few being easily seen without the aid of magnification (marked). All images magnified 60x.

8.9 NiHf-4 (Tikilik/Arnaquatsiak/Qarmaruluit)

NiHf-4 is located on Igloolik Island in the Foxe Basin. It was first mentioned by Parry and Lyon (1823) but was later explored archaeologically by Mathiassen (1927) and then later by Graham Rowley, Meldgaard, and finally Susan Rowley. This site contains a number of Pre-Dorset, Dorset, and early Inuit components but it has a significant Late Dorset components that were found both unmixed and mixed with later Inuit components (Murray 1996:73). While no scaled site plan has been published of the site, the material included in both the microscopic and metric analyses in this thesis was sampled from two Late Dorset features on site: Feature 4 and Feature 9.

Three harpoon heads and two side-hafted handle contained possible traces of iron oxide from NiHf-4. Of these harpoon heads, two (both Type G) were also included in metric analysis making up 11% of all harpoon heads sampled from NiHf-4 that were included in the metric analysis.

NiHf-4:1332 is a Dorset Parallel harpoon head that was not included in the metric analysis. Under normal lighting there appears to be a faint orangish residue across the surviving blade bed (Figure 8.22a). When illuminated under UV light, the residue becomes much clearer which suggests that it is a possible iron oxide residue rather than only being natural discolouration (Figure 8.22b). Similar discolouration is not found elsewhere on the object. NiHf-4:4741 is a Type G harpoon head with a faint possible iron oxide residue found in two locations across the blade bed, while faint, similar discolouration is not found elsewhere on the object. Additionally, NiHf-4:4889 is another Type G harpoon head that also has possible iron oxide residues. While the discolouration is darker than other possible iron oxide residues, NiHf-4:4889 has a securing hole which has similar discolouration around the perforation. Unfortunately, the slot itself was relatively thin which made using the microscope more difficult and decreased the confidence in positively identifying this residue as iron oxide.

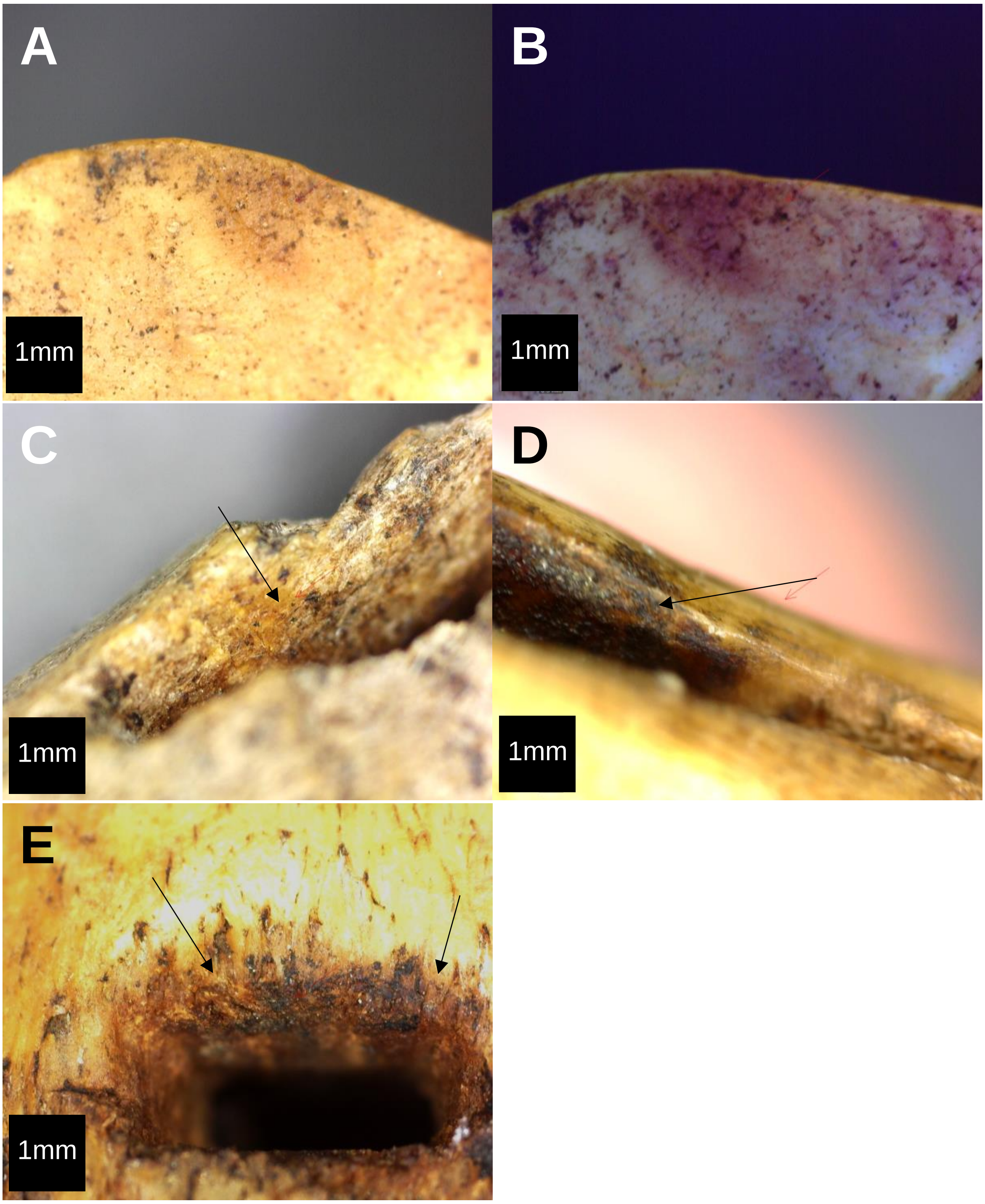

Figure 8.22: A. NiHf-4:1332 Dorset Parallel harpoon head with a faint possible iron oxide residue found on the exposed blade bed. B. NiHf-4:1332 harpoon head with possible iron oxide residue illuminated with UV light. C. NiHf-4:4741 Type G harpoon head with a faint possible iron oxide residue found on the edge of the proximal portion of the blade slot. D. NiHf-4:4889 Type G harpoon head with a faint possible iron oxide residue that is partially obscured by soil residue. E. NiHf-4:4889 harpoon head securing hole with what appears to be faint possible iron oxide residue that is partially obscured by soil residue. All magnified 60x.

There are two side-hafted handles from NiHf-4 that were included in the metric analysis that also had identifiable possible iron oxide residues. NiHf-4:1815 has a faint localised orangish residue near the proximal portion of its blade slot that, when compared to the natural discolouration left by soil remnants elsewhere on the object, appears to be possibly iron oxide. NiHf-4:4363 has a number of localised, although slightly faint, possible iron oxide residues. These are spread both at the proximal and distal portions of the blade slot. While these are more confidently identified as iron oxide compared to NiHf-4:1815, the discolouration being faint makes it difficult to describe it as a certain iron oxide residue.

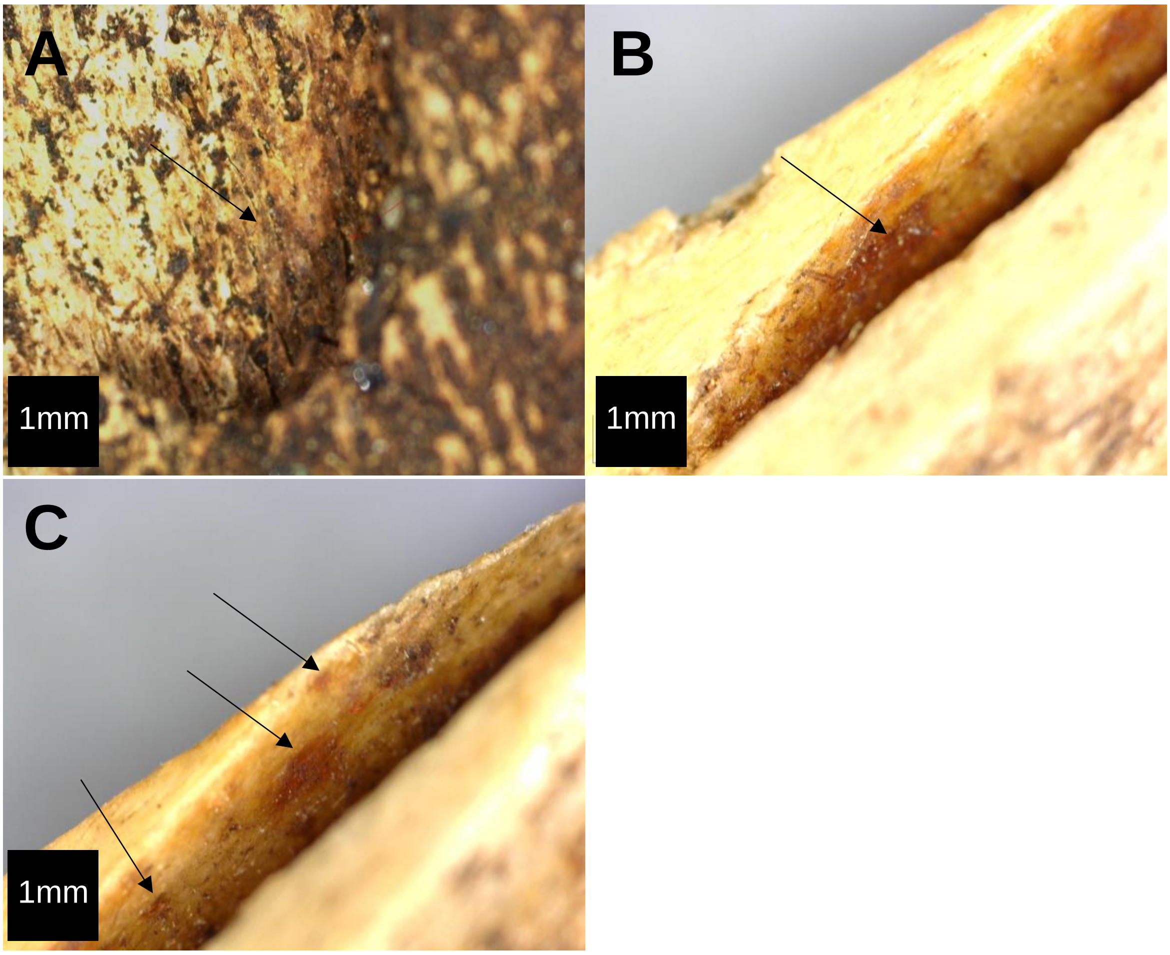

Figure 8.23: A. NiHf-4:1815 side-hafted handle with a faint possible iron oxide residue near the proximal portion of the blade slot. B. NiHf-4:4363 side-hafted handle with a possible iron oxide residue near the proximal portion of the blade slot (marked). C. NiHf-4:4363 handle with localised possible iron oxide residues near distal portion of the blade slot (marked). Magnified 60x.

8.10 Chapter Summary

The results described within this chapter demonstrate a representative sample of the wide range of deposits left behind on harpoon heads and knife handles from Late Dorset collections. Furthermore, the site that has the largest assemblages (e.g. QiLd-1) also tended to have the most amount of organic supports that had identifiable iron oxide residues. However, clearly certain geographic regions did not tend to be over-represented as the only regions that were sampled in this thesis that did not have specimens with identifiable iron oxide residues were Labrador and the western Canadian Arctic, both of which had very small collections and, in the case of Labrador, only pre-Late Dorset organic material.

While the full implications of these results will be discussed fully in Chapter 9, there are a number of important conclusions that should be noted here. First, while it is impossible to prove, the lack of iron oxide residues does not necessarily mean that the organic support never held a metal blade. In fact, there are several taphonomic or conservational processes that may have diminished or even removed some of the deposits from the material sampled. Therefore, these results represent a “minimum” count of organic material that could have had held a metal endblade. Second, none of the sampled material had what could be identified as residue left from a copper endblade. Third, there are a number of organic residues found on Late Dorset material that could be a fruitful avenue for future research and may be significant when compared to Early and Middle Dorset organic material. Fourth, while only residues which could be somewhat confidently identified as iron oxide when compared to other examples were reported, experimental work would greatly strengthen these results offering insight into not only the variety of residue patterns left behind by both iron and copper endblades but also how these residues differ from natural discolouration or organic residues. Fifth, the vast majority of iron oxide residues were found on Type G as opposed to Dorset Parallel harpoon heads. The implications for this particular conclusion will be elaborated upon in Chapter 9. Finally and perhaps most significantly to this thesis, there was only one object which was tentatively described as pre-Late Dorset (despite being recovered in a primarily Late Dorset site) which contained possible traces of iron oxide. Had the residues reported herein been primarily caused by natural means, it would be expected to have more Early or Middle Dorset organic material with similar patterns.

Chapter 9

Assessing the Extent and Intensity of Late Dorset Metal Use and Exchange

9.1 Overview

Throughout the previous four chapters the results of both the metric and microscopic analyses were presented. This chapter will use that data to disentangle the extent and intensity of Late Dorset metal use and exchange. While it is well established in previous scholarship that Late Dorset people used and exchanged metal more widely than what is seen in the previous Pre-Dorset and Dorset time periods (e.g. Appelt et al. 2016; McGhee 1996:202), the extent and intensity of their metal use and exchange has either largely been determined by looking at the extant metal objects (e.g. Franklin et al. 1981) or has been considered only a footnote to the supposedly more intense metal exchange network established by early Inuit (e.g. McCartney 1988, 1991). Previous research has noted the utility of possible metal use proxy indicators on organic tools (e.g. Collins 1937:146; Dumond 2008; Gullason 1999; LeMoine 2005; Schledermann 1975:300; Semenov 1964; Whitridge 2002) but most have taken mainly qualitative approaches with regional datasets. While quantitative, albeit regional, analysis has occurred with Inuit material, the methodology and results of each study differ from one another making integrating the datasets difficult if not impossible (e.g. Gullason 1999; McCartney 1988; 1991; Whitridge 2002). The rigorous quantitative dataset described in Chapters 5-7 combined with the qualitative observations detailed in Chapter 8 provide the first pan-Arctic attempt at disentangling Late Dorset metal exchange.

This chapter will focus primarily on discussing how the data illuminate our understanding of the extent (i.e. where metal was being exchanged) and the intensity (i.e. how much metal was being exchanged) of metal exchange rather than on the use categories of the metal (e.g. hunting, skin processing, adornment, etc.). First, the quantitative blade slot data will be discussed followed by the qualitative microscopy results. The more theoretical aspects of the “nature” of Late Dorset metal exchange (i.e. what these data reveal about Late Dorset interaction networks, their contacts with other groups, and the significance of metal exchange) will be the focus of Chapter 10.

9.2 Harpoon Head Blade Slot Data and its Significance

This section explicitly looks at the quantitative blade slot data detailed in Chapters 5 in regards to harpoon heads and the associated endblade thickness measurements on lithic, organic, and metal objects. First, the blade slot data will be discussed on its own and then it will later be integrated with the lithic material. Finally, the types of endblade securing techniques visible on Dorset harpoon heads will be discussed and placed in context with the rest of the data.

9.2.1 A Quantitative View of Dorset Harpoon Head Blade Slot Sizes

There are effectively four potential proxy indicators for the raw material of blades that are detectable on harpoon heads, three of which will be discussed in detail here. First, the manufacture marks on the harpoon head (or any organic object) itself may indicate if the object was mainly fabricated with a metal or a lithic tool. While this will not be discussed in this thesis, LeMoine (2005) undertook this analysis demonstrating that metal was used as much as stone. She tempered those results by indicating that her analysis does not demonstrate if metal blades were as prevalent as stone but rather that it was just used as frequent (LeMoine 2005:140). Therefore, her results alone cannot directly speak to the intensity of metal use. Second, traces of metal residue may still be present on harpoon heads. This will be discussed later in the chapter. Third, blade slot sizes of harpoon heads may reflect the type of raw material. The studies done on Alaskan (Collins 1937:146; Dumond 2008) as well as Inuit (McCartney 1988; 1991; Gullason 1999; Whitridge 2002) material have clearly shown that this approach is valid. Fourth, there may be traces left on harpoon heads themselves which indicate how an endblade was secured and, therefore, hint at the raw material of the endblade. In general, the data presented herein supports that residues left on the blade slot, the blade slot thickness of harpoon heads, the presence of endblade securing techniques as being reliable, although imperfect, proxy indicators of the raw material of the endblade, at least with Late Dorset material culture.

Significantly, while blade slot size of harpoon heads can more accurately assess the intensity of metal use and exchange by Late Dorset people than only looking at the manufacturing marks left on organic objects, there are a few caveats to this interpretation. A single metal endblade could have been fitted into multiple harpoon heads. Therefore, while certainly having harpoon heads with thin blade slots gives a more accurate picture of metal use intensity than only manufacturing marks or blade slot residues alone, it is not necessarily a perfect indicator. Another important caveat when using blade slot thicknesses for understanding past metal use is that it is possible that the blade slot thickness at time of measurement is not the same thickness at time of use. As previously stated in Chapter 4, some amount of warping or shrinking may have occurred post-deposition. However, few, if any, Late Dorset harpoon heads have blade slots that are warped back on themselves like those seen in Inuit contexts (Whitridge 2002:177). If Late Dorset blade slots were affected by post-deposition deformation, then it would be expected that there will be a significant number of lithic endblades that are thicker than the thickest harpoon heads. As will be shown below, this is not the case. The distal portions of the harpoon heads may have been heat treated prior to securing the endblade as noted ethnographically (Boas 1964 [1888]:110). This would make the blade slot more malleable and potentially facilitate a slightly larger endblade being fit into a slightly thinner blade slot. No purposeful charring evidence was found on any of the harpoon heads analysed but this does not preclude the use of boiling water to achieve the same result. In any case, it is possible that Late Dorset harpoon head blade slots may be slightly smaller at the time of analysis than the blades they would have held.

When comparing the three categories of harpoon heads in this dataset without even looking at associated endblade thicknesses, it is clear that Type G harpoon heads have the thinnest blade slot sizes followed by the pre-Late Dorset harpoon heads and then finally the Dorset Parallel harpoon heads. When plotting the medial and distal blade slot measurements, representing both the two likeliest points of contact between the blade beds and endblade, this grouping becomes clearer (Figure 9.1). The thinnest being almost exclusively composed of Type G harpoon heads around 1.4mm medial thickness, the second composed of all harpoon head types around 2.0mm medial thickness, and the thickest group composed of primarily Dorset Parallel around 2.7mm. Significantly, with few exceptions, only Type G harpoon heads have blade slot thicknesses less than 2.4mm distally and 1.7mm medially. Unsurprisingly, conducting a single factor analysis of variance test (testing whether the means of more than two samples are statistically similar) for all three categories of harpoon head blade slot thicknesses shows that they are statistically different from each other despite, as stated in Chapter 5.2, Hartigan's Dip Test showing the distribution is unimodal (Table 9.1).

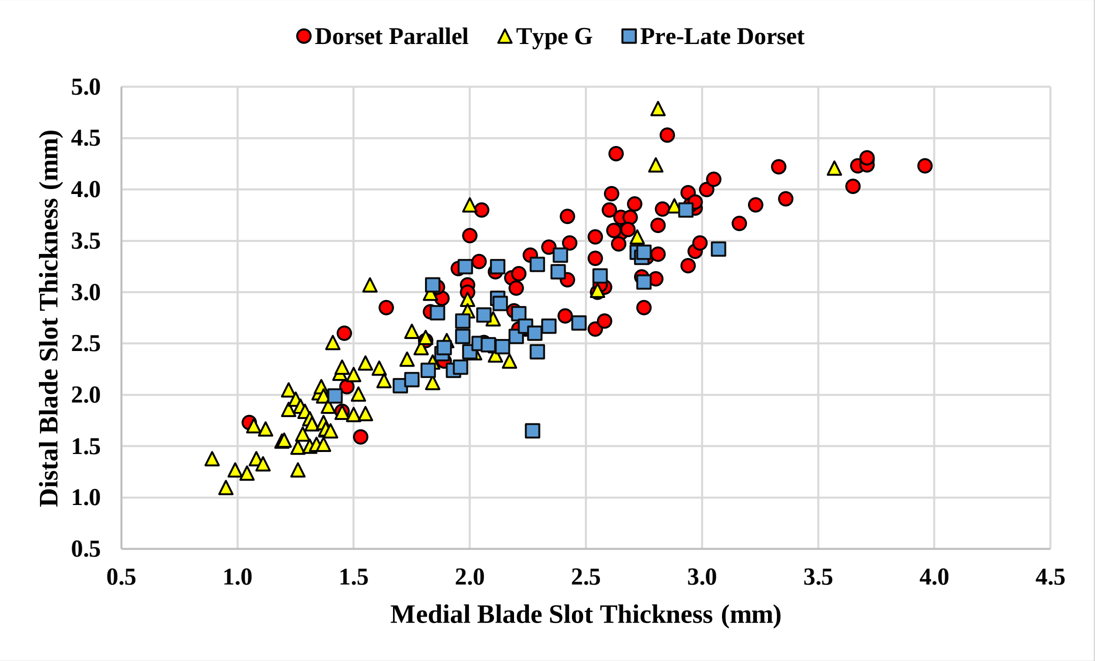

Figure 9.1: Comparing medial and distal blade slot thicknesses for all pre-Late Dorset (n=38), Dorset Parallel (n=72), and Type G (n=68) harpoon heads.

Single Factor ANOVA	Medial Blade Slot Thickness	Distal Blade Slot Thickness
F	60.63	53.05
F Critical	3.04	3.05
p-Value	$4.79*10^{-21}$	$9.77*10^{-19}$

Table 9.1: Single factor analysis of variance calculation comparing the means of Type G, pre-Late Dorset, and Dorset Parallel harpoon heads. If F stat is greater than F critical and the p-value is less than 0.05 then the means are significantly different. In this case, the three harpoon head categories have significantly different blade slot thicknesses at both measurement locations.

Even though Dorset Parallel harpoon head blade slot thicknesses appear to be a continuous dataset when viewed without modification (Figure 9.2), when the objects are separated based on their chronological context, a faint, although visible pattern emerges (Figure 9.3). In particular, Dorset Parallel harpoon heads from a pre-Late Dorset context have generally thicker blade slots than those from distinct Late Dorset contexts (see Table 5.6 for a breakdown of both groups). When viewed on their own, the Dorset Parallel harpoon heads from Late Dorset contexts seemingly have two clusters with a group of harpoon heads having less than 3.3mm distal blade slot thickness and less than 2.0mm medial blade slot thickness and the other group having blade slot thicknesses greater than 3.0mm distally and 2.5mm medially (Figure 9.4). The t-test comparing the pre-Late Dorset and Late Dorset specimens and the dip test results presented in Chapter 5.2.1 show there is a significant statistical difference between the two chronological categories of Dorset Parallel harpoon heads and that, at least in terms of medial blade slot thickness, the Late Dorset specimens have multimodal distribution. From these data alone, it is possible that Late Dorset were crafting at least two blade slot sizes for their Dorset Parallel harpoon heads in general, but they may have started producing Dorset Parallel harpoon heads that have thinner blade slots than their pre-Late Dorset counterparts in order to facilitate novel (and thinner) raw materials such as metal.

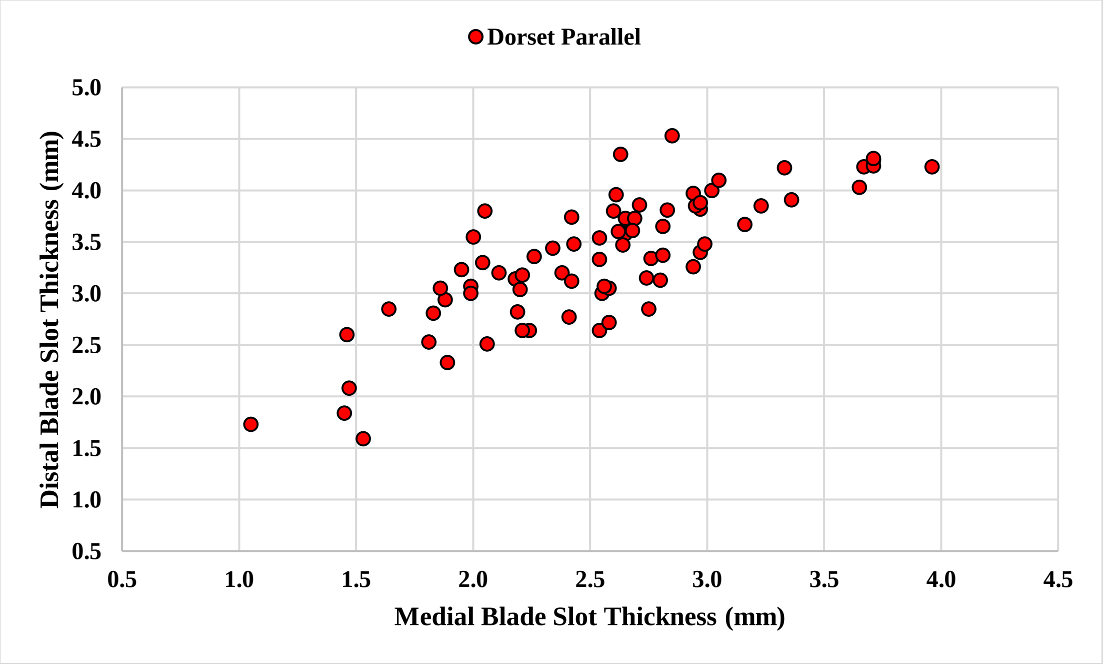

Figure 9.2: Comparing medial and distal blade slot thicknesses for all Dorset Parallel harpoon heads (n=72).

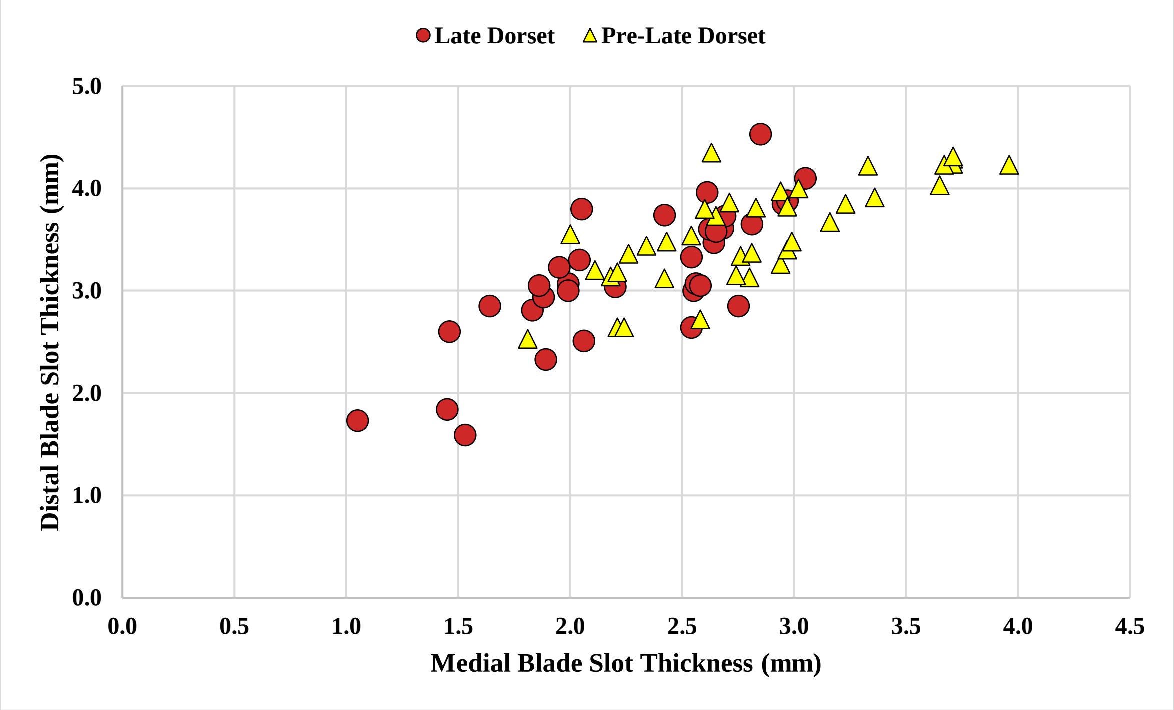

Figure 9.3: Comparing medial and distal blade slot thicknesses for Dorset Parallel harpoon heads from Late Dorset (n=34) and pre-Late Dorset contexts (n=38).

If blade slot thicknesses simply became thinner over time, it would be expected that other changes in Dorset Parallel metrics would also occur. While specimens from Late Dorset contexts are generally longer, they are only marginally larger in size (i.e. length*width*thickness) overall than pre-Late Dorset specimens (Figure 9.5). Given that, as previously stated, there is only a weak-moderate correlation between overall Dorset Parallel object size and the thickness of the blade slot itself (Table 5.4), the expected outcome would be that the larger harpoon heads would have, at least marginally, thicker on average blade slots. But Late Dorset examples have both thinner slots and slightly larger overall sizes. In any case, the type of size clustering seen in Dorset Parallel blade slot thicknesses from Late Dorset contexts is neither replicated in the overall size of Late Dorset nor pre-Late Dorset specimens. However, Late Dorset specimens have a greater range in overall size than do pre-Late Dorset examples. Ultimately, blade slot thickness, at least in terms of Dorset Parallel specimens, developed independently of other metric factors of the harpoon head and, significantly, the clustering of blade slot thicknesses, albeit faint, among Late Dorset specimens indicates two preferential endblade sizes.

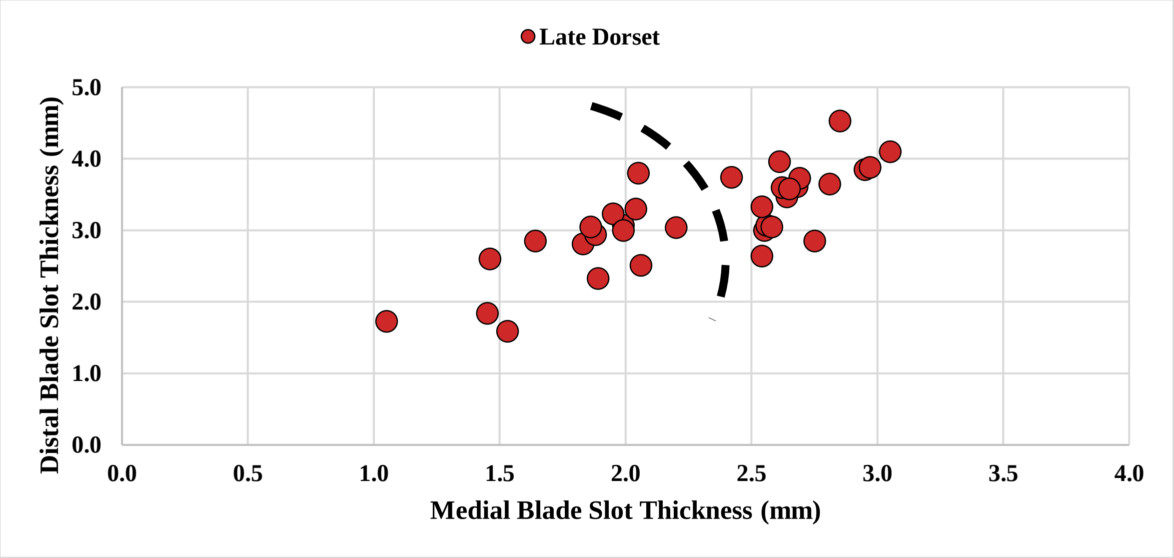

Figure 9.4: Comparing medial and distal blade slot thicknesses for Dorset Parallel harpoon heads from Late Dorset contexts (n=34). The dashed line separates possible size clusters.

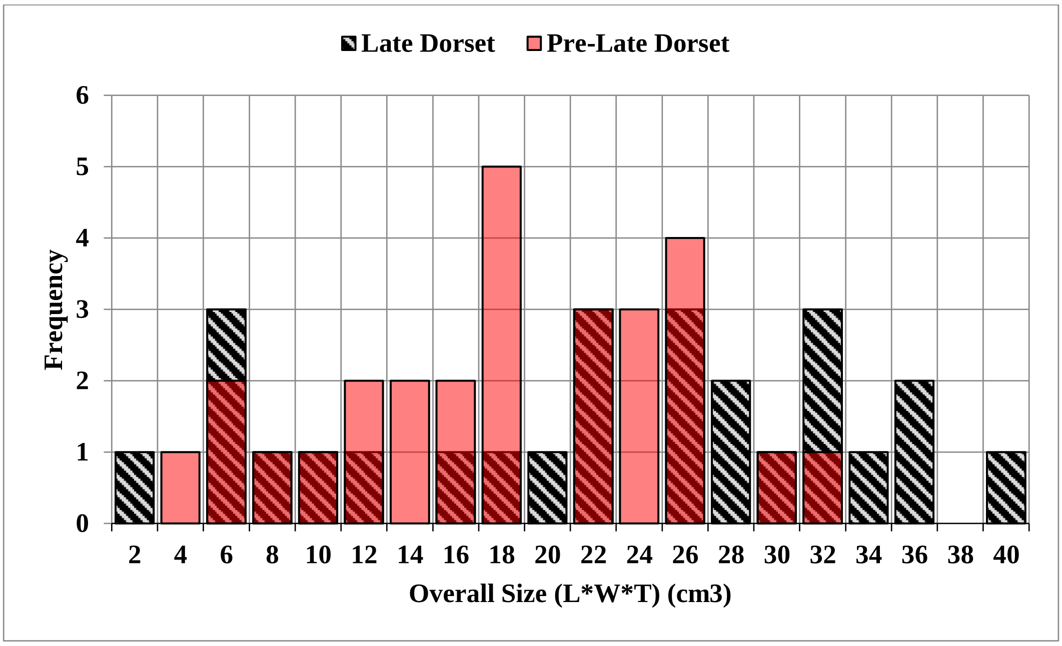

Figure 9.5: Rough overall size (cm^3) for Dorset Parallel harpoon heads from Late Dorset (n=26) and pre-Late Dorset (n=28) contexts. Note the different sample size here is because only complete specimens were used to calculate the overall size.

Type G harpoon heads do not have the same *longue durée* in Dorset material culture as Dorset Parallel harpoon heads but there are some similarities in the data. Aside from having the thinnest blade slots of all the harpoon heads analysed and being associated almost exclusively with Late Dorset contexts, Type G might have a similar clustering. It is most easily observed in the medial blade slot thickness of Type G specimens (Figure 9.6). The majority of the specimens have a medial thickness around 1.4mm (+/- 0.2mm), there is a secondary cluster around 2.0mm (+/- 0.2mm). Despite being more diffuse than what was seen with Dorset Parallel, it is significant that the slightly thicker cluster is at the same size as almost all pre-Late Dorset harpoon heads and the thinner cluster of Dorset Parallel harpoon heads (recall Figure 9.1). This pattern can also be seen when comparing the medial and distal blade slot thicknesses of Type G harpoon heads alone (Figure 9.7). Additionally, another similarity between the Dorset Parallel harpoon heads from Late Dorset contexts and Type G harpoon heads is that both have more variable blade slot thicknesses when compared to pre-Late Dorset specimens with consistently higher overall range, standard deviation, and coefficient of variation (Table 9.2).

Testing this potential clustering seen in Type G harpoon heads with Hartigan's Dip Test, however, shows that there is no strong multimodality in the dataset (Table 9.3). This means the medial blade slot thicknesses shown in Figure 9.6 represent likely log normal distribution. However, as seen above with the overall harpoon head blade slot thicknesses, using only a dip test or t-test to describe a dataset can be misleading. This visual pattern seen with Type G blade slot thicknesses will be further assessed in Chapter 9.2.2 when the lithic data is integrated.

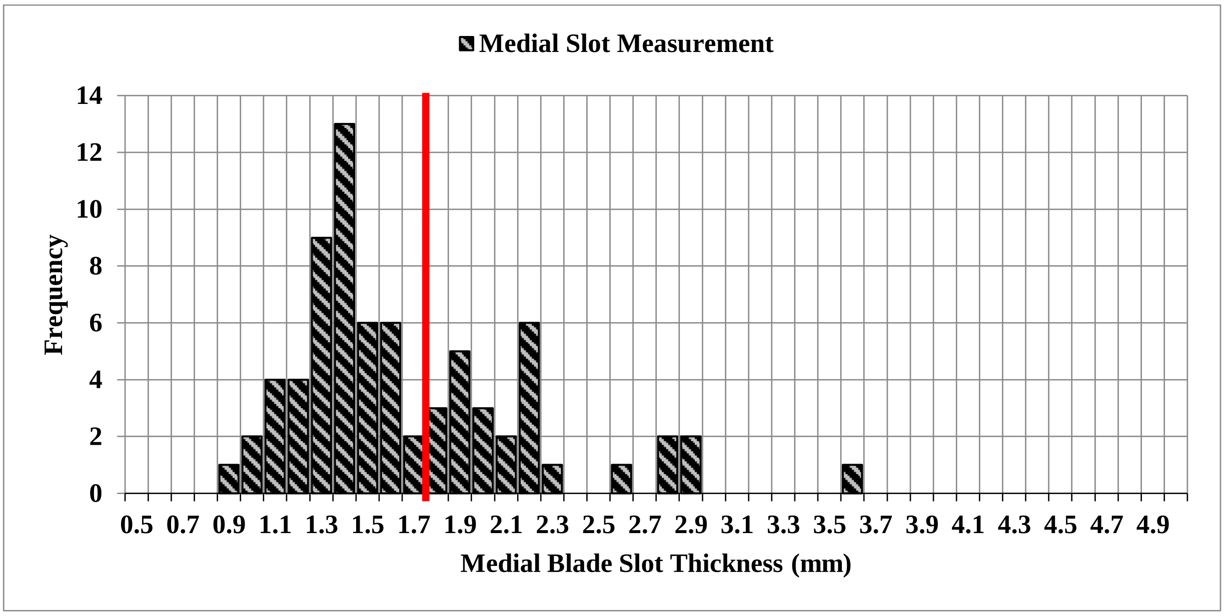

Figure 9.6: Medial blade slot thickness for all Type G harpoon heads included in the dataset (n=73). The red line divides the distribution into two potential clusters.

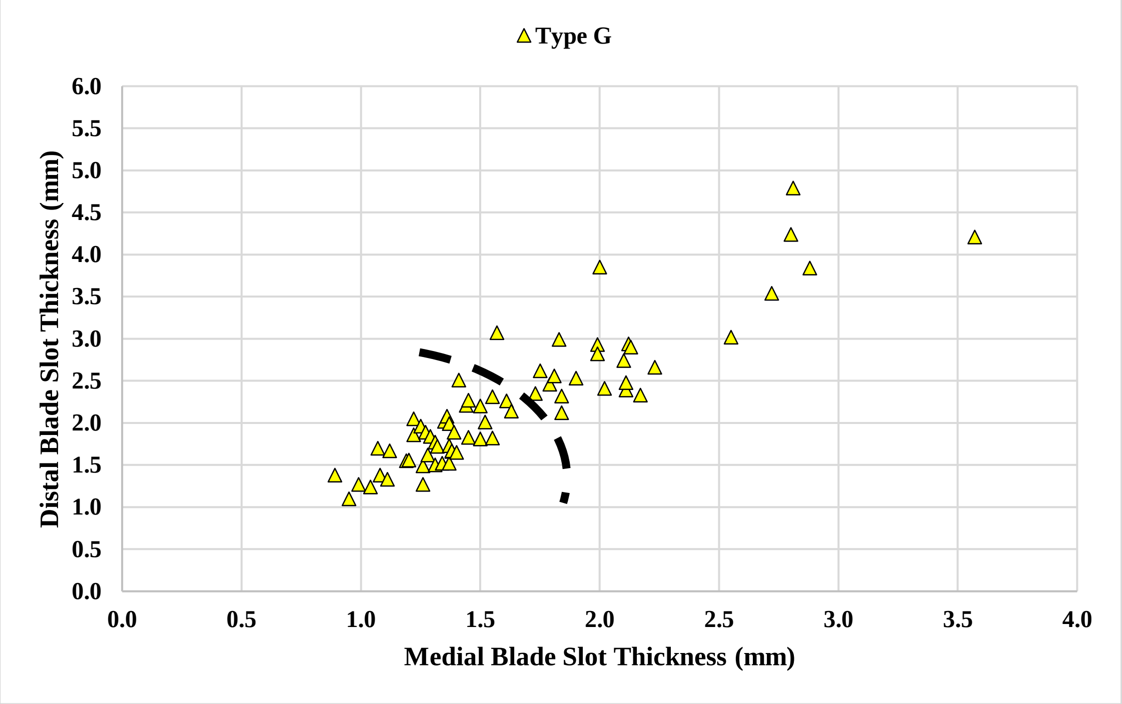

Figure 9.7: Comparing medial and distal blade slot thicknesses for all Type G harpoon heads included in the dataset (n=68). The dashed line separates the two potential clusters.

Medial	Pre-Late Dorset	Dorset Parallel (Pre-Late Dorset)	Dorset Parallel (Late Dorset)	Type G
n	39	40	39	73
Mean	2.20	2.81	2.31	1.63
Median	2.13	2.75	2.42	1.45
Range	1.65	2.15	2.48	2.68
Standard Deviation	0.37	0.53	0.54	0.51
Coefficient of Variation	16.82	18.86	23.38	31.29
Distal	**Pre-Late Dorset**	**Dorset Parallel (Pre-Late Dorset)**	**Dorset Parallel (Late Dorset)**	**Type G**
n	38	38	34	68
Mean	2.74	3.57	3.18	2.23
Median	2..69	3.55	3.15	2.07
Range	2.15	1.82	2.94	3.69
Standard Deviation	0.48	0.50	0.69	0.77
Coefficient of Variation	17.52	14.01	21.70	34.53

Table 9.2: The variability of medial and distal blade slot thicknesses for each harpoon head category. Note how both Late Dorset categories are significantly more variable than their pre-Late Dorset counterparts.

Hartigan's Dip Test	D-Value	p-Value
Proximal	0.0334	0.838
Medial	0.0322	0.879
Distal	0.0221	0.996

Table 9.3: Hartigan's Dip Test of unimodality for Type G harpoon head blade thicknesses at all measurement locations. A p-value of <0.05 is considered statistically significant. In the case of the calculations here, all distributions are unimodal.

Single line hole pre-Late Dorset harpoon heads appear to have very slight bimodal distribution in their medial and distal blade slot thicknesses but their blade slot thicknesses are much less variable than both Dorset Parallel and Type G harpoon heads (Figure 9.8). This is significant since, theoretically, pre-Late Dorset harpoon heads were sampled from a broader time period (i.e. 500 BC to AD 500) compared to Late Dorset harpoon heads (AD 500 to AD 1300) and would be expected to show more variability. Despite there being a potential cluster of harpoon heads that have a medial blade slot thickness greater than 2.5mm and a distal blade slot thickness greater than 3.2mm, there are far fewer specimens in this thicker cluster than what appears in both Type G and Dorset Parallel harpoon heads from Late Dorset contexts. Despite this qualitative grouping, Hartigan's Dip Test shows that this potential separation is not statistically significant and the distribution is unimodal (Table 9.4).

It seems likely that given that the main concentration of pre-Late Dorset blade slot thicknesses and the thicker cluster of Type G blade slots overlap that the faint clustering seen with Type G is more likely to represent two different endblade sizes based on raw material: the thicker cluster matching the same raw material used in nearly all pre-Late Dorset harpoon heads (stone) and the thinner cluster potentially representing metal endblades. If this is the case, then these results indicate that Type G would have held a considerably higher amount of metal endblades than what is reflected in Late Dorset collections. Forty-three such specimens (63.2% of Type G harpoon heads) are grouped in the thinner cluster. Moreover, only two pre-Late Dorset harpoon heads (NjHa-1:1947; KeDe-14:846) and four Dorset Parallel (from Late Dorset contexts) (NiHf-4:4864; QiLd-1:1465, 1551, 1937) are in the same range as the thin Type G cluster. These results will be tested against lithic and metal endblade sizes to determine if these patterns are confident proxy markers of metal use and exchange or if they represent stochastic changes in the archaeological record.

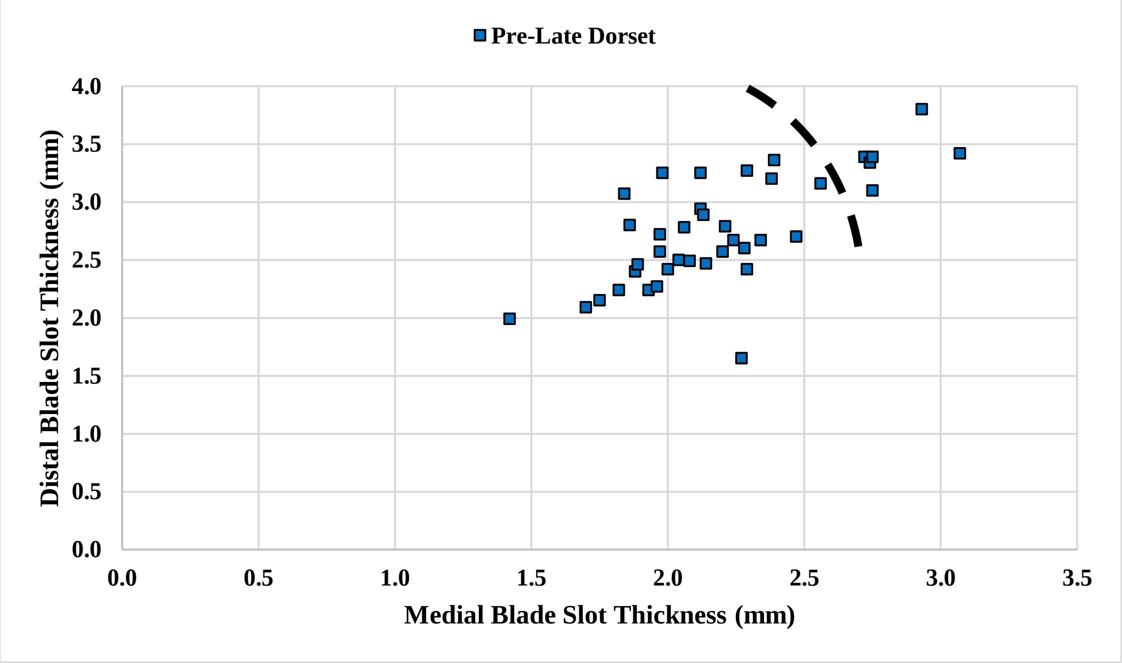

Figure 9.8: Comparing medial and distal blade slot thicknesses for all pre-Late Dorset harpoon heads (n=38). The dashed line shows a potential, albeit unlikely, size clustering.

Hartigan's Dip Test	D-Value	p-Value
Proximal	0.0417	0.908
Medial	0.0544	0.505
Distal	0.0584	0.398

Table 9.4: Hartigan's Dip Test of unimodality for pre-Late Dorset harpoon heads. A p-value of <0.05 is considered statistically significant. In the case of the calculations here, all distributions are unimodal.

9.2.2 Integrating Blade Slot and Endblade Thicknesses

As highlighted by Gullason (1999:503) and the supposed inconsistencies in past attempts at using blade slot thickness as a proxy for metal use (e.g. Collins 1937:145; Larsen and Rainey 1948:82; McCartney 1988:59; 1991:30; Whitridge 2002:177), blade slot measurements alone are not necessarily perfect indicators of metal use without the lithic and metal endblades themselves also being measured. While all major lithic tool categories were assessed, the most likely category to have been slotted into a harpoon head is likely either triangular endblade or a stemmed/notched knife. As discussed in Chapter 6, despite sample size differences the attributes of a stone tool in terms of how it was flaked (i.e. unifacially, bifacially, and/or tip fluted), the basal morphology (i.e. concave/flat base, stem or side-notch), and its lithic raw material had only minor influence on the basal thickness. Furthermore, sites that have primarily Late Dorset, mixed pre-Late Dorset and Late Dorset, or only pre-Late Dorset lithic material do not show any major trends in terms of basal thickness. In fact, the sites with the thinnest triangular endblades were sites that had predominantly pre-Late Dorset occupations. Likewise, tip fluted endblades, which are entirely absent in Late Dorset contexts, are slightly thinner than non-tip fluted specimens. While there was slightly more distinct patterning with knives, the differences were relatively minor suggesting that there is only a weak-moderate correlation between the basal thickness (i.e. the part of the tool that sits in the organic haft) and other features of the object itself. This slightly contrasts with Nagle's (1984:346) analysis regarding the weight of lithic artefacts depending on if they have been bifacially or unifacially flaked. He effectively found that unifaces use less material overall. Despite this, it only had a minor effect, on a broad scale, on the basal thickness of stone tools.

With these preliminary conclusions in mind, the medial and distal basal thicknesses of the lithic endblades can be plotted against the medial and distal blade slot thicknesses of all the harpoon heads (Figure 9.9). While the sample sizes are different, the distribution of endblade basal thicknesses largely follow the same pattern as the majority of the harpoon heads. In fact, no pre-Late Dorset harpoon head has a medial blade slot thickness that is thinner than the thinnest group of endblades. Conversely, a large number of Type G harpoon heads have blade slot thicknesses well under the thinnest endblades. When focusing on the hypothetical clustering identified in Type G blade slots, only fifteen endblades (4.0%) overlap with the thinner cluster while forty-three (63.2%) of all Type G harpoon heads constitute that cluster (Figure 9.10). If the maximum thickness for endblades are used rather than the distal basal thickness, only six remain overlapping with the thinner Type G cluster (Figure 9.11).

The fact that Hartigan's Dip Test determined that Type G medial and distal thicknesses were not "statistically bi- or multi-modal", does not mean that there are not real patterns in the data. Integrating the harpoon head and lithic endblade data together clearly shows that there is a significant number of Type G that are thinner than the majority of lithic endblades. Computing Welch's t-tests for all the harpoon head against the endblade data shows that there is no significant statistical difference between Dorset Parallel harpoon head blade slot thicknesses and lithic endblade thicknesses but there are significant statistical differences between Type G and pre-Late Dorset harpoon heads with the lithic endblade data (Table 9.5). The differences between Type G and endblade thicknesses are clearly seen in the bivariate plots discussed above (Figure 9.9 and Figure 9.10) but the visual differences between the pre-Late Dorset and endblade data is not easily seen in those same plots. The lack of statistical similarity between the endblade data and the pre-Late Dorset harpoon head data does not mean the endblades were not used with the harpoon heads but rather that the endblade data itself is variable. As with anything that can be statistically defined, archaeological datasets are influenced by not only their sample size but also how the data is classified and organised (Drennan 2009:160-161).

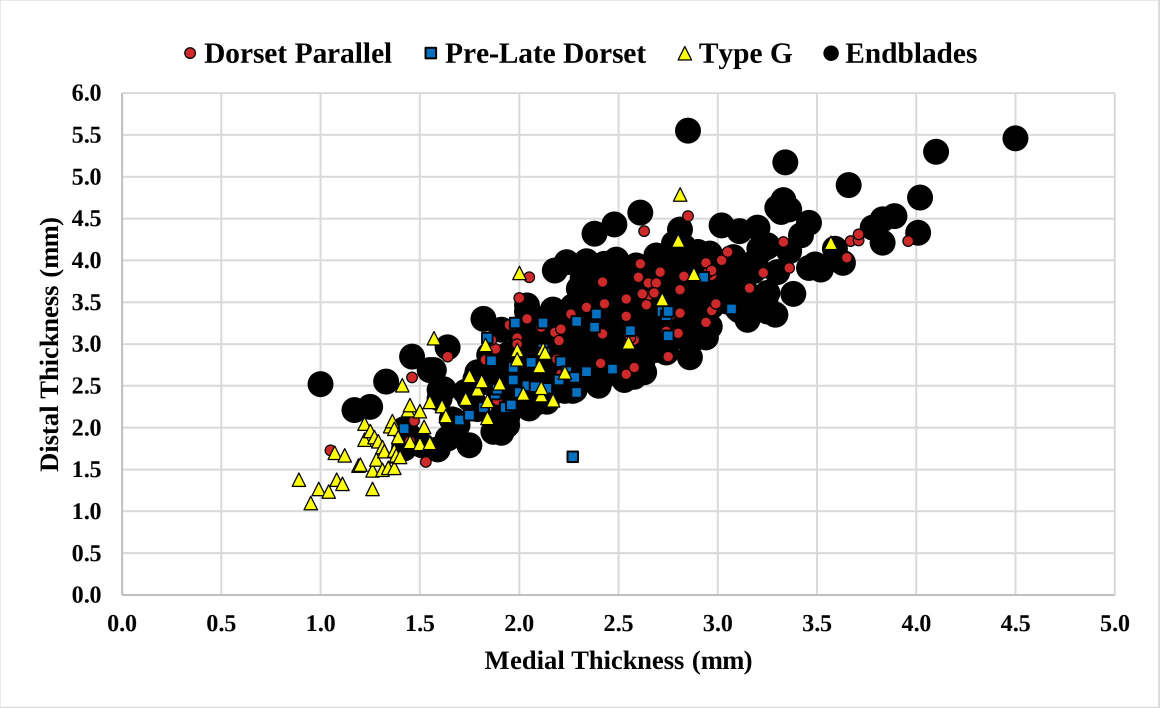

Figure 9.9: Comparing medial and distal blade slot thickness of all endblades (n=372) with the medial and distal thickness of all harpoon head blade slots (n=183). Note the symbols for all endblades enlarged for easier comparison.

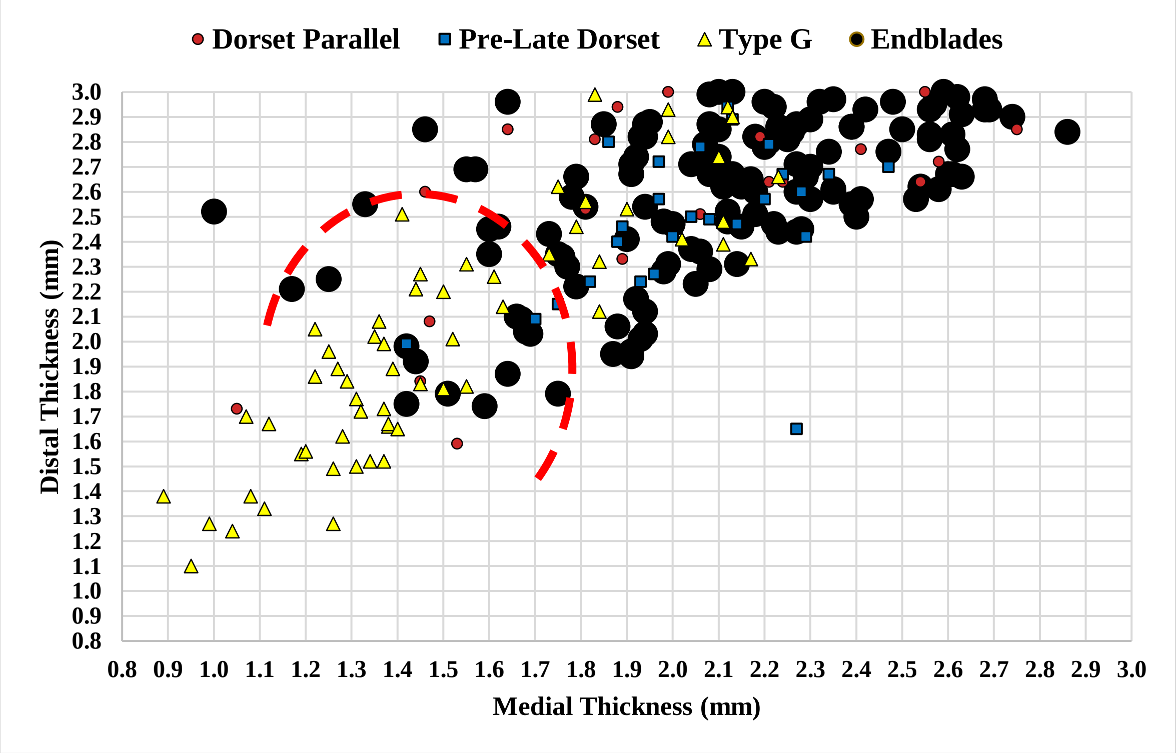

Figure 9.10: Enlarged view of distal and medial blade slot thickness of Type G harpoon heads and their relationship to all lithic endblades. Note the red line showing potential division between the Type G clusters discussed above.

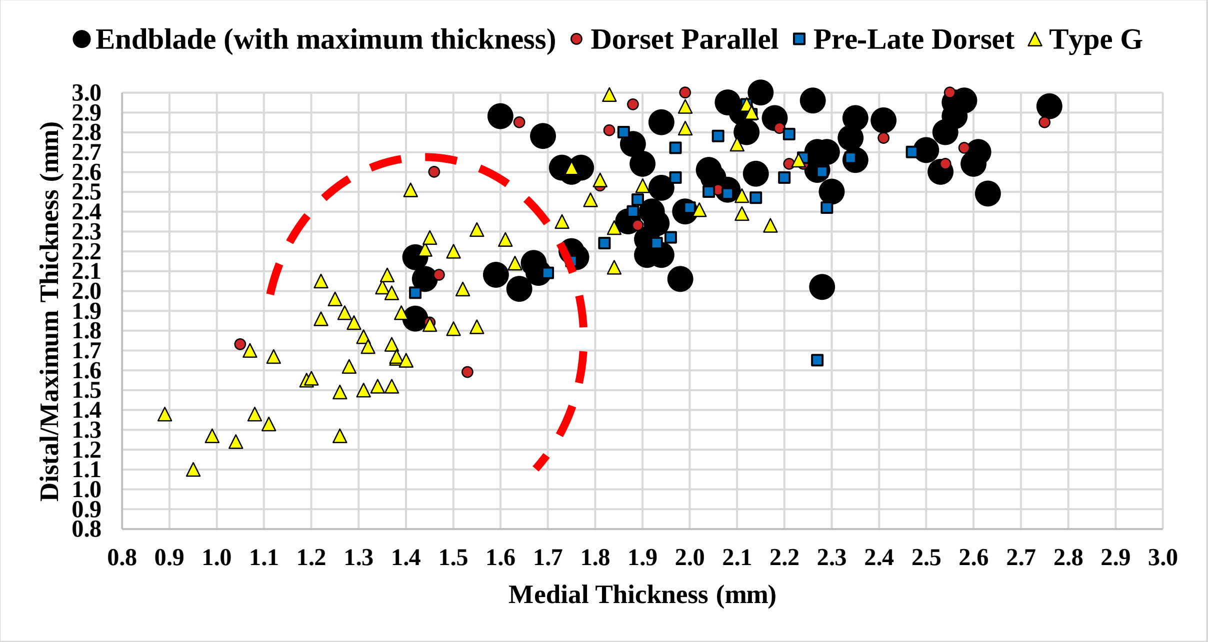

Figure 9.11: The relationship between medial and distal blade slot thickness of Type G harpoon heads and medial and maximum basal thickness for all endblades.

Welch's t-Test	**Type G**		**Pre-Late Dorset**		**Dorset Parallel**	
	Medial	**Distal**	**Medial**	**Distal**	**Medial**	**Distal**
t-Stat	13.72	10.44	5.18	6.16	0.23	1.21
t Critical (two-tail)	1.98	1.99	2.00	2.00	1.98	1.98
p-Value	$3.71*10^{-25}$	$1.98*10^{-17}$	$3.02*10^{-6}$	$8.79*10^{-8}$	0.82	0.23

Table 9.5: Two sample Welch's t-test results for harpoon head blade slot thicknesses and corresponding lithic endblade basal thicknesses. The t-stat being greater than the critical value and the p-value being less than 0.05 indicates there is a significant statistical difference between the distribution of blade slot thicknesses and endblade basal thicknesses. In this case, both Type G and pre-Late Dorset harpoon head blade slots are statistically different from corresponding endblade thicknesses.

The visual discrepancy between Type G blade slot thicknesses and lithic endblade basal thicknesses does not happen elsewhere. For example, the endblade dataset has a number of specimens that are thicker than the majority of Dorset Parallel blade slots. While this could indicate that thicker endblades are secured in slots that are thinner than their basal portions, it may also indicate that some of what have been interpreted as triangular endblades were not always used with harpoon heads and may have been used with lances. When isolating that group of larger endblades, they almost all derive from Labrador sites which also have the fewest number of harpoon heads in the dataset (Figure 9.12). If those Labrador endblades are ignored, the ratio of endblades to harpoon heads remains effectively constant throughout the whole dataset except at the aforementioned thinnest portion.

This collection of endblades that are thicker than the thickest harpoon heads may indicate post-depositional shrinking of the blade slots. However, the relatively low quantity of these endblades and the fact that some of these thicker lithic implements may not have even been used with harpoon heads suggests that any post-depositional blade slot shrinking was minimal. Had post-depositional shrinking or warping affected all harpoon heads equally, a discrepancy seen in the thinnest part of the spectrum between harpoon heads and endblades should be duplicated in the thickest part with a large number of endblades being much thicker than the harpoon heads with the thickest slots. Undoubtedly, shrinking and warping did affect the results presented here but just not in the magnitude to cast significant doubt on the conclusions.

It is possible that the post-depositional warping or shrinking disproportionately affected Type G harpoon heads over other types. Recall that Type G harpoon heads tend to have marginally longer blade slots than the other harpoon head categories which might make them more susceptible to any post-depositional shrinking If this is the case, then it is not possible to conclude one way or another based on the data presented here. However, the additional strands of evidence discussed below that also support a correlation between Type G harpoon head blade slot thicknesses and metal use indicate that any post-depositional shrinking did not greatly impact their blade slot thicknesses.

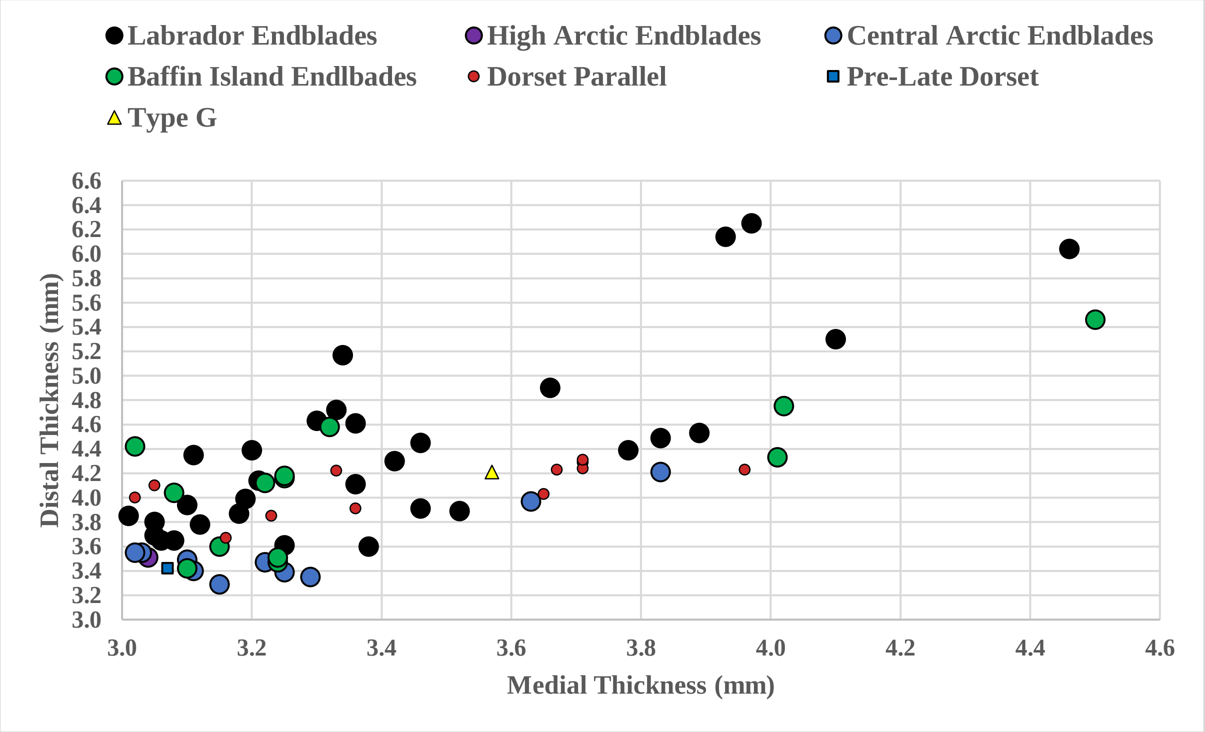

Figure 9.12: Harpoon head blade slot thickness and basal endblade thickness greater than 3.0mm medially and distally. Note the majority of endblades larger than the harpoon heads mostly derive from Labrador sites.

The other class of artefact that may have been hafted in harpoon heads are knives. Much like the endblade data, the distribution is relatively normal with no single attribute of the knives affecting its basal thickness (Figure 9.13). While the basal thickness of all the knives is much more variable than the endblades, which is to be expected, the bulk of the knives are clustered in roughly the same region as the bulk of the endblades and pre-Late Dorset and Dorset Parallel harpoon heads. However, they are much thicker on average than the endblades and there is only one (0.3%) specimen that overlaps with the thinner cluster of Type G harpoon heads. Significantly, this demonstrates that while the vast majority of knives, endblades, and harpoon heads have complimentary blade slot and basal thicknesses, Type G blade slots are consistently thinner than the most likely lithic tools that they would have supported. Furthermore, barring the variable nature of the knives, there is not a similar pattern of lithic material being much thicker than the thickest harpoon head blade slots.

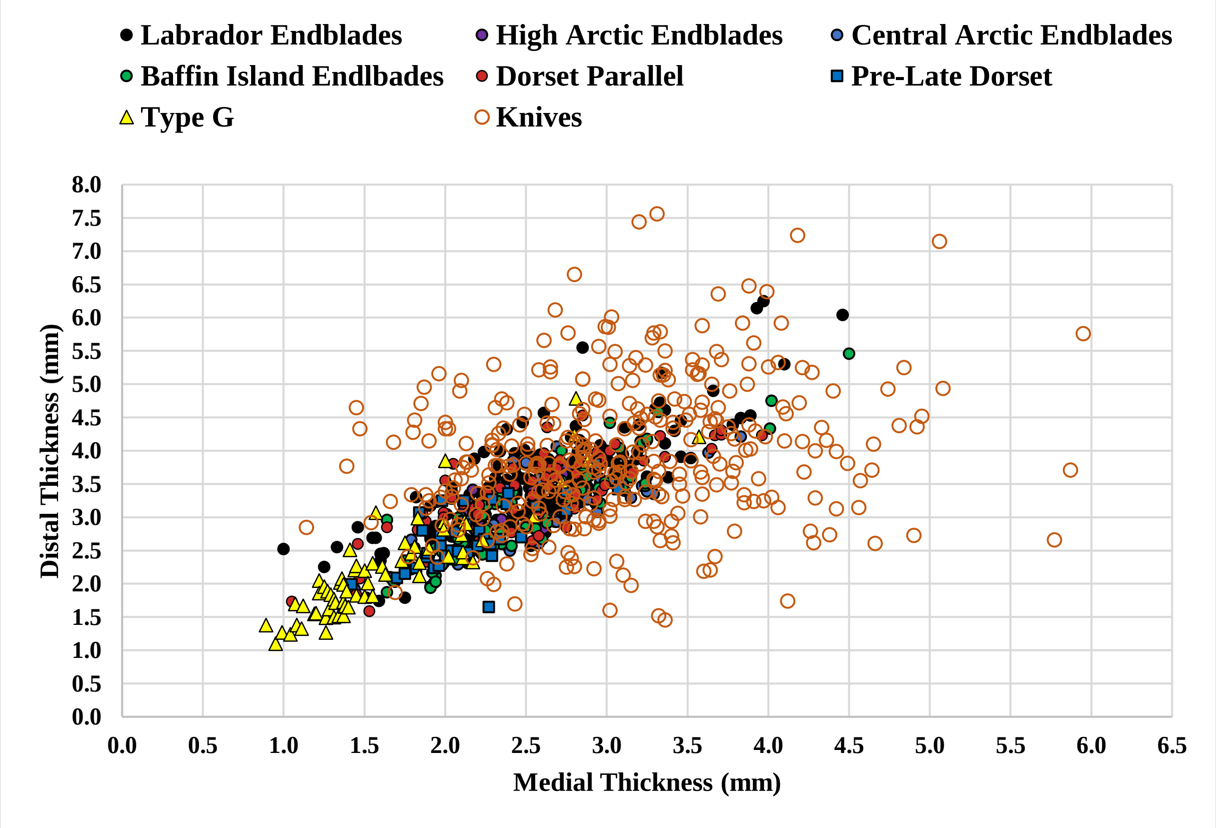

Figure 9.13: Medial and distal basal thickness for all lithic knives (n=349) included in dataset compared to harpoon head blade slot and endblade basal thicknesses. Despite the increased variability, the majority of lithic knives cluster in the same region as the lithic endblades.

Although the sample size is small, the metal objects from SiFi-4 included in the dataset are, as expected, thinner than the vast majority of all lithic tools (Figure 9.14). Interestingly, while it was originally thought that the two clusters seen in the metal tools were the result of some tools being finished and others being unfinished, both clusters neatly group to the Type G blade slot clusters. In saying that, the fact that the majority of the thicker metal objects are those that do not seem to have been completed objects, it is still more likely that the two clusters represent different stages of the manufacturing process rather than two distinct sizes, tempting as that suggestion is. Additionally, this highlights the fact that even the harpoon heads with thicker blade slots could have supported a much thinner metal endblade. In any case, six metal objects (54.5%) have basal thicknesses that overlap with the thinner cluster of Type G harpoon heads. In spite of the small sample size, this points to at least the thinner cluster of Type G harpoon heads being made to support exclusively metal endblades.

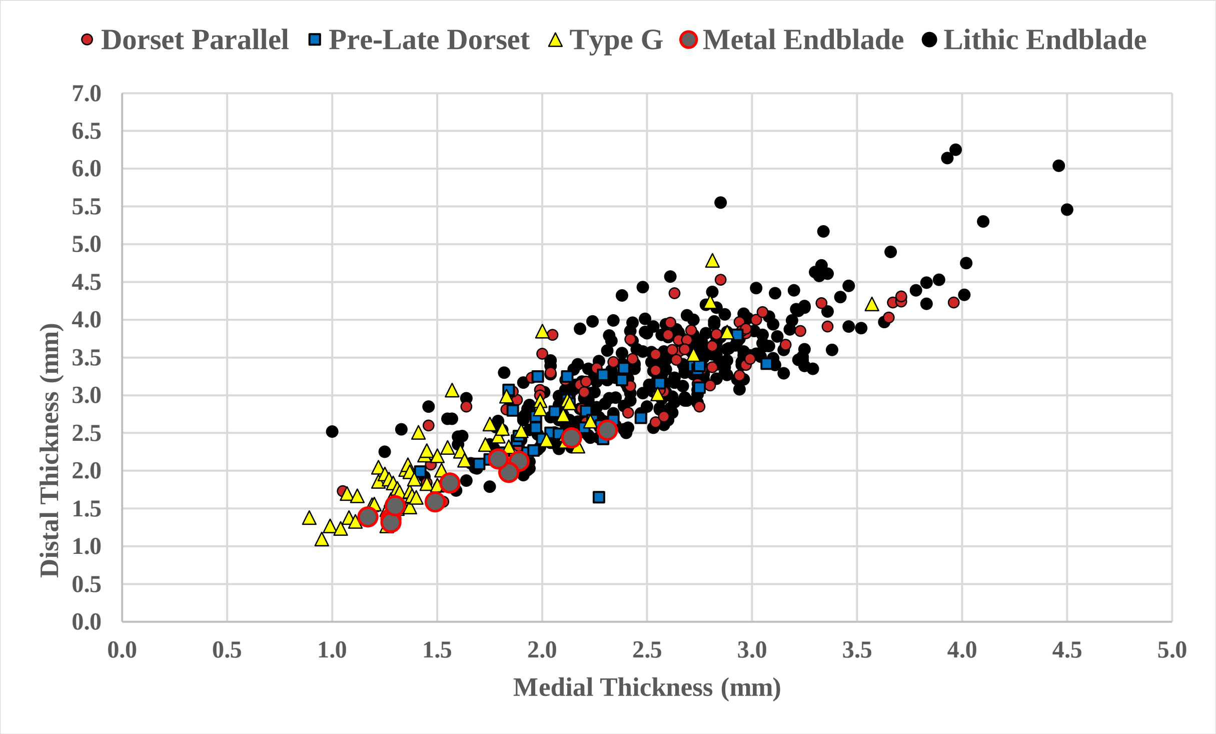

Figure 9.14: Medial and distal basal thicknesses for all metal objects (n=11) included in this thesis compared with lithic endblade basal thicknesses and harpoon head blade slot thicknesses.

9.2.3 Harpoon Head Securing Techniques and their Relation to Metal Use

As stated in Chapter 5, there were effectively five different states of Late Dorset harpoon heads when it came to the visible traces for securing endblades (recall Figure 5.31). First, Type G harpoon heads may have no evidence for endblade securing techniques. Second, twenty-six Type G and four Dorset Parallel harpoon heads had what was termed a securing hole. Third, some Type G harpoon head with securing holes were developed into notches at the distal-most portion of the harpoon head rather than a simple perforation. Fourth, twenty-one Type G harpoon heads had visible lashing grooves that went around the blade slot. Fifth, two Type G harpoon heads have both visible securing holes and lashing grooves. It was hypothesised earlier that the securing holes/notches likely used a thin piece of sinew that went through the notch or hole and was tied to one of the line holes.

Occasionally, some Type G harpoon heads had longitudinal grooves that went from the line hole to the securing hole or notch to help facilitate that sinew tie. For this reason and the fact that few have ever been identified in Late Dorset collections, it seems unlikely that this would have related to using a copper or organic rivet.

The presence of endblade securing techniques on Type G harpoon heads is significant since it is such a rare occurrence on pre-Late Dorset harpoon heads (e.g. Mary-Rousselière 2002:83-84). While past researchers have hypothesised that these are good indicators for metal use (e.g. Schledermann 1975:300), the presence of endblade securing techniques on Late Dorset harpoon heads has never been formally quantified. Interestingly, Type G harpoon heads with securing holes and/or lashing grooves make up the vast majority of the specimens included in the metric analysis of this thesis (Figure 9.15). While it was shown previously that those with securing holes or notches tended to have slightly thinner blade slots than the others (Figure 5.32), it is curious that as blade slots became thinner, the means to securely attach endblades to the harpoon head became more prevalent. When comparing medial and distal blade slot thicknesses with the securing technique, the pattern is largely respected with almost all harpoon heads with securing holes or notches having thinner blade slots than those with lashing grooves or no visible securing method (Figure 9.16).

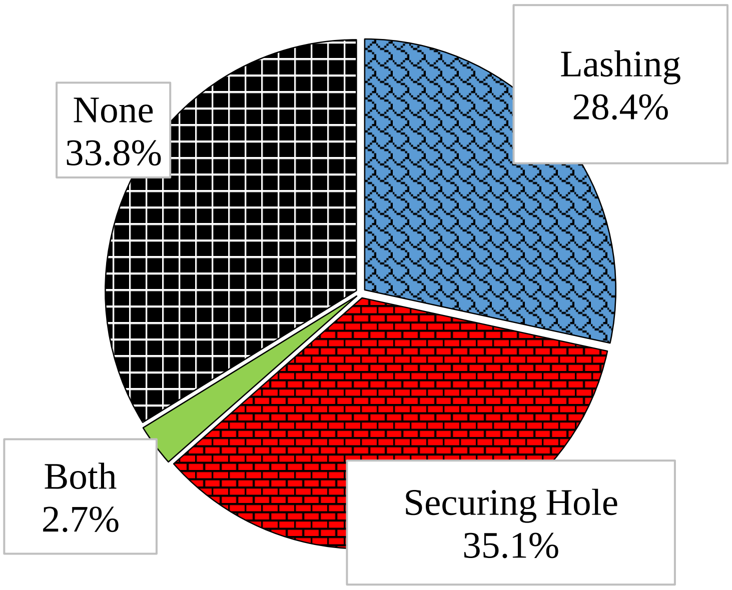

Figure 9.15: Relative proportion of Type G harpoon heads with visible traces of endblade securing techniques.

In addition to chert or similar lithic endblades being nearly impossible to attach with a rivet or similar technique, it would be expected that the slightly thicker lithic endblade would fit more tightly in the thinner Type G slot and, therefore, would not need additional fastening (much like what is seen with pre-Late Dorset harpoon heads). However, if a thin metal endblade was being fixed, it may need either a securing line, rivet, or lashing grooves to fasten it in a blade slot that is of similar (or greater) thickness. Recall that the most complete metal endblade, SiFi-4:116, did not have a perforation in the middle of the endblade but did have distinct side notches which would be in a similar location as lashing grooves found on a Type G harpoon head. Importantly, while lashing grooves could be used for either lithic or metal endblades, securing holes or notches could only be used with metal endblades.

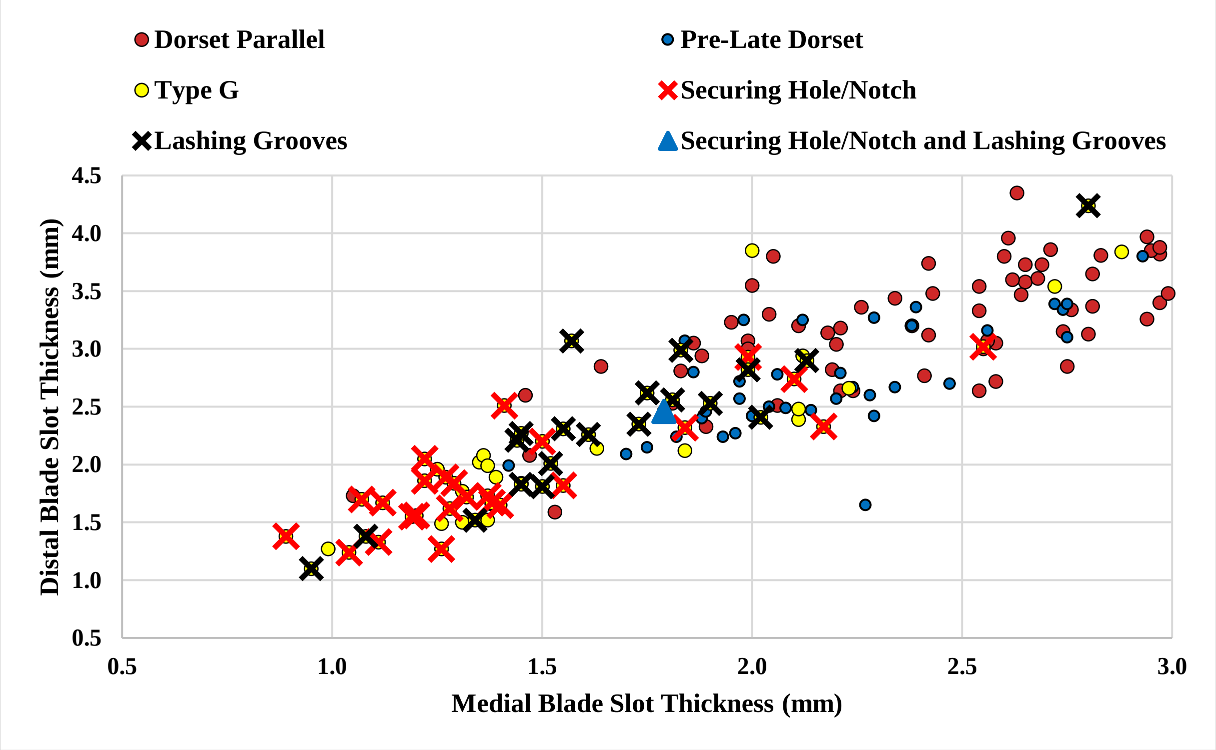

Figure 9.16: Blade slot thicknesses of Dorset harpoon heads with visible endblade securing techniques.

Another possibility that is poorly represented in Late Dorset collections is that they used endblades made from organic raw materials. These could easily be relatively thin and could be perforated to facilitate a rivet or securing line. One antler endblade included in the dataset, despite not being abnormally thin, had evidence of a perforation (Figure 9.17). However, this endblade was relatively thick (2.42mm medial thickness, 3.85mm distal thickness). Unless more organic endblades are identified, it will be difficult to assess their significance.

Much like blade slot thicknesses, the presence of an endblade securing technique does not necessarily guarantee metal use. However, with such a majority of Type G harpoon heads having very thin blade slots, the presence of a securing hole, despite being a lower prevalence than very thin blade slots, supports the interpretation that it once held a metal endblade. The low level of Dorset Parallel harpoon heads with visible traces of securing techniques also indicates a variety of raw materials being used. Since Dorset Parallel did not see a similar proliferation in endblade securing techniques, it may indicate that the older (and larger) harpoon head form maintained predominantly using lithic endblades.

Figure 9.17: QjJx-1:92 antler Late Dorset endblade with central perforation to facilitate the use of a rivet or securing line to fasten to a harpoon head. Photo permission courtesy of the Government of Nunavut and the Prince of Wales Northern Heritage Centre.

9.2.4 Concluding Remarks

Taken together, this is the strongest evidence that not only do blade slots of Type G harpoon heads indicate that they likely once held metal endblades, but they potentially held metal endblades more frequently than they held lithic endblades. The almost complete lack of pre-Late Dorset harpoon heads with similarly thin slots shows how ubiquitous metal use and exchange began with Late Dorset. Not only does this support LeMoine's (2005) findings that metal was used at least as often as stone in manufacturing organic objects by Late Dorset people, but it advances our understanding by demonstrating that metal was used in daily subsistence activities as well. Moreover, these data demonstrate that the existing Late Dorset metal assemblage vastly underrepresents how much metal that was being used. Alternatively, while it is possible that a single metal endblade was refitted into multiple harpoon heads throughout its use-life, it seems odd that a similar amount of curation and reuse was not given to lithic endblades. Endblades can be considered "high risk" objects in terms of being lost and frequently replaced (e.g. Grønnow 2017:87; Gullason 1999:524) and therefore it is expected that endblade raw counts should always outnumber harpoon heads which is not the case for Type G harpoon heads.

Additionally, the fact that there are two thickness clusters for Dorset Parallel harpoon heads from Late Dorset contexts, despite being on average thicker than Type G, also indicates that there were at least two endblade sizes. The data unfortunately cannot disentangle if two different sizes of lithic endblades were used for Dorset Parallel harpoon heads or if the thinner cluster there also represents increased metal use. In any case, the metal assemblage also maps well to both the Type G clusters and the thinner Dorset Parallel cluster. Given the normal distribution of both pre-Late Dorset harpoon heads and Dorset Parallel harpoon heads from pre-Late Dorset contexts, it seems unlikely that they would have begun to use two different lithic endblade sizes without a similar detectable change in the lithic material as well. If the clustering seen with Late Dorset harpoon heads was simply stochastic, it seems unlikely that a similar pattern is seen in two independent harpoon head categories as well when comparing metal and lithic endblade thicknesses.

Likewise, the explosion of visible endblade securing techniques is another supporting strand of evidence that indicates wide-spread metal use among the Late Dorset. While only one third of all Type G harpoon heads had securing holes or notches their presence along with lashing grooves demonstrates that even though Late Dorset harpoon head blade slots were becoming thinner, they needed additional means for fastening the endblade to the harpoon head. The most parsimonious explanation for all these phenomena is that starting around AD 500, Dorset people literally reshaped the raw material they used for their harpoon endblades and began to exchange this raw material over thousands of kilometres of Arctic landscape. Whether this behaviour is reflected in their knife handles will be discussed next.

9.3 End- and Side-Hafted Knife Handles and Late Dorset Metal Use

This section will discuss the results of the end- and side-hafted knife handle blade slot data and then it will contextualise it with lithic object basal thicknesses, much like how the harpoon head data was treated. Side-hafted knife handles will be discussed first followed by end-hafted handles.

9.3.1 Side-Hafted Handles and their Significance

Unlike the harpoon head data, there is less stylistic variability with side-hafted handle. Therefore, it is difficult to assign a temporal period to side-hafted knife handles unless they are associated with other material that has a more distinct chronological signature. In addition to this challenge, the blade slots of side-hafted handles are fundamentally different from both harpoon heads and end-hafted handles. In particular, the measurements taken represent the outermost portion of the blade slot and do not reflect, as do the harpoon head and end-hafted knife handle data, the full profile of the blade slot. As such, a slightly different approach for understanding these data will be taken. In particular, this discussion will rely on the “proximal” and “distal” measurements which, as discussed in Chapter 4, represent the proximal-most portion and the mid-point of the blade slot respectively. These two measurement locations should also represent the thinnest and thickest parts of the blade slot.

Side-hafted knife handle blade slots are less regularly distributed than harpoon heads (Figure 9.18). In saying that, it appears to be generally log normal distribution. When separated by region, the bulk of the data follows the same pattern except for the specimens from the Foxe Basin which seem to have two clusters (Figure 9.19). Interestingly, the dip test conducted in Chapter 5.3.1 also showed that Foxe Basin side-hafted handles were at least bimodal in terms of medial slot thicknesses which is not the measurement represented here but is at least indicative of some sort of multimodality in the Foxe Basin sample. This same pattern is faintly visible with the Central Arctic material, although with much less distinct clusters. Interestingly, the sites included in both the Foxe Basin group (NiHf-4; NiHf-45) and in the Central Arctic group (QiLa-3; QiLd-1; QjJx-1; QjJx-10; RcHh-1; RcHw-7) are all Late Dorset. It is tempting to suggest a similar two-cluster result among the side-hafted handles of these Late Dorset sites as seen in the Late Dorset Type G and Dorset Parallel data. However, comparing this dataset with the associated microblade data is revealing.

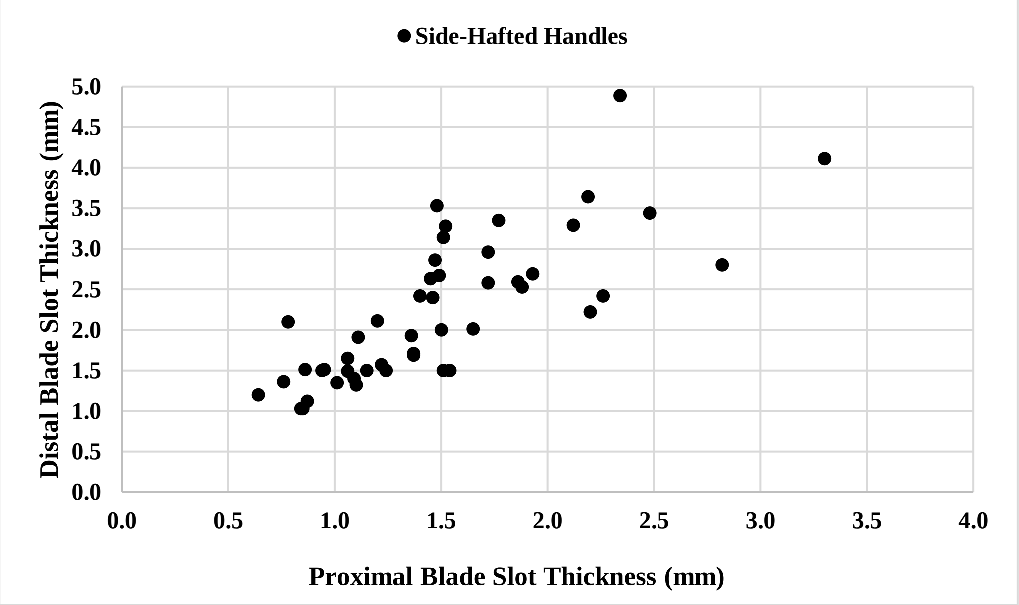

Figure 9.18: Comparison of proximal and distal blade slot thicknesses for side-hafted handles (n=48). Recall that the position of the measurement for side-hafted handles is slightly different than with the other organic tool types.

The associated microblade data match very closely with the distal blade slot thicknesses of side-hafted handles with a primary cluster around 1.5mm and then a secondary, more diffuse cluster around 2.5mm in a log normal distribution (Figure 9.20). Therefore, unlike the harpoon head and endblade data, there is a complimentary distribution in both the blade slot and associated lithic tool thicknesses. Therefore, raw material does not seem to have been a causal mechanism for the distribution. Interestingly, Schledermann (1990:252) suggests the decreased frequency in microblades specifically in Late Dorset contexts may be a result of metal blades being favoured. The data demonstrate that the blade slot thicknesses did not decrease to accommodate a new raw material if Schledermann’s speculation is correct.

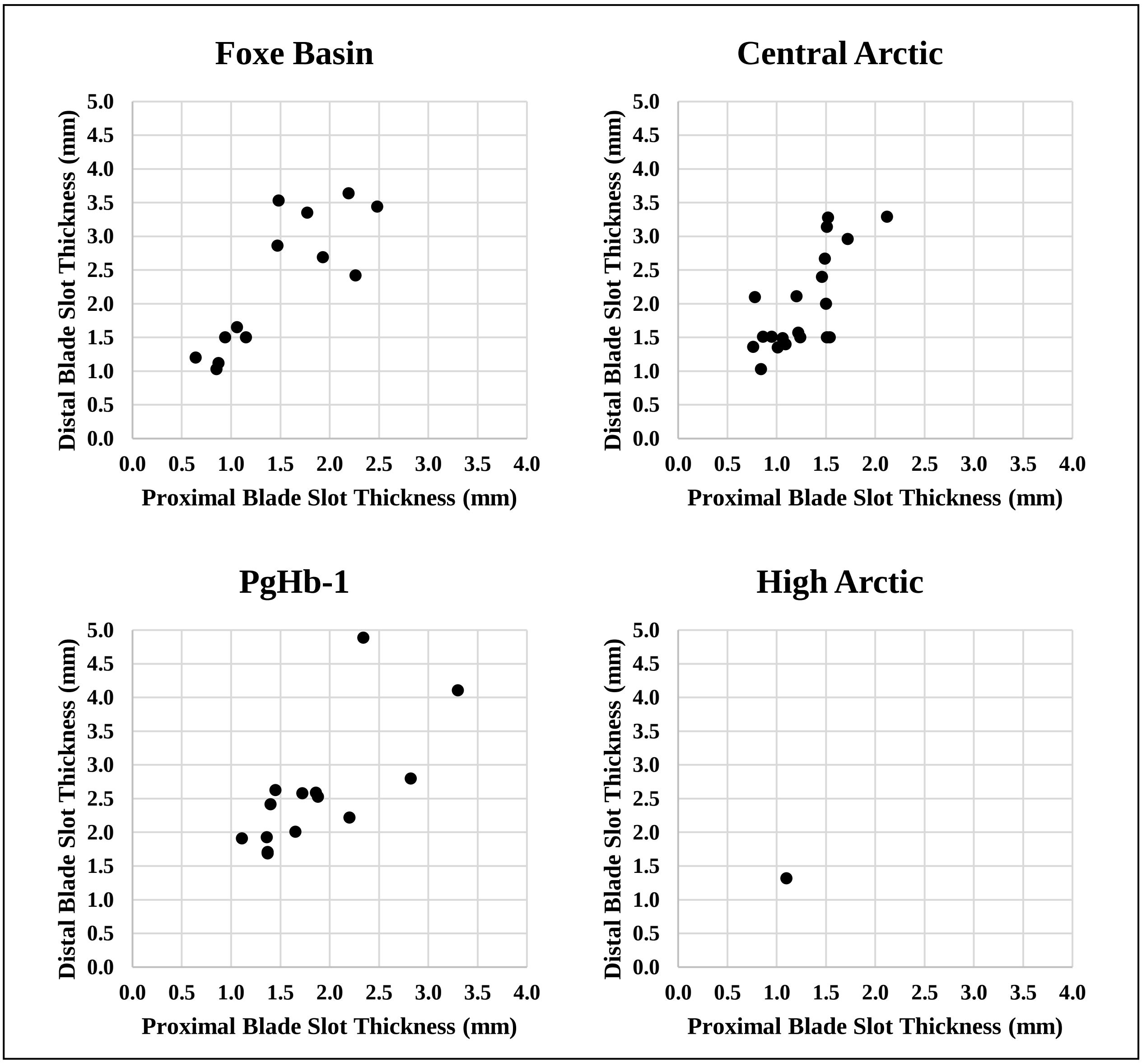

Figure 9.19: Comparison of the proximal and distal blade slot thicknesses for side-hafted handles from the Foxe Basin (n=13), Central Arctic (n=20), PgHb-1 (n=14), and the High Arctic (n=1).

While the sample size of metal tools that seemed to have been hafted into side-hafted endblades is small, the two specimens match closely with the microblade and side-hafted handle data (see Figure 9.20). Undoubtedly, increasing the metal blade sample size may yield different results but as it stands both metal blades and microblades were effectively the same thickness.

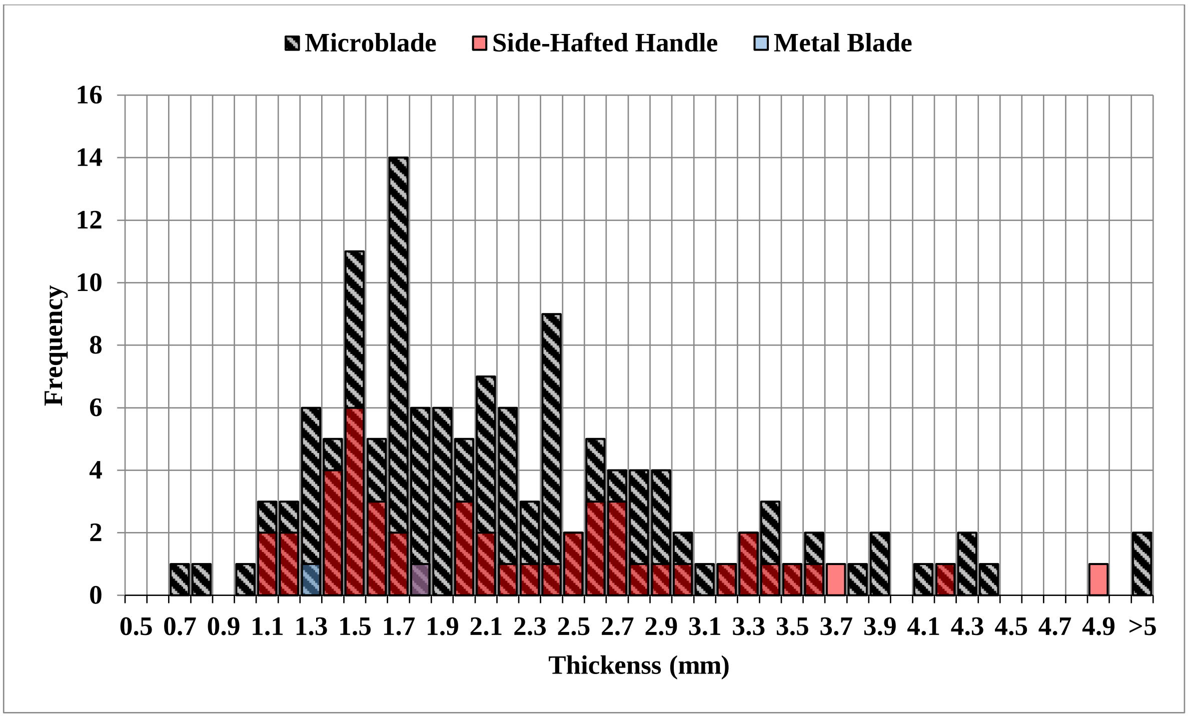

Figure 9.20: Comparing the lateral microblade thickness (n=133) and the medial thickness of both metal tools from SiFi-4 that were shaped to be hafted into a side-hafted knife handle (n=2) with the distal blade slot thickness of side-hafted knife handles (n=48).

9.3.2 End-Hafted Handles and their Significance

End-hafted handles have a number of lithic tools they could have supported. These include not only endblades or knives but also scrapers and burins. Furthermore, much like side-hafted handles, end-hafted handles appear throughout the Dorset period which makes assigning them a chronological association difficult without relying on other contextual information. When compared directly with harpoon head blade slot sizes, end-hafted blade slot medial thickness correlates well with pre-Late Dorset and Dorset Parallel harpoon heads (Figure 9.21). However, the distal blade slot thickness is much more variable. This is likely due to many end-hafted handle blade slots may have been stretched apart distally during their use-life which causes a slightly more variable distal thickness measurement. In many cases, these handles begin to split longitudinally starting from the base of the blade slot. Most also showed evidence for lashing grooves around the slot which would have helped to keep the endblade snug in the handle’s slot. Due to its correlation with the harpoon head data, it seems clear that most endblades and certainly the lithic knives could be easily slotted into an end-hafted handle with the finished metal objects being slightly thinner than most of the end-hafted handles. Burin-Like-Tools also correlate fairly well with the end-hafted handle data despite there being a few outliers on the thinner portion of the spectrum (Figure 9.22). However, scrapers are, on average, thicker than the end-hafted blade slot handles despite there being some overlap (Figure 9.23). One possible reason for this is that endscrapers may have occasionally been lashed on open slots (i.e. a blade slot that only has one blade bed as opposed to a closed slot which has two) which would mean controlling basal thickness is a smaller priority.

As noted in Chapter 5.3.2, there is a clear regional pattern in the blade slot sizes of end-hafted handles with those from the Hudson Strait being slightly thinner on average than those from northern Baffin Island. This relationship was confirmed by the t-test results comparing the medial blade slot thicknesses between the two regions. By incorporating the lithic data, however, it seems clear that this is simply some amount of regional patterning as all lithic tool types overlap with the end-hafted handles.

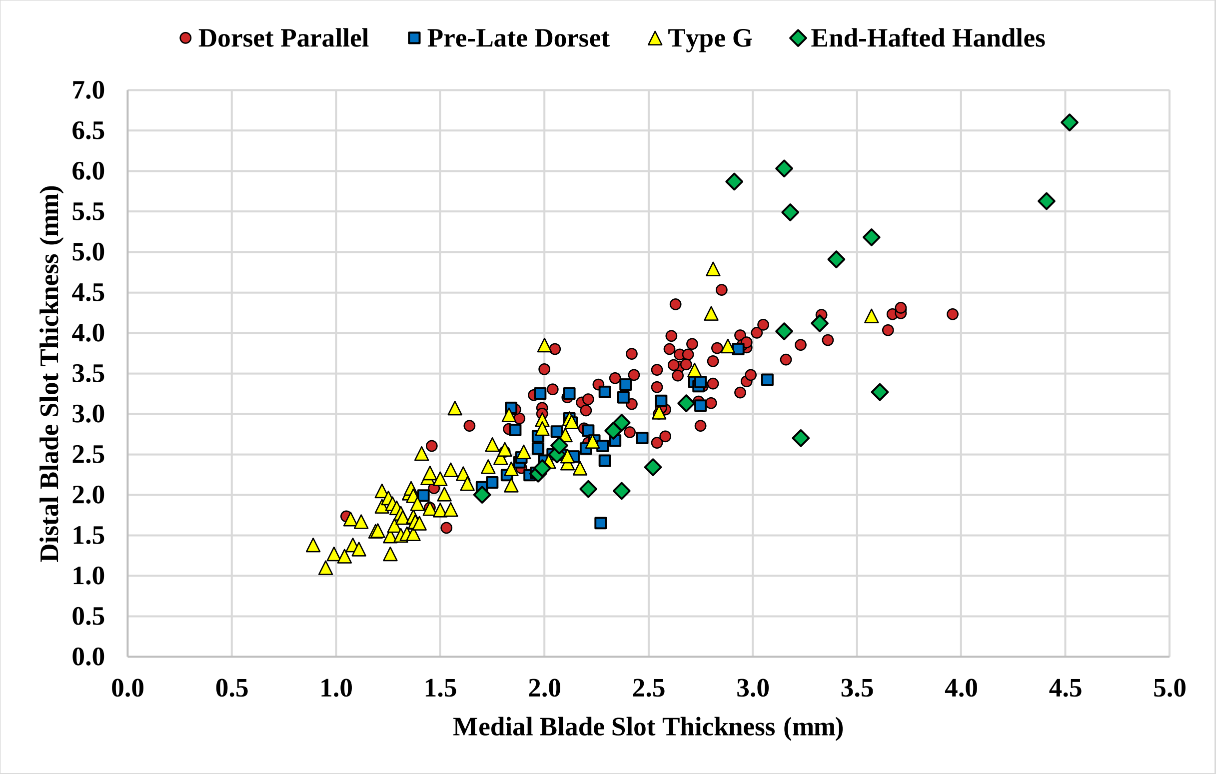

Figure 9.21: Comparison of medial and distal blade slot thicknesses for all harpoon heads (n=183) and end-hafted handles (n=22).

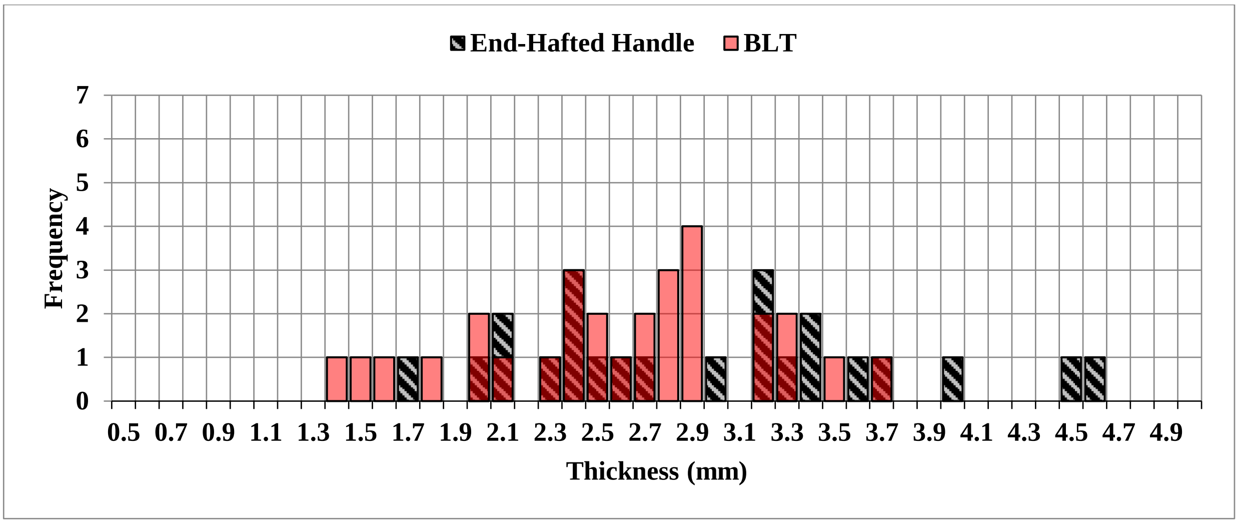

Figure 9.22: Comparison of medial blade slot thickness for end-hafted handles (n=23) with the basal thickness of burin-like-tools (n=29). Recall that only one basal thickness measurement was taken for BLTs due to the morphology of the tool itself and the similarity between all three measurement location thicknesses.

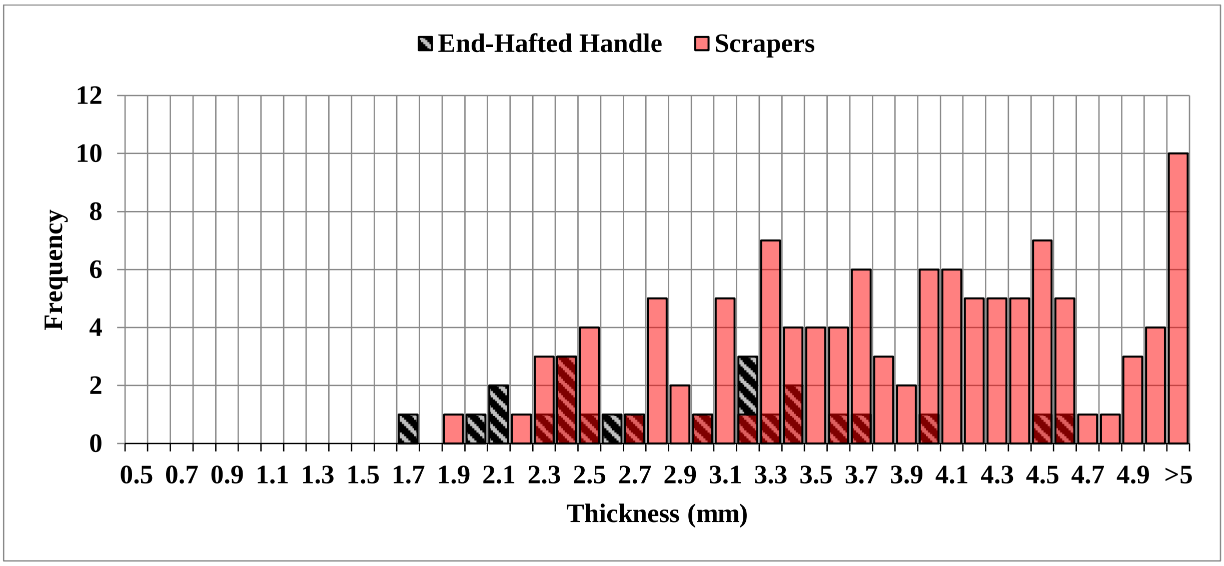

Figure 9.23: Comparison of medial blade slot thickness of end-hafted handles with basal thickness of scrapers. Recall that, like the BLT data, only one basal thickness measurement was taken for scrapers due to the tool morphology and the fact that the three measurement locations had similar thicknesses. Note the final column on the right contains all specimens with a basal thickness greater than 5mm.

9.3.3 Concluding Remarks

These data are significant for not only understanding Late Dorset metal use but also for verifying the interpretations of the harpoon head data. In particular, side-hafted handles showed no clear patterning in their blade slot sizes that indicated different raw material use. The extent to which metal was used is obscured by the fact that microblades have similar thicknesses. Likewise, there is no clear indication in the end-hafted handle data that suggests different raw material use. Significantly, even with having more varied lithic tool types that they could have supported, the blade slot thickness of end-hafted handles correlated well with the stone tools. Despite side- and end-hafted handles being able to support metal objects, it is very unlikely they did so exclusively.

These data are perhaps most significant when understanding what it reveals about the harpoon head dataset. Specifically, given that there is good correlation between the lithic tool basal thicknesses and the handle blade slots with no collection of handles having significantly thinner blade slots, the absence of stone tools that correlate with the thinner cluster of Type G harpoon heads should directly indicate metal use. Likewise, this also demonstrates that handles are less reliable, at least from the view of their blade slots, for estimating the extent of metal use. In saying that, it is interesting to note that the side-hafted handles from Late Dorset sites cluster, albeit less strongly, in a similar fashion as Late Dorset harpoon heads in that there are potentially two blade slot sizes. While it is clear that raw material might be a causal mechanism for blade slot size clustering in harpoon heads, the same cannot be said for side-hafted handles. Ultimately, these conclusions highlight the need for using varied methodology when using proxy indicators for metal use and the utility of microscopy in confirming or challenging these results.

9.4 Microscopy Significance

This section will discuss the microscopy results while also placing them in context with the blade slot data. Despite these results being preliminary, they represent the first attempt at classifying identifiable residues on Late Dorset organic harpoon heads and knife handles. In general, iron oxide residues were identified on thirty harpoon heads (twenty-six Type G, three Dorset Parallel, and one potentially pre-Late Dorset harpoon head) and eight side-hafted handles with no residues being found on end-hafted handles. Of these, twenty-seven harpoon heads and seven side-hafted handles were also included in the metric analysis. While this only represents 13.6% of all harpoon heads and 12.7% of all side-hafted handles in included in the metric dataset, this analysis can still help validate (or challenge) some of the blade slot data.

As stated in Chapter 8, it is likely that the presence of iron oxide under-represents the intensity of metal use among Late Dorset people. This is especially relevant considering residues left behind by copper endblades were not identified on any organic object despite the raw material being common in the extant Late Dorset metal collections. Therefore, sites that have relatively more copper than iron, such as the Little Cornwallis Island Sites or those from the western Canadian Arctic (e.g. LeMoine et al. 2003; Friesen 2004:689), may be underestimated if observing blade slot residues alone.

Ten of the harpoon heads were classified as having certain iron oxide residues while the remaining twenty only had possible iron oxide residues. Two of the side-hafted handles were also classified as having certain iron oxide residues. When these data are compared to the metric results, neither the presence of iron oxide residues nor the certainty of their identification seems to have clustered on any part of the harpoon head dataset other than that there are no harpoons that have blade slots thicker than average that also have identifiable iron oxide residues (Figure 9.24). In particular, a large number of harpoon heads with certain iron oxide residues are a part of the thicker Type G blade slot cluster (and thus overlap also with other harpoon head categories). It is clear that harpoon heads that have slightly thicker blade slot sizes could still have supported a metal blade.

In light of this, the clustering seen on both Type G and Dorset Parallel harpoon heads from Late Dorset contexts represents simply two different sizes of endblades rather than one size exclusively for lithic endblades and the other exclusively for metal. Instead, the microscopy results show that while the thinner cluster of Type G harpoon heads likely supported metal endblades, the thicker cluster could have supported either metal or lithic endblades. Importantly, this interpretation is supported by the visible endblade securing techniques with harpoon heads with securing holes/notches, used almost exclusively for metal endblades, being thinner than those with lashing grooves which could be used with either lithic or metal endblades. While the endblade securing techniques do not necessarily have to be used, the identifiable iron oxide residues associated with the slightly thicker blade slots that primarily have lashing grooves and not securing holes/notches demonstrates that different materials could have been used in the same harpoon head and, perhaps, certain harpoon heads were designed for specifically that capacity.

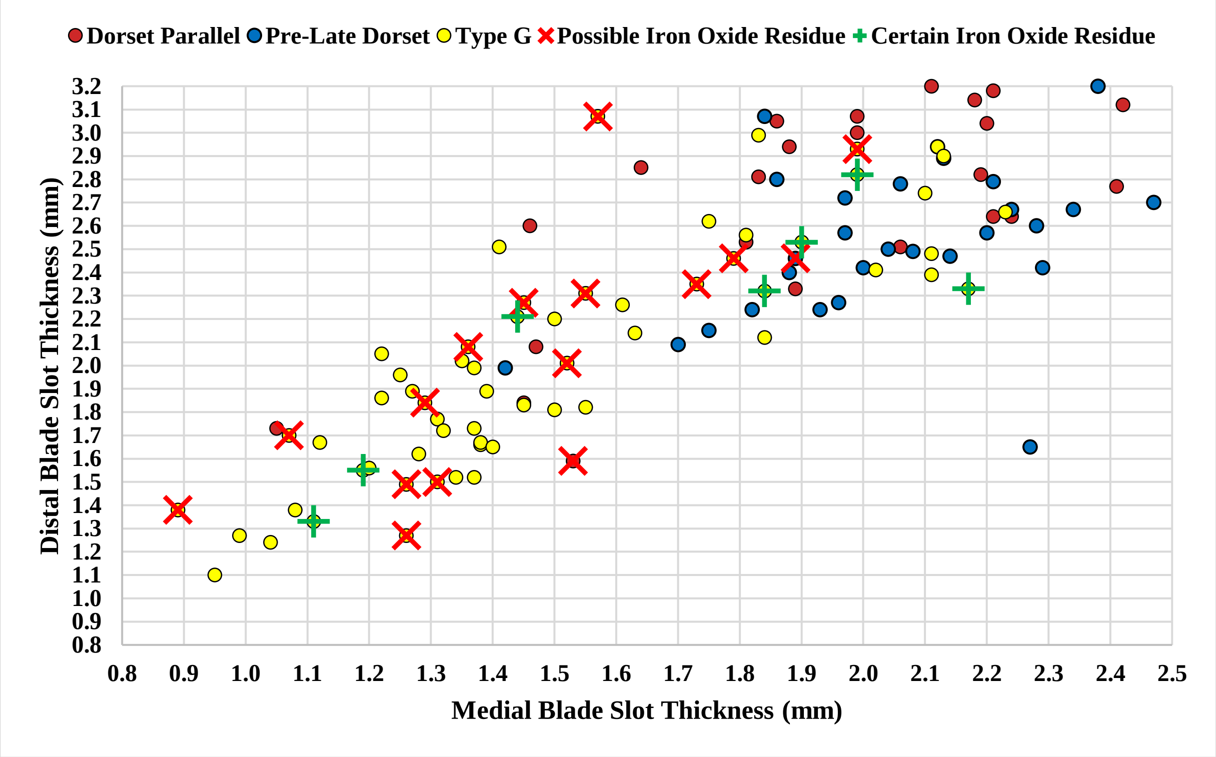

Figure 9.24: All harpoon heads that had certain (n=7) or possible (n=17) iron oxide residues.

Given that both clusters of Dorset Parallel harpoon heads from Late Dorset contexts overlap with the lithic endblade distribution, the purpose of the bimodal distribution remains perplexing. Both Dorset Parallel harpoon heads that have possible iron oxide residues that were also included in the metric analysis were from Late Dorset contexts. Moreover, both come from the thinner cluster of that harpoon head subset. While more data are necessary for disentangling the purpose of the Dorset Parallel harpoon head blade slot clustering, the microscopy results presented here suggest the thinner cluster may have been created specifically for thinner metal endblades, although it should be made clear that this thinner cluster still overlaps with the bulk of the lithic endblade data.

Although there are slightly fewer side-hafted handles with identified iron oxide residues in proportion to harpoon heads, the specimens that do have iron oxide residues tend to have thinner blade slots with the only residue classified as “certain” being among the thinnest cluster (Figure 9.25).

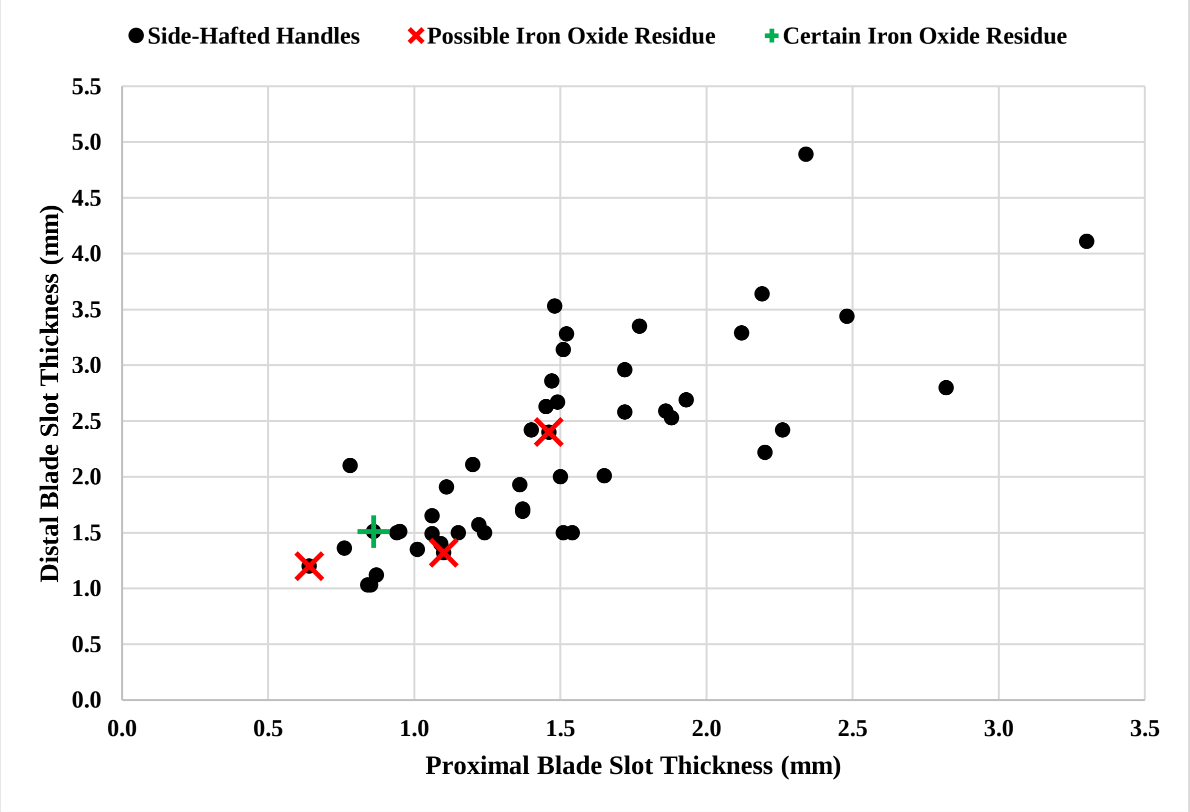

Figure 9.25: Side-hafted handles with certain (n=1) and possible (n=3) iron oxide residues. Note the sample size is smaller because some specimens did not have fully surviving blade slot and could not be accurately measured.

9.5 The Extent and Intensity of Late Dorset Metal Use and Exchange

The data discussed above is useful for understanding the extent of Late Dorset metal use and exchange from two different perspectives. First, it speaks directly to the geographic extent of Late Dorset metal exchange showing where metal flowed despite there being little or no metal objects being found in most sites. Second, the data also demonstrate the extent of how metal was being used. In particular, while the side-hafted handle data is not a reliable proxy indicator of metal use, the harpoon head data is much clearer. The extant Late Dorset metal assemblage, including those discussed in this thesis, speak directly to how the Late Dorset were using metal be it for subsistence activities or general utility (as seen by the SiFi-4 metal objects) or for personal adornment or even ritualistic activities (e.g. Harp 1974). However, the blade slot data show that in the case of harpoon heads, metal was used relatively frequently on one of the most common types recovered in late Dorset sites (e.g. Appelt et al. 2016:785). Therefore, while the extant metal assemblage hinted at how metal was being used, the proxy data presented here widen not only where metal was being used but, importantly, how it was being used. This section will first discuss the geographic extent of Late Dorset metal use and then begin debate the intensity of this exchange network.

9.5.1 The Extent of Late Dorset Metal Exchange

For the most part, the data discussed above largely agrees with the extent of metal exchange as seen in the existing metal objects found in Late Dorset sites throughout the Arctic. While the blade slot data cannot differentiate between the types of metal that may have been used, the microscopy results have shown iron use to be relatively ubiquitous throughout the Arctic with only sites in the western Canadian Arctic and the Hudson Strait not producing harpoon heads with iron oxide residues. Both regions had relatively few, if any, Late Dorset harpoon heads included in the dataset which, if rectified, would likely be illuminating regarding Late Dorset iron use. Significantly, 64.7% of sites that contained at least one Type G harpoon head also had at least one harpoon head contained within the thinner cluster of Type G blade slots.

Iron, realistically, had two main sources: the Cape York meteorite spread in northern Greenland or through trade with the Norse in southern Greenland. Given that Norse arrival in Greenland is dated towards the end of the 10th century (Arneborg et al. 2012), Late Dorset sites that predate this would have likely acquired all their iron from northern Greenland. Sites more than 800km away (linear distance) from Cape York produced harpoon heads or knife handles included in the data discussed above that would have held a metal blade. Copper, which derived from the Coppermine river area (or, again, trade with the Norse) would have travelled similar distances with some copper being found in Ellesmere Island sites (Schledermann 1990:216).

Taken together, the analysis presented above demonstrates that despite metal not being found at every Late Dorset site or Type G harpoon heads not exclusively using metal endblades, it is clear that metal was present, at least at some level, in every region that was sampled for this thesis (Figure 9.26). These interaction networks extended across vast distances. It is through the newly added body of metal proxy use as seen through harpoon heads and side-hafted knife handles that expands this metal use to sites where no metal was recovered.

The only other Arctic raw materials that were part of similar regular long distance trade network at some point in time would be Ramah chert which travelled thousands of kilometres in some time periods (e.g. Desrosiers 2017:107; Loring 2017) and walrus ivory which originated in the North American Arctic and Iceland and was traded into Europe by the Norse (Star et al. 2018). Additionally, metal was being exchanged over potentially vast distances from Asia into Alaska across the Bering Strait in the first and early second millennium AD (e.g. Cooper and Bowen 2013; Cooper et al. 2016). Metal, in the case of the Eastern Arctic, is particularly significant since there are two types being used (i.e. copper and iron) from two sources on opposite sides of the Arctic and both have similarly broad exchange networks in the Late Dorset period.

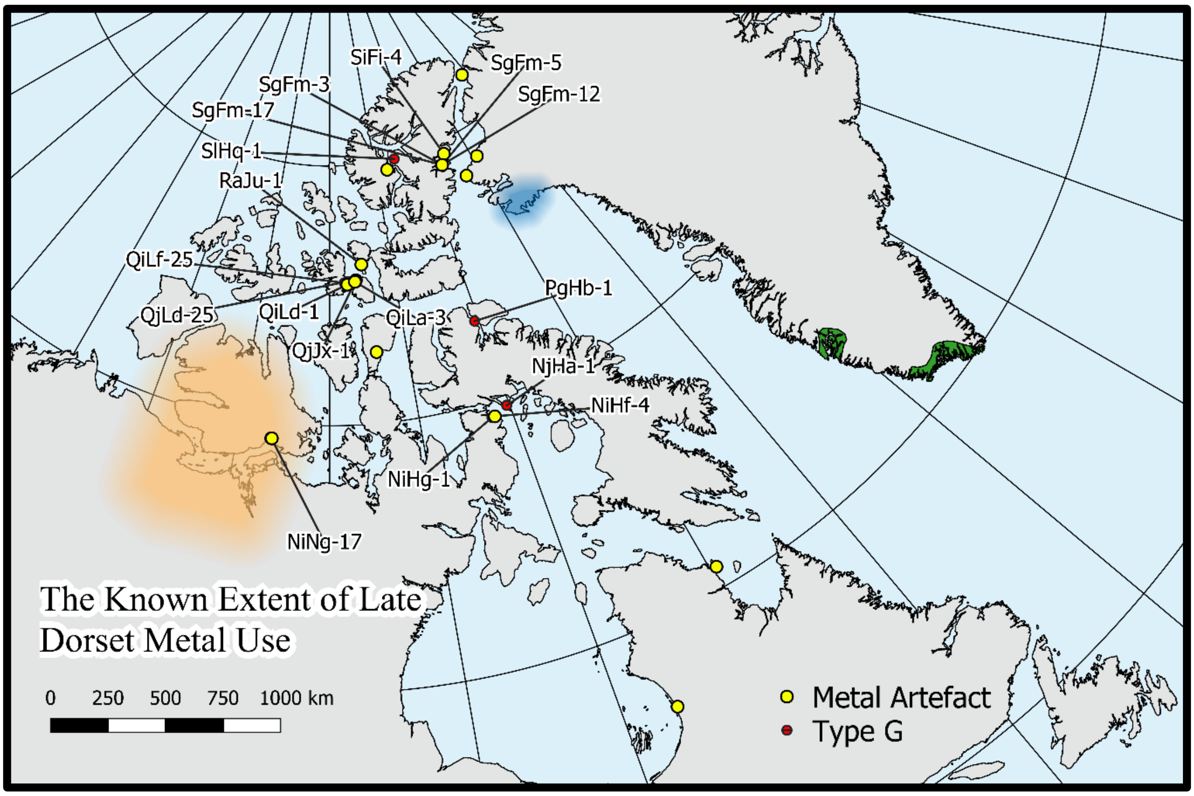

Figure 9.26: The known extent of Late Dorset metal use, showing sites with either a Type G harpoon head (labelled) or a metal artefact. Likely sources of Late Dorset copper and iron also included.

9.5.1.1 The Chronology of Late Dorset Metal Exchange and Intercultural Interaction

Assessing chronological change in the extent and intensity of Late Dorset metal exchange is not a trivial task. In particular, a number of Late Dorset sites have not been adequately dated and in some cases not at all. All dates from sites containing likely metal-supporting harpoon heads are included in Table 9.6. While PgHb-1 is a large multi-component site and has a similarly broad date range, it only has one Type G harpoon head in the assemblage (Figure 9.27). On the other hand, all the other sites that both contain at least one Type G harpoon head and suitable radiocarbon dates tend to cluster from AD 500 to 1000 (Figure 9.28). There are a few outliers, such as QiLa-3 and SlHq-1, which likely have dates relating to pre- and post-Late Dorset occupations respectively. Significantly, sites that date to the earliest part of Late Dorset (e.g. PgHb-1 and QjJx-1) contain evidence of metal use. While QjJx-1 has a large surviving metal assemblage, it also had one of the lowest frequencies of Type G harpoon heads that likely only supported metal endblades (see discussion in Chapters 5.2.2 and 9.5.2). Without more data, it is impossible to assess the validity of those dates. In any case, metal was used throughout the Late Dorset period with the lack of sites dating to post-11th century likely due to the few sites in general that are that recent to begin with.

While the material was not included in this thesis, very recent Late Dorset sites on Victoria Island have surviving copper objects which would have had to have been sourced from the Coppermine River area (Friesen 2004:688). Importantly, contemporaneous early Inuit sites on the mainland also exploited the same source. Although there is little evidence for direct contact between the two groups, aside from overlapping radiocarbon dates (e.g. Friesen 2004:689; Savelle et al. 2012:178), it does not seem that, at least, Late Dorset metal acquisition was hampered. In saying that, incorporating the organic artefacts, if possible, from those sites with the data presented here would be illuminating.

Another important, if contested aspect of the final stages of the Late Dorset culture is their contact with the Norse (e.g. Sutherland 2009; Sutherland et al. 2015 cf. Hayeur Smith et al. 2018; Sinding et al. 2015). There are a small number of metal objects found in Late Dorset sites which have been compositionally identified as being Norse in origin (e.g. Harp 1974; Plumet 1985). While Norse arrival in Greenland post-dates most of the sites that were sampled in this thesis, the addition of a novel source for metal is significant. With evidence of formalised exchange between the two groups being recently contested (e.g. Hayeur Smith et al. 2018; Sinding et al. 2015), it is difficult to understand the scope of Norse metal that would have made its way into Dorset interaction networks. Recent work by Sutherland and Thompson (2016) suggests that compositionally analysing whetstones or abrading stones in Late Dorset collections is a fruitful avenue for assessing specifically the influence of Norse metal on the Late Dorset. Unfortunately, the data here cannot differentiate between native and European sources of metal but it is important to note that there is minimal evidence for metal use detected at the sites used by Sutherland (2009) as case studies for Dorset-Norse contact.

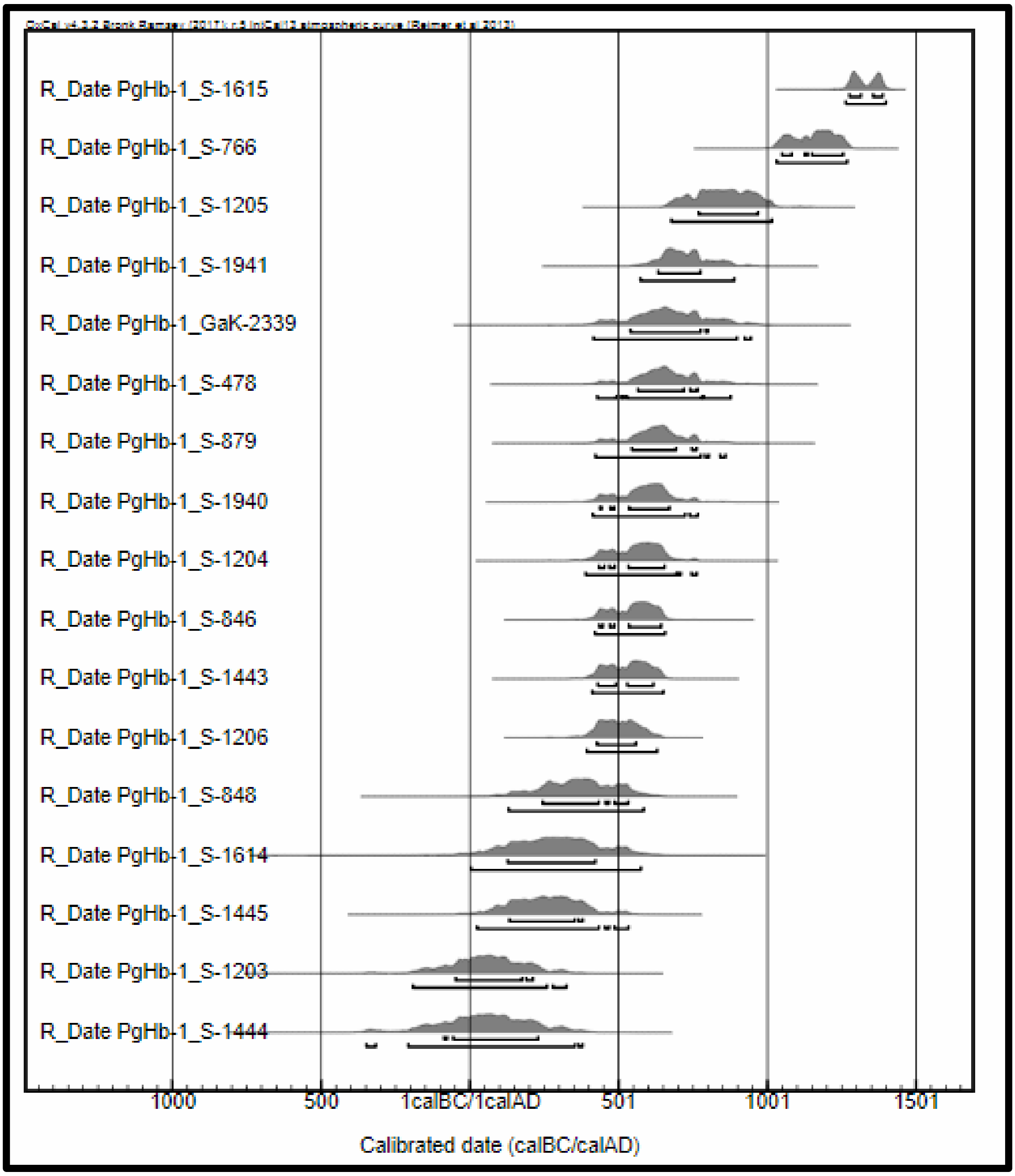

Figure 9.27: Plot of all dates from PgHb-1 from Late Dorset houses. All calibrated by author with OxCal 4.3 using the IntCal13 calibration curve (Bronk Ramsay 2009; Reimer et al. 2013). Data were retrieved from CARD (Martindale et al. 2016).

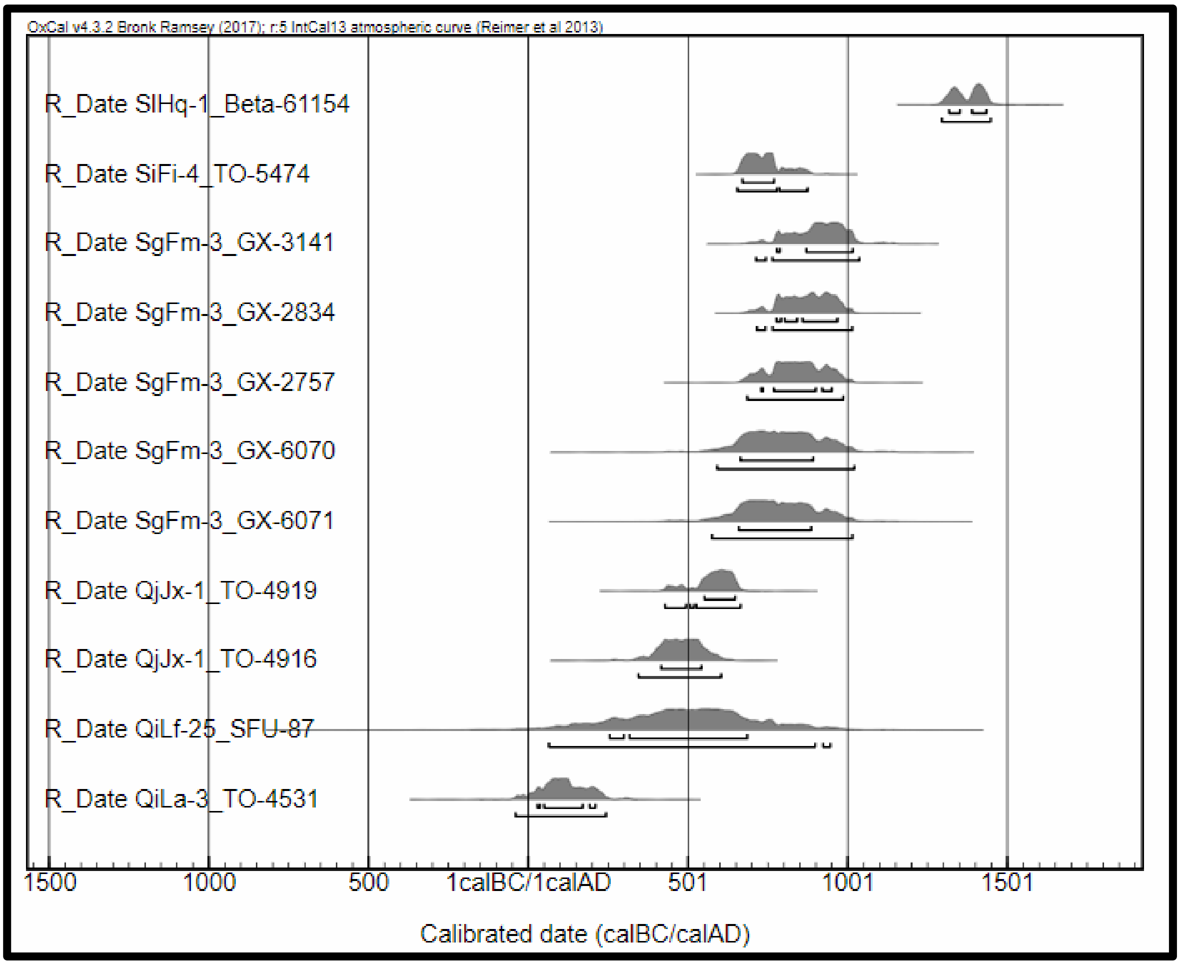

Figure 9.28: Plot of all Late Dorset sites that have likely metal-securing Type G harpoon heads excluding PgHb-1. All calibrated by author with OxCal 4.3 using the IntCal13 calibration curve (Bronk Ramsay 2009; Reimer et al. 2013). Data were retrieved from CARD (Martindale et al. 2016).

Site	**Lab Code**	**Material**	**Context**	^{14}***C Date* (uncal.)**	**Cal AD (2-sigma)**
PgHb-1	S-1615	Wood	House 73	670 +/- 50	1264-1400 (95.4%)
PgHb-1	S-766	Plant remains	House 71	860 +/- 70	1032-1269 (95.4%)
PgHb-1	S-1205	Caribou bone collagen	House 73	1170 +/- 90	678-1016 (95.4%)
PgHb-1	S-1941	*Salix* sp.	House 73	1320 +/- 80	574-890 (95.4%)
PgHb-1	GaK-2339	Burned bone collagen	House 71	1370 +/- 120	416-898 (94.3%)
PgHb-1	S-478	Charcoal/burned bone	House 72	1380 +/- 95	429-494 (5.7%), 528-782 (81.5%) 787-878 (7.6%)
PgHb-1	S-879	Caribou bone collagen	House 73	1400 +/- 90	422-778 (93.9%)
PgHb-1	S-1940	Plant remains	House 73	1440 +/- 90	414-724 (92.4%), 739-768 (3.0%)
PgHb-1	S-1204	*Salix, Cassiope tetragona*	House 73	1470 +/- 90	390-695 (93.9%)
PgHb-1	S-846	*Cassiope tetragona*	House 73	1490 +/- 70	421-657 (95.4%)
PgHb-1	S-1443	Plant remains	House 73	1510 +/- 70	412-652 (95.4%)
PgHb-1	S-1206	*Cassiope tetragona*	House 73	1550 +/- 60	394-630 (95.4%)
PgHb-1	S-848	Caribou bone collagen	House 71	1670 +/- 100	131-585 (95.4%)
PgHb-1	S-1614	Plant remains	House 73	1740 +/- 130	4-576 (95.4%)
PgHb-1	S-1445	Plant remains	House 73	1770 +/- 100	25-434 (92.2%), 487-534 (2.6%)
PgHb-1	S-1203	*Salix, Cassiope tetragona*	House 73	1940 +/- 100	192 BC – 260 AD (92.6%), 280-325 (2.8%)
PgHb-1	S-1444	Caribou bone collagen	House 73	1940 +/- 120	208 BC – AD 355 (93.6%)
QiLa-3	TO-4531	Caribou bone collagen	Midden feature 3	1900 +/- 60	40 BC – 244 AD (95.4%)
QiLf-25	SFU-87	Ungulate bone collagen	Longhouse	1520 +/- 200	66-899 (94.8%)
QjJx-1	TO-4919	Caribou bone collagen		1460 +/- 60	527-665 (81.7%), 429-495 (12.2%) 508-520 (1.5%)
QjJx-1	TO-4916	Caribou antler		1580 +/- 60	345-604 (95.4%)
SgFm-3	GSC-3141	*Salix?*	Hearth row 2	1110 +/- 70	714-744 (2.1%) 765-1037 (93.3%)
SgFm-3	GSC-2834	*Salix* sp.	Hearth row 1	1150 +/- 60	717-743 (3.4%), 766-1015 (92.0%)
SgFm-3	GSC-2757	*Salix* sp.	Hearth row 1	1180 +/- 70	686-987 (95.4%)
SgFm-3	GX-6070	Bone collagen	Hearth row 1	1240+/-120	592-1022 (95.4%)
SgFm-3	GX-6071	Bone collagen	Hearth row 1	1260 +/- 120	576-1016 (95.4%)
SiFi-4	TO-5474	Muskox bone collagen	Dwelling	1280 +/- 50	655-780 (78.3%), 788-875 (17.1%)
SlHq-1	Beta-61154	Bone collagen	House feature	540 +/- 60	1296-1448 (95.4%)

Table 9.6: All Late Dorset sites that have at least one likely metal-supporting Type G harpoon head with available radiocarbon dates. All calibrated by author with OxCal 4.3 using the IntCal13 calibration curve (Bronk Ramsay 2009; Reimer et al. 2013). Data were retrieved from CARD (Martindale et al. 2016).

9.5.2 The Intensity of Late Dorset Metal Use

As previously stated, the blade slot data has been very useful for seeing metal use among Late Dorset harpoon heads but less so with side-hafted handles. While some broad-scale patterns emerged between blade slot size clustering with both harpoon heads and side-hafted handles, Type G harpoon heads were unique in having a majority of the specimens having thinner blade slots than the vast majority of lithic tools. Dorset harpoon head types have occasionally been associated with specific prey (e.g. Murray 1999) but it seems that the emergence of Type G harpoon heads during the Late Dorset period coincided with a large scale increase in the intensity of using metal endblades. Despite the data presented in this thesis being a sample of the totality of Late Dorset material culture, if Type G pattern found herein can be extrapolated to other Late Dorset contexts then it is possible that more than half of bladed Late Dorset harpoon heads held primarily metal endblades. In saying this, the pattern may shift in regions that are furthest away from iron and copper sources, such as Nunavik and Labrador, and, if there was a comparable assemblage, show increased stone endblade use.

Previous researchers have attempted to establish a minimum blade slot thickness rule of sorts that indicated which could support lithic or metal object or just a metal object in early Inuit contexts (e.g. Gullason 1999:511; McCartney 1988; 1991). The weakness of summarising the thickness of a blade slot with a single number, especially in Dorset contexts where the blade beds are very infrequently parallel to each other, is that it removes the variability in the blade slots morphology in some cases or, when multiple blade slot measurements for a single object are averaged (e.g. Whitridge 2002:177), is not actually a direct measurement of the blade slot. With this in mind, no attempt will be made to collapse the data down but it will be emphasised that given the few lithic tools that have basal thicknesses less than 1.7mm in the medial location and 2.4mm in the distal location, it seems most likely that any future Late Dorset harpoon head blade slots that fall in this location will most likely have held a metal blade. However, this does not preclude harpoon heads with thicker blade slots also supporting metal endblades. Therefore, any such “rule” can be seen as a minimum rather than a maximum.

Importantly, the forty-three Type G harpoon heads that constitute the thinner cluster of blade slots came from eleven sites. While, overall, this constituted 63.2% of all Type G with sufficient surviving blade slots to get both medial and distal measurements and 64.7%

of all sites that contained at least one Type G harpoon head, the frequencies generally increase when broken down on a site-by-site basis (Table 9.7). Significantly, only three sites that have at least one Type G specimen in the thinner cluster has a relative proportion of thin Type G blade slots that is less than average. Interestingly, two of those sites, SgFm-3 and QjJx-1, represent sites that are very close to a metal source and that have high frequencies of metal objects found in their collections respectively. Interestingly, all six sites that do not have at least one Type G harpoon head in the thinner cluster only have one specimen each. Rather than assume that metal was not being used at these sites, it is the sample bias at these sites that is producing the results. This breakdown clearly demonstrates that while the proportion of metal-supporting organic objects is high, on some sites it represents nearly all Type G harpoon heads.

Site	**Number within Thinner Cluster**	**Number within Thicker Cluster**	**Percentage within Thinner Cluster**
NiHf-4	5	1	83.3%
PgHb-1	1	0	100%
QiLa-3	1	0	100%
QiLd-1	23	10	69.7%
QiLf-25	1	1	50%
QjLd-25	1	0	100%
QjJx-1	3	3	50%
SgFm-3	2	4	33%
SgFm-5	2	0	100%
SiFi-4	3	0	100%
SlHq-1	1	0	100%
All others	0	6	0%
Total	**43**	**25**	**63.2%**

Table 9.7: Sites that contain at least one Type G harpoon head. Note that "thinner" and "thicker" cluster refers to the groupings discussed above.

One of the challenges of using proxy indicators for determining the intensity of metal use is that the metal objects themselves will never be recovered in sufficient number to validate these results. However, it must be emphasised that the fact that harpoon heads are the tool type that is used to assess metal use is significant in that sea mammals compose a significant proportion of Late Dorset subsistence economy although they were far from reliant on them (e.g. Cox and Spiess 1980:666; Darwent and Foin 2010:323; Friesen 2009:242; Gotfredsen et al. 2018; Howse 2018:14; Murray 1999:472). Both in terms of the archaeofauna from Late Dorset sites and from the material culture, harpoon heads were themselves common objects. And of those Late Dorset harpoon heads, Type G is among the most common bladed type found on Late Dorset sites (e.g. Damkjar 2005:156; Park and Mousseau 2003:264). If the harpoon head data presented in this thesis is at all analogous for the Late Dorset in general then it would seem the majority of one of the most common harpoon heads frequently held metal endblades. This suggests that metal was not simply a rare object that had to be continually curated and reused (e.g. McCartney 1988:94) but one that was present in everyday life.

Another marker for the intensity of metal use is seen in the microscopy data. In particular, QiLd-1 (Brooman Point) and NiHf-4 had a number of harpoon heads and knife handles that had iron oxide residue. Assuming the iron from those sites derived from the Cape York meteorite, then each object with a residue potentially represents a journey (from the object's perspective) of over 900km. In total, 34.7% of harpoon heads from QiLd-1 and 11.1% of harpoon heads from NiHf-4 had identifiable iron oxide residues and the proportion of likely metal-supporting harpoon heads increases to 65.2% for QiLd-1 and 27.7% for NiHf-4 when the presence of a securing hole/notch and thin blade slots (i.e. less than 2.4mm distally and 1.7mm medially) is considered. Despite the differences between the two sites, it is clear that metal was likely primarily hafted in harpoon heads anywhere from one third to two thirds of the time. Had copper residues been detectable and if the data could differentiate between harpoon heads that could have held both metal and lithic endblades, this number would likely increase again. Considering both NiHf-4 and QiLd-1 approach 1000km away from either Cape York in northern Greenland or the Coppermine River just south of Victoria Island, the intensity of metal use is likely only higher from sites closer to the source. For example, 57.1% of harpoon heads from SgFm-3, 66.7% of harpoon heads from SgFm-5, and 100% from SiFi-4 could be considered metal-supporting harpoon heads with those same criteria (i.e. iron oxide residue or securing hole/notch or thin blade slot) and they are all located on the east coast of Ellesmere Island. However, recall Table 9.7 that shows that some sites that would be expected to have the highest relative frequency of metal-supporting harpoon heads (e.g. SgFm-3 and QjJx-1) have the lowest.

Another tempting, if speculative, result of the microscopy data is that, despite blade slot thicknesses being a less reliable proxy indicator for side-hafted handles, the similar relative proportion of residues identified on harpoon heads and handles might be an indication that the proportion of metal to lithic blades are similar between the artefact categories.

Although, given that not all residues were identified with certainty and that there are unknown taphonomic processes that may have obscured or even removed some iron oxide residues it makes it difficult to verify this observation. Along these lines, Schledermann (1990:252) suggests the relative decrease in microblade prevalence in Late Dorset contexts when compared to Early or Middle Dorset may also be the result of metal being used more intensively.

9.6 Concluding Remarks

This chapter compared the strands of data presented in Chapters 5-8 and demonstrated that not only is metal use explicitly detectable in the organic material culture, specifically the harpoon heads and knife handles, of the Late Dorset. The quantitative blade slot data was first presented and subsequently the weak-moderate correlation between blade slot thickness and other measureable physical properties of the object (e.g. blade slot length or overall artefact size) verified in their respective results chapter. Similar analyses were done for lithic material although the correlation between basal thickness and the physical dimensions of the object were slightly more strongly correlated.

With the blade slot data tested and verified to not just be influenced by the object's other dimensions, this chapter took these datasets and integrated them together. Significantly, this showed that blade slot thickness, especially in the case of Late Dorset Type G harpoon heads, is a good indicator of metal use. In combination with the microscopy evidence showing, overwhelmingly, that Type G are the most common object type that have iron oxide residues with pre-Late Dorset harpoon heads showing effectively no evidence of such residues, the blade slot thickness data was validated as being a valuable proxy indicator for metal use, at least among harpoon heads. While iron oxide residues were identified on side-hafted handles, albeit at a lesser frequency, the thinness of microblades (i.e. the most likely lithic tool to be hafted in a handle) made differentiating between a metal- or lithic-supporting handle much more difficult, if not impossible. In saying that, metal use evidence from both side-hafted handles and harpoon heads from Late Dorset contexts confirms metal was used for a variety of activities.

The clearest explanation for these data is that metal use was extensive and intensive in the Late Dorset period with little, if any, evidence of metal use being found in preceding periods. Along with this, metal use is the best direct indicator of the extent (and intensity) of Late Dorset interaction networks. Unless new sources are identified, iron from northern Greenland and native copper from the Coppermine River, were ultimately spread thousands of kilometres away. Although the dataset is not robust enough to give a definitive answer, the quantity of metal-supporting objects is not strongly correlated with distance from the source with sites, such as NiHf-4 and QiLd-1, producing roughly the same intensity of metal use as sites located closer to the source of the raw material. Undoubtedly, this may change, however, by increasing the sample size of objects deposited within short distance of the source. Using these proxy indicators, a greater amount of metal use can be quantitatively demonstrated as opposed to being simply speculated (e.g. Schledermann 1975). With this in hand, the Late Dorset interaction network and the social relations created through that system can now be more explicitly discussed.

Chapter 10

Enchainment of Late Dorset Social Relations

10.1 Overview

This chapter will discuss the “nature” of Late Dorset metal exchange. For the purposes of this chapter, “nature” can be defined as why the Late Dorset used and exchanged metal and also how that new raw material potentially afforded new types of social relations. Specifically, the theoretical framework outlined in Chapter 3 will be tested to see if the data discussed in Chapter 9 supports or challenges it. In particular, the concept of social relation enchainment, as developed through Chapman (2000), will be examined as a key social process within Late Dorset interaction networks and subsequently if it is a suitable framework for understanding the nature of Late Dorset metal exchange. Importantly, the approach taken here is not to provide a grand explanation of Arctic life or even fully detail Late Dorset exchange and interaction but rather use a middle-range theory to explore potential causal mechanisms for and results of Late Dorset interaction networks as seen from the data discussed in Chapter 9 (following the epistemological approach outlined by Smith 2015). In keeping with the somewhat symmetrical approach laid out in Chapter 3, this chapter will not only engage with the affordances of metal in creating social relations but also the affordances of those social relations in distributing material across space. Lastly, the mechanism of enchainment within Late Dorset interaction networks will be compared to Middle Dorset contexts as a way of checking if similar processes developed from an earlier period.

10.2 The Materiality and Itineraries of Late Dorset Enchainment

As touched upon in Chapter 3, enchainment is a process where inalienable social relations are created between individuals through the exchange of material. To engage with this process, the materiality of metal and the itineraries of metal are the two core concepts of this enchainment that first need to be discussed in order to assess if it is a valuable tool for understanding Late Dorset metal exchange. First, the materiality of Late Dorset material culture will be detailed. Next, the itineraries of their objects will be discussed in reference to enchainment. Once the foundations of how enchainment may have worked within Late Dorset metal exchange are established, the implications of enchainment on Late Dorset interaction networks will be debated.

10.2.1 The Materiality of Late Dorset Social Relations

This section will first discuss the materiality of metal. That is to say, the ways Late Dorset engaged with and understood metal as a raw material. In order to accomplish this, establishing the ontological perspective of the Late Dorset is key. By observing other aspects of their material culture, this section will demonstrate how metal objects themselves may have been some sort of social index (i.e. representing something bigger than the object itself) beyond its functional role as a raw material, a fundamental requirement for creating enchained social relations.

Despite the Late Dorset not having living descendants to use as a direct ethnographic analogy, numerous studies of northern peoples has shown a common, underlying belief that the world is inhabited by human, nonhuman animal, and nonanimal persons (e.g. Fienup-Riordan 1994; Fitzhugh 2009; Fitzhugh and Kaplan 1982; Lund 2015; Oosten 1992:114; Willerslev 2007:73). However, this is not to say that there is not diversity in what constitutes an animate being and what does not in circumpolar north minds (Lund 2015:32). This way of relational understanding is commonly referred to as animism but more recently it was developed by Viveiros de Castro (1998:470) from his work in the Amazon and has been termed Amerindian Perspectivism. Within Human-Animal relations specifically, Betts et al. (2015) have used this theoretical approach specifically for explaining the considerable number of polar bear carvings in Late Dorset collections as a direct indication of not only how Dorset people interacted with polar bears but to also underline that, through commonalities in hunting strategy, prey, and mutual deadliness, Dorset people likely understood polar bears as similar beings to themselves. A similar conception may have been applied to nonanimals. This is important for understanding the nature of Late Dorset metal exchange as it specifically frames how the Dorset people may have understood the world around them and the role they played in that world.

Within traditional Inuit ontology, the world had a closed systems of souls where none were added and, upon death, none were lost (Guemple 1994:118). While there are various terms among different groups of Inuit and Yupik people, the general term *inua* refers to the soul contained within all animals, objects, and even celestial bodies (Oosten 1992:116). Willerslev (2007:74) argues a similar concept exists among the Yukaghir of Siberia where all humans, animals, and objects being persons and having a soul (termed *ayibii*). Moreover, both traditional Yukaghir and Inuit beliefs view the hunter-prey relationship as reciprocal in some ways where respect towards the animal must be given if the hunter is to be successful (e.g. Laugrand and Oosten 2015:38; Willerslev 2007:104).

Interestingly, for the Yukaghir the dream world and the awake world are different sides of the same reality. When hunters dream, their *ayibii* can take on the form of animals (Willerslev 2007:176). While detailing the complexities of this ontology is outside the scope of this chapter, it is important to note that Yukaghir frequently have a physical manifestation of their dream-state *ayibii*, called an *ioyä*, which guards them from losing their *ayibii* during their dreams (Figure 10.1). They carry this with them during hunts and, when successful, offer the figurine a drink of water and some blood of the animal (Willerslev 2007:177). Similar concepts are found within the Late Dorset ontological view. For example, Betts et al. (2015:104) show a subcategory of all bear carvings in Late Dorset assemblages that appear to be human-bear hybrids or transformations. This transformation may be related to shamanic practices or an attempt by the Late Dorset to appropriate the bear’s seal hunting skill (Betts et al. 2015:105) but it may also be similar to the Yukaghir concept of transforming into an animal form during dreams (Willerslev 2007:176). Both of these interpretations of Late Dorset polar bear figurines are ultimately speculative but it is important to note that both cultures may create physical representations of human and nonhuman persons. Given the symbolic power often associated with Late Dorset carved objects (e.g. Kleist 2018; MacRae 2013; Taçon 1983), it is possible that this association exists in other types of material culture.

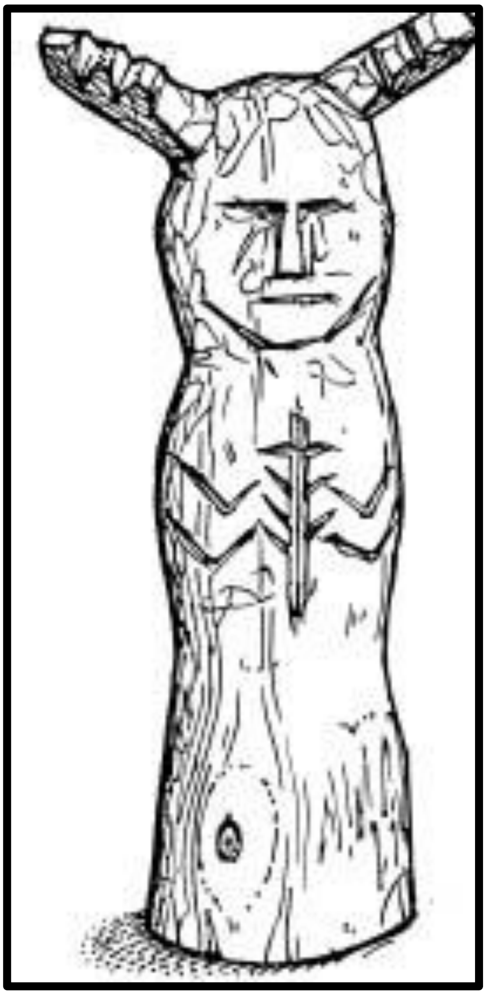

Figure 10.1: A Yukaghir ioyä (after Willerslev 2007:177).

Despite being rare overall, there are a few instances of Late Dorset decorating their harpoon heads and side-hafted handles with facial features (e.g. Schledermann 1990:213, 248; Maxwell 1985:222). While the known examples of harpoon heads decorated with facial motifs are localised to Ellesmere Island sites and Abverdjar in the Foxe Basin, these may be demonstrations of associations of links between Late Dorset material culture, and their utilitarian/functional material culture, and their broader ontological understanding of the world. In fact, while there is only one known example, the copper amulet from Gulf Hazard 1 along the southeastern coast of Hudson Bay is in the shape of a Late Dorset endblade despite the object clearly being non-functional (Harp 1974). As touched upon in Chapter 3.2, the concept of the mundane or everyday object being symbolically charged due to a human actor's frequent and constant engagement with that object is powerful. Therefore, despite few examples that exist, it is possible that Late Dorset hunting technology and, therefore, the endblades that were slotted into their harpoon heads might also carry symbolic or indexical qualities (seen also in Murray 1999). In other words, the facial features seen on harpoon heads may hint at a function similar to the Yukaghir *ioyä* by being a physical representation of the hunter's soul but also being inscribed on the tool the hunter must use to be successful in the hunt. Ultimately, while much attention is given to Late Dorset carved objects as being powerful indicators of their social systems (e.g. Hardenberg 2013; Kleist 2018; MacRae 2013; Sutherland 1997; 2001; Taçon 1983), it is clear that their more functional material culture carried with it similar relational symbolism.

Associations between metal and important activities is seen in other northern contexts as well. Cameron (2011:180) notes that Dene of the northwestern Subarctic in the late 18th century made associations between the quality of the native copper nugget and the animals they hunt (deer being the most valuable). Importantly, Cameron (2011:180) argues that by creating these associations between the symbolic and material world, the Dene were making a connection between "… the piece of copper in their hands and a diverse network of things that enabled to hunt, eat, and imagine their world". Similar examples of "storying" metal objects by Kugluktukmiut was recorded in Coppermine in the 1950s (Cameron 2011:182). Here, James Qoerhuk tells a story set in the past of a group of seal hunters who become stranded on an ice floe when one hunter throws his native copper snow knife (a tool used primarily to construct snow houses when travelling) into the ocean when all seemed lost. When the hunters eventually return to safety, the snow knife itself brought them home due to its associations with travel and safety. In this case, however, copper is not the only important aspect of the object but rather it is also its known itineraries and use-life that afford it specific symbolic meaning. Recalling the observations made of Bering Strait Inuit by Nelson (1899), metal had important associations based both on the metal material itself and how it was used. The metal (whether clumps of raw material or finished objects) were not just tools to be used but rather were significant in their own right. In these examples, the materiality of metal was enmeshed in the worldview of northern peoples and, in many cases, creating symbolic networks between people, animals, and things.

Fitzhugh (2017:152) discusses how Inuit inuksuit and their associated meanings could be considered attempts on part of the early Inuit to "people" their landscape. Through processes of collective memory and reinvention, the meaning of inuksuit changed through time but remained important physical and cultural roots for Inuit in the Arctic (Fitzhugh

2017:181). Despite some of the original inuksuit being potentially constructed by the Dorset, no similar tradition existed among the Palaeo-Inuit. However, in addition to the greater number of polar bear carvings that appear in Late Dorset context compared to earlier periods (e.g. Betts et al. 2015:90; Hardenberg 2013:96; Kleist 2018), humans are even more common, becoming their most prevalent in the Late Dorset period (Hardenberg 2013:155). Using the logic of Betts et al. (2015:107), if an increased incidence of polar bear carvings in Late Dorset contexts indicates an increased amount of human-bear interaction then so too must the increased prevalence of anthropomorphic carvings. In one sense, the increased amount of anthropomorphic Late Dorset carved objects might be a direct indication that their interaction network is also growing. Therefore, just as the symbolically powerful inuksuit were used to people the Inuit landscape, perhaps the Late Dorset used their material culture to people theirs.

Murray (1999) discusses one particularly significant example of Late Dorset using their functional material culture to reinforce collective memory of their own world. By examining archaeofauna and material culture collections from Foxe Basin sites, Murray (1999:474) notes that the intensification of walrus hunting near the start of the Early Dorset period around 500 BC coincides with the development of the larger Dorset Parallel harpoon head that, as stated previously, has been interpreted as a walrus hunting harpoon head. Throughout this time, walrus hunting and the walrus hunting harpoon head potentially became a critical aspect of Dorset culture. However, as walrus hunting became less productive in other parts of the Canadian Arctic towards the start of the Late Dorset period, the Dorset Parallel harpoon head and other material that perhaps symbolised walrus hunting continued to be used throughout the Arctic. This means that the "spread and use of materials that symbolised certain aspects of Dorset identity allowed people thousands of miles apart to be integrated into a single system - a system which apparently had greater sustainability then the subsistence practice from which it originated." (Murray 1999:479).

With all this in mind, metal therefore must have carried with it similar symbolic and power. As was argued in Chapter 9, metal endblades were an integral part of Late Dorset harpoon technology. However, unlike other materials exploited by the Late Dorset, metal objects had restricted source regions and, in many cases, would have only be acquired through their interaction network. While it is possible that other raw materials like nephrite, quartz crystal, soapstone, or even organic materials like antler or ivory flowed through those same networks, metal use remains the best metric for understanding the maximum extent of Late Dorset interaction networks. This compounding factor means that metal objects were not just symbols of a distant place but potentially one that directly connects seemingly disparate Late Dorset groups, much in the same way Murray (1999) argues Dorset Parallel harpoon head styles did.

Within the perspectivism framework described above," … reciprocity is a central element in the relationship between humans and objects or humans and places" (Lund 2015:32). Regular engagement between objects (and their itineraries) and humans creates social obligations between those animated beings, such as the presence of walrus hunting harpoon heads in contexts where walrus hunting may have played a small role in their subsistence economy. Or, in the case of this thesis, in the repeated use of metal objects only acquired through trade when lithic material is potentially more accessible and just as functional. Despite experimental research comparing the functional aspects of metal and lithic material not being done in Arctic contexts, recent research on material from the Old Copper Culture (4000-1000 BC) around the Great Lakes region has demonstrated that copper projectile points had similar, or only marginally better in some cases, penetrative depth than their lithic counterparts (Bebber and Eren 2018:42). While the research only assessed one type of activity (i.e. hunting) and did not take into account the opportunity costs of manufacturing (or acquiring) metal or lithic objects, it is possible that metal objects are effectively the same as lithic objects in terms of their performance. If this can be applied to an Arctic context, it is likely that the functional benefits of metal over stone implements may not be the sole reason for its widespread adoption during the Late Dorset period.

10.2.2 Object Itineraries and Metal as Fragments of Space and Time

The second core concept of enchainment is the exchanged material's itinerary. Using Weiner's (1992) concept of "keeping-while-giving", exchanged objects have certain inalienable components to them that, despite being traded away, remain linked to its previous owners. In this process, objects that can accumulate complex itineraries are often specifically mobilised to create those enchained relations (Wallis 2013:212). Wallis (2013) describes how a paddle for applying a unique decoration to ceramic vessels may accumulate an increasingly complex itinerary as not only the paddle is used and even traded but also how the pots that it creates are distributed. Gell (1998:221) interprets these "distributed objects" as spatially separated parts each with their own microhistory but are inalienably connected to each other. While Gell's (1998) main examples of these objects are works from the same artistic movement or of individual components of a china dinnerware set whereby one single specimen is inalienably linked to other related objects, this concept can be applied to a paddle creating common motifs on disparate ceramic vessels or even metal objects that derive from a discrete source region.

Although not specifically stated, the itinerary of the walrus hunting harpoon heads discussed by Murray (1999) and their associations with what it meant to be "Dorset" are the reason why they were so culturally important. Like even metal endblades, these objects with powerful itineraries were important indexes (i.e. drawing connections between the materiality and itineraries of the object and Late Dorset society) that connected Late Dorset groups together. In the case of metal, the itineraries were built as the objects were exchanged across space and also curated through time. Much like the examples of "storying" metal objects by Cameron (2011), it is not just inherently the material of the object that is important but rather the itineraries it builds throughout time and space.

As for the accumulation of an increasingly complex itinerary through space, it is important to understand metal through the vector of its exchange. The limited transportation technology of the Late Dorset (e.g. Appelt et al. 2016:786) indicates that it is unlikely that individuals travelled the thousands of kilometres that it took to connect some Late Dorset groups to the source of metal. While the well-known example of Qitdlarssuaq, an Inuk shaman, leading a group from Baffin Island to northern Greenland can be used as a model for the distances that Arctic peoples travelled in the deeper past (Mary-Rousselière 1980), the Dorset did not have the same transportation technology and it would seem unlikely that travel of even that scale was undertaken as frequently as the proxy data for metal use has indicated. Instead, metal likely flowed through interconnected regional networks which would have increased the complexity of their respective itineraries.

The current distribution of Late Dorset longhouses, as seasonal aggregation sites, with concentrations in the Smith Sound in the north, around Bathurst Island and Somerset Island in the Central Arctic, southern Victoria Island in the west, and the Hudson Strait in the east lends itself to being the "central nodes" of the Late Dorset interaction networks and, therefore, metal exchange (Figure 10.2). Interestingly, Damkjar (2005:156) notes that harpoon heads in general but especially Type G specimens are found relatively more frequently at longhouse sites than non-longhouse sites. Paradoxically, however, despite the increased prevalence of seal hunting harpoon heads, seals are no more abundant and potentially even less abundant in longhouse faunal assemblages than their non-longhouse counterparts (Damkjar 2005:162). While this may be the result of taphonomic or depositional differences between activities at longhouse and non-longhouse sites (especially if they were inhabited in different seasons), this observation suggests that the presence of harpoon heads at a longhouse site is perhaps not just reflecting their functional role but also may be the result of increased exchange of metal objects (much of which is associated with Type G harpoon heads). The increased frequencies of quartz crystal in longhouses, another material that was likely frequently exchanged, demonstrates the sites played complex roles in Late Dorset interaction networks (Damkjar 2005:155). Longhouses were likely important symbolic and social centres in the Late Dorset world providing space for both ritual and trade (Damkjar 2005; Friesen 2007:205; Gulløv and Appelt 2001:158; Plumet 1989:324). It is possible that some of these important meanings were transposed on the objects that travelled through these sites.

One aspect undoubtedly that played a role in the Late Dorset understanding of the metal objects' itineraries is the type of metal that was used. The knowledge of where the metal originated is analogous to what Gell (1998:221) described as a distributed object in that the metal objects are spatially separate but would have known to be from a single source. Much like how Murray (1999) argued walrus hunting harpoon heads may have served as a symbol for Dorset groups on the edge of their settlement range to connect them back to the walrus-rich hunting grounds of the Foxe Basin, the knowledge of the source of a metal object would connect the current owner with the source of the object and every point in between. This is similar to how Chapman (2000) describes the way the deliberate fragmentation of objects can facilitate social relation enchainment. Metal objects, finished or unfinished, can be seen as fragments of place deriving from a single region where the objects themselves are "… easy to carry, distinctive, bearing complex cultural memories" associated with the itineraries that were created as they were exchanged (Chapman 2000:227).

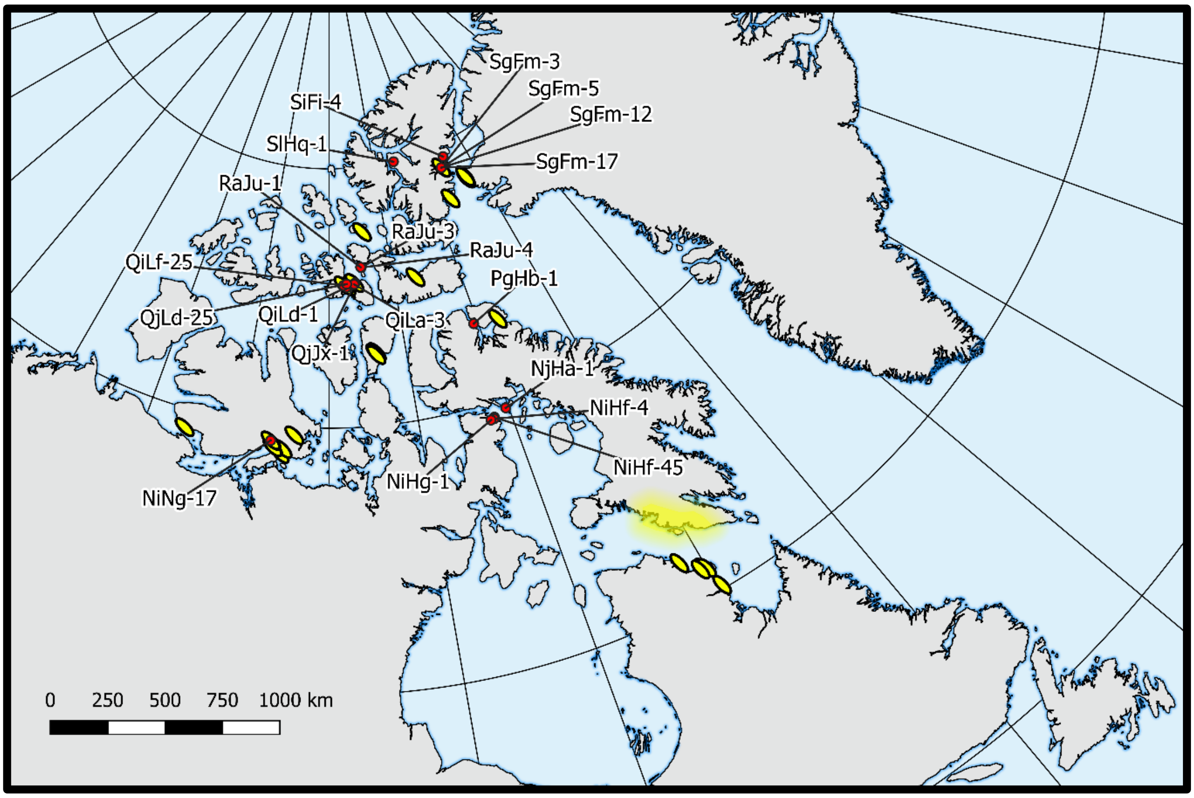

Figure 10.2: Map showing all Late Dorset longhouses and sites that contain at least one Type G or Late Dorset Dorset Parallel harpoon head sampled in this thesis. Yellow area denotes region of significant surveyed longhouse concentration but no published records.

Similar processes are seen elsewhere. McCaffery (2011:159), interpreting Subarctic Quebec and Labrador lithic raw material use, argues that the indexical properties of a raw material (both in terms of its visual properties and its source location) were socially important beyond the functional aspects of the material. By “indexical properties”, it is meant that the knowledge of the source of the material, its use-life, and the social mechanisms that transported that material across space imbued the object with value beyond its functional aspects. In essence, it is not just about where the material originated but also the length and complexity of the object’s itinerary which were significant (McCaffery 2011:162). Thompson and Doonan (2018) report a similar case from the Northwest coast of North America with the creation of large copper sheets (termed Copper). The Copper was constructed with a number of different fragments of copper objects with the source and itineraries of each being an important part in its inclusion. In both these cases, meaning is specifically attached to objects entirely due to where it comes from and the itinerary it built throughout its life. In fact, among ethnographic accounts of North Alaskan Inuit, the older the amulet that a person inherited (and therefore the more complex its itinerary) the more value associated with it (Lillios 1999:246; Ray 1977:17).

The inherent generationality implied by object curation (e.g. Knappett 2011:192), especially in the Arctic, underscores how the itineraries of metal may have not just linked people between other people and space but also through time. In this sense, while the concept of "fragmentation" is greatly different from what is described by Chapman (2000), it is a useful metaphor

As discussed in Chapter 9, metal was used throughout the Late Dorset period. As these metal objects moved from site to site and person to person, they accumulated an increasingly complex itinerary. While the extent of object curation can only be speculated, given the poorly represented amount of metal in Late Dorset collections it must have played a significant role rather than just the paucity of the material in the archaeological record being attributed to poor preservation (e.g. McCartney 1988). Without the distinctive materiality of metal, as seen by how it was used and how intensively it was used despite readily available lithic alternatives, its constrained source regions, and the extensiveness of Late Dorset interaction networks and the compounding itineraries that it creates, metal could not take on the role as being an active agent in enchaining Late Dorset social relations.

10.2.3 Manifesting Late Dorset Enchained Social Relations

If the two concepts of social relation enchainment, the relational materiality of the exchanged object and the potential for complex and compounding itineraries, are met within the realm of metal exchange of the Late Dorset then it is possible that the process was pervasive during the time period. As previously stated, using perspectivism as a grounding ontology, there is an important reciprocal relationship between human and nonhuman persons as well as just between humans (Lund 2015:32). Enchainment creates links between people, place, and time. As metal is exchanged between Late Dorset people, links are created between them and the symbols and associations attached to the object. Likewise, links between those objects and specific places (e.g. longhouses) may also be created. Whether this created an obligation between the two parties is not clear based solely on the archaeological record but the relations were certainly linked.

While enchainment as a social process has not been identified in the ethnographic literature of the Inuit, Burch's (2005:155) description of early 19th century Iñupiaq "trading partners" in northwestern Alaska can be used as a close analogue. In essence, a plurality of Iñupiaq nations lived in northwestern Alaska and, despite to outsiders being considered “Inuit”, these nations were individual entities that had strict territorial boundaries, customs for enacting trade and marriage, and even engaged in warfare (Burch 2005). One component of the social relations between the different nations was a concept described as a trading partnership (e.g. Burch 2005:155). This type of international relationship was common with partners meeting frequently throughout the year but at the very least one or two times with associated social obligations. Occasionally, trading partners were part of the same nation but each had differing sought after skills. The traditional start of a formal trading partnership began with exchanging gifts with an obligation for future exchange (Burch 2005:156), although this social obligation extended beyond simply the exchange of food, raw materials, or manufactured goods and could also be called upon for protection against other nations (Burch 2005:158).

The social hierarchy of early 19th century Iñupiaq was greatly different from what we know about the Late Dorset. For example, lesser population density over a far greater area, greater egalitarianism, and little, if any, evidence for inter-group conflict are just some of the ways Late Dorset society differed from early Inuit and especially early 19th century Iñupiaq (Friesen 2007). However, the Iñupiaq trading partnerships are one form, albeit different in its reality, of enchained social relations in the Arctic from which we can begin to understand how Late Dorset enchained relations may have also worked. Moreover, the material signature of Iñupiaq trading partnerships is greatly different from what is being argued for Late Dorset. In particular, the current archaeological record suggests a much more uniform interaction network among the Late Dorset. However, both examples demonstrated linked social relations that are created through the exchange of materials which potentially creates significant inter-person relationships.

Through these enchained networks flowed ideas on how to gather (e.g. Friesen 2007; Savelle et al. 2012:176), important symbolism and beliefs (e.g. Gulløv and Appelt 2001; Friesen 2007; Hardenberg 2013; MacRae 2013; Sutherland 2001), and material culture and architectural forms (e.g. Appelt et al. 2016; Darwent et al. 2018; Ryan 2003). Undoubtedly, less archaeologically visible concepts circulated in these same channels as well. It is tempting to suggest that these enchained social relations were causal mechanisms for much of the archaeological ubiquity we see taking shape in the Late Dorset period (Friesen 2007:203; McGhee 1996:148).

Just as Fitzhugh (2017) argues that the collective memory surrounding inuksuit inalienably rooted Inuit in the Arctic landscape perhaps so too did the enchainment of social relations among the Dorset. The act of exchanging metal objects and being aware of their associated object itineraries rooted the Dorset within the cultural and physical landscape of the Arctic through both time and space. Acquiring new metal would have brought with it novel interactions with the past peoples and places of the Arctic while trading away metal would have extended the object's own itinerary now with a novel strand. To what degree those individual strands of the object's itinerary were remembered or actioned is immaterial. Similar to how, upon contact with Christianity brought a changing worldview, the original meanings of the inuksuit faded, new itineraries emerged (Fitzhugh 2017:156-157). What does remain is the ways metal symbolically connected and enchained the Late Dorset world through its use and exchange.

However, it was not just metal that could have created these enchained relations. It is possible that other materials or ideas reinforced Late Dorset social relations. In fact, the defining characteristics of Late Dorset archaeological record, such as longhouses or a consistent artistic style, may have themselves also reinforced these networks along with metal. In some cases, the longhouses were reoccupied a number of times with each addition and alteration to its architectural form as a result of subsequent occupations (e.g. Darwent et al. 2008) may have itself created explicit site-specific itineraries that enchained those that visited those sites.

10.3 The Absence of Enchainment

With the context of where enchainment occurred in Late Dorset interaction networks set, it is important to consider where this process may not have occurred. By understanding in what contexts enchainment was not a key process aids in supporting why enchainment is a sufficient explanation for Late Dorset metal exchange. It is impossible with the current data to understand why and, importantly, when Late Dorset interaction networks developed and if the desire for acquiring new resources and information was a causal mechanism or if the networks were already established, and this afforded better access to materials and knowledge from more distant parts of the Late Dorset world. However, understanding the context from which these networks developed is possible.

Much of the literature regarding Middle Dorset interaction networks largely focuses on their regionality as opposed to the much more widespread networks of the Late Dorset (e.g. Anstey and Renouf 2011:194; LeBlanc 2010; Odess 1998; Stopp 2016). Likewise, the ubiquity of carved objects among Middle Dorset groups is likely not as pervasive as what is seen with the Late Dorset either (e.g. Hardenberg 2013). While more research should be conducted on Middle Dorset sites from northern Labrador and the Arctic Archipelago, the only widely-exchanged material that is known so far is Ramah chert in Labrador. It is sourced from Ramah Bay in northern Labrador and throughout all periods of the Palaeo-Inuit tradition, the material was exchanged relatively long distances. Numerous other groups, such as ancestral Innu peoples and Maritime Archaic, also exploited the lithic source throughout various time periods. However, unlike Late Dorset metal exchange, down-the-line exchange likely occurred in Dorset contexts for Ramah chert whereby frequencies of the toolstone decrease as distance from the source increases (Anstey and Renouf 2011:200; Desrosiers 2017; Nagle 1986). Regardless, the size of Ramah chert exchange is massive, particularly south of Newfoundland despite it not being an integrated interaction network like what is seen with the Late Dorset (Loring 2017).This form of exchange may have not just been a factor of more regional interaction networks but could be the result of the linear coastal network of Labrador itself (see Fitzhugh 1997; Loring and Cox 1986:78). Conversely, the sites sampled for this thesis largely came from the Arctic Archipelago which is a matrix-type network which itself could afford different styles of interaction and exchange (Fitzhugh 1997:395). Likewise, while there is emerging evidence that communal gathering sites were beginning to be developed in the Middle Dorset (e.g. Friesen 2016) the presently known distribution is largely regionally specific unlike what is seen in the Late Dorset period. Ultimately, this brief survey of Middle Dorset interaction networks has demonstrated that the core concepts required for extensive enchainment of social relations (i.e. symbolic materiality associated with exchanged objects and complex object itineraries) are not nearly as present as they are in the Late Dorset period.

10.4 Concluding Remarks

This chapter took the conclusions reached in Chapter 9 regarding metal use and exchange among the Late Dorset as being both extensive and intensive and applied it to the theoretical framework established in Chapter 3. This has produced a number of important conclusions that have advanced the theories detailed herein and our understanding of the nature of Late Dorset metal use and exchange.

Primarily, the two core concepts required by enchainment theory, symbolic or relational materiality and complex object itineraries, are found within the context of Late Dorset metal exchange. By taking an Amerindian Perspectivism approach and by comparing the data with relevant examples from elsewhere in the circumpolar north, it is clear that the Late Dorset would have likely had a symmetrical understanding of their world where humans and nonhumans were considered persons. In so doing, the objects themselves that the Late Dorset use, regardless if they are overtly symbolic or functional, are interwoven in this ontology. As such, given that the affordances of metal being engaged with frequently by the Late Dorset, being easily exchanged, having the potential for complex and compounding itineraries related to both exchange across space and curation through time, having restricted source regions, and passing through a matrix-type network of symbolically charged places, it is possible that the social relations being created throughout the exchange process would be inalienably enchained to one another by the material itself. In so doing, this would link the Late Dorset world together with metal being the best physical representation of the maximum extent of this network so far known.

Importantly, while previous applications of enchainment theory have briefly touched upon social relations being enchained through time, Late Dorset metal exchange offers an explicit example of this process with sites throughout the Late Dorset period having evidence of extensive and intensive metal use. With knowledge and information flowing through those same interaction networks, Late Dorset metal exchange was likely a powerful presence connecting disparate groups together through time and space. The archaeologically visible outcomes of this process is the ubiquitous material culture and architecture and the seemingly egalitarian social structure that remain consistent throughout the Late Dorset period. Following on from Murray’s (1999) portrayal of the symbolic importance of walrus hunting harpoons and Fitzhugh’s (2017) contextualisation of inuksuit as means of culturally grounding people in the Arctic, the symbolic aspects of Late Dorset metal itineraries would have functioned in a similar manner not only reminding the Late Dorset of where they came from and that they are a part of a much wider world but also what it means to be Dorset.

While the commonalities seen throughout the Late Dorset archaeological record may be the result of their common origin in the Foxe Basin (ca. AD 500) prior to migrating out towards the western Canadian Arctic and High Arctic (e.g. Appelt et al. 2016:784; Darwent et al. 2018:532; Friesen 2007:203), a more likely reason is their extensive enchained interaction networks. Since metal use was found at most sites that had a sufficient sample of Late Dorset organic material and that, despite the poor chronological data, it does not appear to fluctuate through time, knowledge and ideas were likely being spread just as extensively and intensively. Despite the transition between Middle and Late Dorset being incompletely understood, the ubiquity of Late Dorset material culture through space and, more importantly, time is more likely the result of the way they interacted with each other rather than a common geographic origin. In this light, viewing their social relations as being enchained to one another is particularly plausible. Significantly, the egalitarian social relations that are strongly argued by Friesen (2007) may have themselves been reinforced through this enchained network of relations.

Importantly, while metal use and exchange has been highlighted here, it may not have been the only way enchained social relations were being produced. Other aspects such as the exchange of information, food, or carved objects may have similarly created enchained social relations built upon an entirely different set of itineraries and symbolically-charged materiality.

Chapter 11

Conclusion: Once Upon a Time in the Arctic

11.1 Future Directions

The results found within this thesis helped disentangle the extent, intensity, and nature of Late Dorset metal exchange but, as with any piece of research, has identified a number of fruitful approaches for future research. First and foremost, the dataset provided here is easily expandable. The methodology for taking the measurements was fully described and incorporating new data points would be straightforward. Of particular interest would be to include all Greenlandic Late Dorset data as well as the significant collections of pre-Late Dorset material from Nunavik. While it is not likely that either of these regions has a significant enough quantity of material to overturn the general conclusions of this thesis, their incorporation may be illuminating regarding regional differences. Second, a comprehensive compositional analysis of existing Late Dorset metal tools, particularly the copper material, would enable much deeper engagement with the sources of Late Dorset metal and begin to unravel if any of the material is the result of contact with the Norse. Along those same lines, using compositional analyses, if possible, on the identified iron oxide residues would be greatly informative not just for confirming (or challenging) the results presented above but also for illuminating their potential composition (e.g. Cooper 2016:189). Additionally, experimental research regarding not only the manufacturing process of Late Dorset metal tools but also a comparison about their performance with lithic tools would add to our understanding regarding why the Late Dorset began to use the new raw material and maybe why earlier groups did not. Experimental work would also be critical for verifying the residues identified by the microscopic analysis. Finally, direct comparison between Late Dorset and Ipiutak material from Alaska would be informative. Given that both groups are the first in their respective regions of the Arctic to widely use metal, understanding the different signatures of the material and how the proxy indicators presented in this thesis may or may not manifest in a different context would be interesting.

Most importantly, the Late Dorset existed in a time when both Norse were establishing colonies on southwest Greenland and the early Inuit began to enter the Eastern Arctic. The data presented here is not sufficient to unpack the totalities of those potential contacts. In particular, McGhee (1984; 2009) argues that the acquisition of iron would have been a driving factor in initiating the Inuit migration into Arctic Canada. However, knowledge of the metal source in the east assumes some amount of contact between the Late Dorset and Inuit occurred. Acquiring better representative samples from regions that show potential overlap between the two groups, such as Victoria Island (e.g. Friesen 2004), Nunavik (e.g. Labrèche 2015 cf. Pinard and Gendron 2009), northern Greenland (Appelt and Gulløv 1999), and northern Labrador (Fitzhugh 1994), is critically important for understanding not just the lifeways of Late Dorset and early Inuit groups but for determining the impact of any potential contact that occurred. Likewise, if Norse contact did occur with either group, excavating these early Inuit or very Late Dorset sites would maximize the chance of acquiring relevant data.

11.2 Significance and Final Remarks

This thesis has a number of significant outcomes. First and foremost, the extent and intensity of Late Dorset metal exchange was quantified relatively comprehensively for the first time. Additionally, through the lens of social relation enchainment, the nature of Late Dorset metal exchange was also advanced. While previous research has always suggested metal was a familiar part of the Late Dorset assemblage, the data presented here indicates that it is even more significant than previously thought.

However, the results should not be uncritically accepted. In particular, there are inherent biases found both with the blade slot analysis and microscopy. For example, while the harpoon head material produced clear results in regards to endblade raw material, the same was not seen with knife handles. Likewise, having unknown taphonomic and conservation histories means that the identified iron oxide residues are likely under-representative. It was only through the identification of iron oxide residues on the blade slots and taking broad-scope approach that these conclusions could be verified.

In general, it was found that there are real differences between the blade slot sizes of Late Dorset and pre-Late Dorset harpoon heads. This means that despite there being only slight changes in the physical dimensions of the harpoon head through time, the blade slot became progressively thinner. At the same time, there was an increase in the visible traces of endblade securing methods. There were two main methods identified: securing holes/notches and lashing grooves. The former would likely only secure a metal (or organic) endblade as the physical properties of flaked stone tools make it difficult to perforate. The latter could be used for endblades of any kind of material. When the blade slot sizes are separated based on visible endblade securing methods, the securing holes/notches tended to be slightly thinner.

With handles, there was less chronological control over the sample. However, side-hafted handles from sites that are most likely Late Dorset (i.e. those from the Foxe Basin and Central Arctic) had a faint 2-cluster distribution, much like harpoon heads. Unfortunately, this distribution was not supported by the statistical tests nor were similar patterns seen in end-hafted handles.

Once these blade slot thicknesses were compared with relevant lithic basal thicknesses, it became clear that the thin slots commonly found on Type G harpoon heads did not correlate with the bulk of the lithic material but matched well with the metal objects. Microblades would have likely been the most likely lithic tool supported in a side-hafted handle and, due to their thinness, no pattern was discernible in regards to the blade slot thicknesses. Ultimately, while most harpoon heads or side-hafted handles could have supported either lithic or metal blades, there is a large proportion of Type G harpoon heads that seemingly nearly exclusively supported metal endblades.

The microscopy results also confirmed that at least some of the Late Dorset material supported metal endblades while none of the pre-Late Dorset material showed evidence of metal use. The prevalence of harpoon heads and side-hafted handles with visible iron oxide residues across the entire dataset is smaller than what the blade slot data would suggest, however, the prevalence of those residues within both object categories individually is similar. This was likely due to unknown taphonomic or conservation histories removing some of the residues. In any case, if all these strands of data were combined, the picture of

Late Dorset metal use and exchange becomes much more extensive than what was previously seen in the published literature.

Another important outcome is that this thesis demonstrates how quantitative data can help answer more theoretical questions about people and their interaction networks. In particular, it is clear that Late Dorset social relations were undoubtedly affected by the material they exchanged. Taking into account the relational materiality and the object's complex associated itineraries, social relations can become inalienably linked. Although it is probable that the totality of these itineraries were not fully remembered on an individual basis, the collective memory created surrounding metal and metal exchange extended beyond its utility as a cutting edge. Since metal was so frequently used and was intensively used with an object category that has a high risk of being lost, over lithic endblades which were locally available and did not depend on extended interaction networks, it is clear that the value of metal extended beyond any functional benefit it may have had.

As metal was exchanged intensively and extensively across the Arctic by the Late Dorset, it would become enchained not only to its previous owners but also to its previous places. In effect, this binds the present user within a complex and compounding itinerary of the object that could extend thousands of kilometres across the Arctic landscape and potentially multiple generations. From a broad perspective, Late Dorset metal exchange is a significant case study in how the exchange of material can enchain not only people to place but also people through time and advance concepts of enchainment and object itinerary significantly.

Importantly, these results underline the basic assumptions that have been made previously about the Late Dorset (e.g. Appelt et al. 2016). The inclusion of quantitative data regarding metal exchange is the best-known analogue for the interaction networks more broadly. Delimitating metal exchange has demonstrated that the materials that flowed through these expansive networks were bound with the ideas and concepts of what it meant to be Dorset.

The data and its interpretation throughout this thesis focused on how a group which has no direct descendants, whose name is effectively unknown, that once lived in the Arctic for thousands of years began using a raw material to create objects, which no longer exist, and began exchanging them across thousands of kilometers. Once upon a time in the Arctic, these people created and maintained social relations across a vast and fragmented tundra landscape and through those networks flowed ideas, knowledge, and novel raw materials at a scale never before seen in the circumpolar North America.

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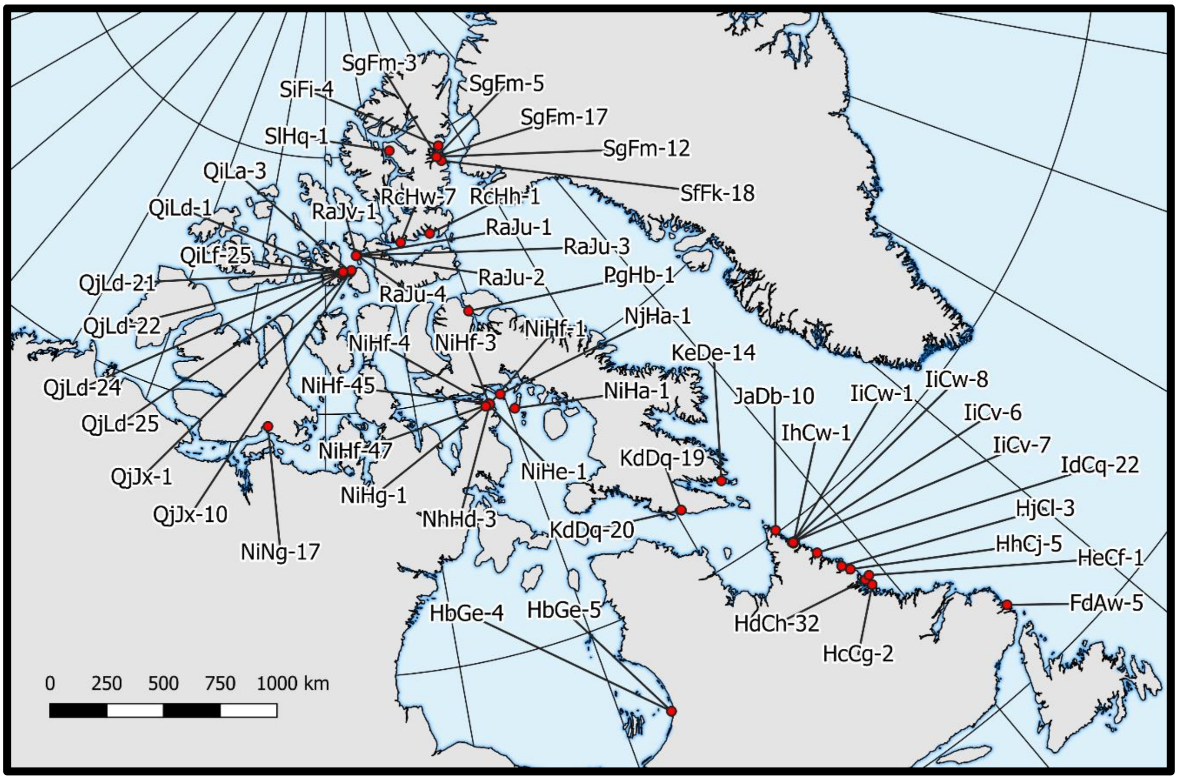
Appendices

Appendix I: Sites Sampled



Location of all sites sampled in this thesis.

Borden	Site Name	Borden	Site Name
FdAw-5	St. Francis Harbour Bight 1	NiNg-17	Cadfael
HbGe-4	Belanger 1	NjHa-1	Kapuivik (Jens Munk)
HbGe-5	Belanger 2	PgHb-1	Nunguvik
HcCg-2	No-Name Island 2	QiLa-3	
HdCh-32	Central Island 1	QiLd-1	Brooman Point
HeCf-1	St. John's Island 3, L4	QiLf-25	
HhCj-5	Iglusuaktalialuk Island 4 West	QjJx-1	Arvik
HjCl-3	Okak 3	QjJx-10	Tasiarulik
IdCq-22	Shuldham Island 9	QjLd-21	
IhCw-1	Komaktorvik 1	QjLd-22	
IiCv-6	Beacon Island 5	QjLd-24	
IiCv-7	Beacon Island 6	QjLd-25	
IiCw-8	Big Head 6	RaJu-1	Snowdrift
IiCw-1	Peabody Point 1	RaJu-2	
JaDb-10	Avayalik Island 1	RaJu-3	Maze
KdDq-19	Killuktee (Kiliktee)	RaJu-4	
KdDq-20	Omagadjua	RaJv-1	Dundas Island West Beach
KeDe-14	Willows Island 4	RcHh-1	Lee Point
NhHd-3		RcHw-7	
NiHa-1	Kaersut Island	SfFk-18	
NiHe-1		SgFm-12	Narrows Point
NiHf-1	Kaleruserk (Parry Hill)	SgFm-17	Shelter
NiHf-3	Freuchen	SgFm-3	Longhouse
NiHf-4	Tikilik (Qarmaruluit, Arnaquatsiak)	SgFm-5	Cove
NiHf-45	Qalirusiujak	SiFi-4	Franklin Pierce
NiHf-47	Parry Hill	SlHq-1	Bear Track
NiHg-1	Abverdjar		

All sites sampled in this thesis with proper names

Appendix II: Metric Data

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Harpoon Heads

Borden	Artefact #	Slot Prox	Slot Med	Slot Dist	Length	Width	Thickness	Slot length	Type	Sliced	Lashing Groove	Securing Hole	Decoration	Complete
JaDb-10	3472	1.64	2.80	3.13	59.77	15.77	18.13	7.69	Dorset Parallel	n	n	n	n	y
JaDb-10		2.75	3.02	4.00	62.00	18.22	15.13	8.35	Dorset Parallel	n	n	n	n	n
KeDe-14	1041	1.74	3.36	3.91	19.96	14.40	12.30		Dorset Parallel	n	n	n	n	y
KeDe-14	1080	2.21	3.96	4.23	65.62	15.45	13.10	11.31	Dorset Parallel	n	n	n	n	y
NhHd-3	6	1.55	2.38	3.20	62.84	16.18	15.13		Dorset Parallel	y	n	n	n	y
NhHd-3	51	1.23	2.18	3.14	47.85	12.11	10.98		Dorset Parallel	y	n	n	n	y
NiHa-1	29	1.42	2.43	3.48	80.06	18.50	16.84	4.89	Dorset Parallel	n	n	n	y	y
NiHa-1	215	1.42	2.00	3.55	89.63	18.38	19.23	8.89	Dorset Parallel	n	n	n	y	y
NiHa-1	216	1.35	2.63	4.35	83.22	15.60	17.04	6.81	Dorset Parallel	n	n	n	n	y
NiHe-1	20	1.82	2.94	3.26	79.73	19.37	16.34	6.77	Dorset Parallel	n	n	n	n	y
NiHf-3	272	2.30	3.71	4.29	78.23	23.57	15.63	12.69	Dorset Parallel	y	n	n	n	y
NiHf-3	810	1.74	2.65	3.73	68.07	18.35	13.91	11.08	Dorset Parallel	y	n	n	n	y
NiHf-3	811	1.69	2.97	3.40	62.80	19.05	14.97	11.49	Dorset Parallel	y	n	n	n	y
NiHf-3	818	1.73	2.99	3.48				10.43	Dorset Parallel	n	n	n	n	n
NiHf-3	819	1.75	2.41	2.77	36.51	14.13	9.43	6.52	Dorset Parallel	y	n	n	n	y
NiHf-4	700	1.63	2.19	2.82	45.74	14.95	10.79	8.3	Dorset Parallel	y	n	n	n	y
NiHf-4	986	2.01	3.71	4.24	71.78	19.90	15.38	12.18	Dorset Parallel	y	n	n	n	y
NiHf-4	987	1.71	2.74	3.15	69.89	19.61	16.62	10.5	Dorset Parallel	y	n	n	n	y
NiHf-4	1007	1.79	2.54	3.33	65.86	14.04	16.83	8.42	Dorset Parallel	n	n	n	n	n
NiHf-4	1186	1.07	1.86		53.82	16.95	14.66	8.45	Dorset Parallel	n	n	n	n	n
NiHf-4	1757	1.45	1.89	2.33	70.45	11.12	9.37	7.13	Dorset Parallel	n	n	n	n	n
NiHf-4	2790	1.49	2.85	4.53	55.46	14.88	19.00	13.7	Dorset Parallel	n	n	n	n	n
NiHf-4	3739	1.70	2.81	3.65	76.90	18.39	18.89	8.87	Dorset Parallel	n	n	n	y	y
NiHf-4	3762	1.85	2.65	3.58	80.04	15.37	19.76	6.65	Dorset Parallel	n	n	n	n	y
NiHf-4	4864	1.06	1.46	2.60	83.23	16.05	16.39	6.88	Dorset Parallel	n	n	n	y	y
NiHf-4	4952	1.36	1.99	3.00	69.88	15.14	15.84	8.15	Dorset Parallel	n	n	n	n	y
NiHf-45	155	1.68	2.58	3.05	76.41	16.09	15.25	7.77	Dorset Parallel	n	n	n	n	y
NiHf-45	158	1.24	2.04		85.33	17.62	14.02	6.22	Dorset Parallel	n	n	n	n	y
NiHf-45	665	1.73	2.54	2.64	56.25	15.97	11.86	5.66	Dorset Parallel	n	n	n	n	n
NiHf-45	776	2.47	3.18		58.81	15.31	16.34		Dorset Parallel	n	n	n	n	y

Borden	Artefact #	Slot Prox	Slot Med	Slot Dist	Length	Width	Thickness	Slot length	Type	Sliced	Lashing Groove	Securing Hole	Decoration	Complete
NiHf-47	105	1.77	3.67	4.23	57.92	21.78	15.92	11.56	Dorset Parallel	n	n	n	n	n
NiHf-47	250	1.99	2.58	2.72	69.76	20.75	15.09	10.46	Dorset Parallel	n	n	n	n	y
NiHf-47	345	1.24	2.11	3.20	34.22	13.73	10.85	7.55	Dorset Parallel	n	n	n	n	n
NiNg-17	25	0.78	1.81	2.53	57.50	12.98	11.99	6.32	Dorset Parallel	n	n	y	n	y
NjHa-1	110	2.10	2.94	3.97	62.91	20.80	17.91		Dorset Parallel	n	n	n	n	n
NjHa-1	115	2.27	2.76	3.34	72.86	20.75	15.34		Dorset Parallel	y	n	n	n	y
NjHa-1	118	1.39	2.58		59.61	17.54	13.91		Dorset Parallel	y	n	n	n	y
NjHa-1	122	1.33	2.97	3.82	72.46	20.56	16.57		Dorset Parallel	y	n	n	y	y
NjHa-1	130	1.08	2.58		69.74	19.95	17.41		Dorset Parallel	y?	n	n	y	y
NjHa-1	813	1.75	3.33	4.22	71.45	17.98	15.64	13.42	Dorset Parallel	n	n	n	n	n
NjHa-1	1253	1.64	3.16	3.67	15.70	18.00	14.61	14.89	Dorset Parallel	n	n	n	n	y
NjHa-1	1256	1.45	2.83	3.81	55.27	15.97	12.13	11.84	Dorset Parallel	n	n	n	y	y
NjHa-1	1257	1.42	2.71	3.86	57.01	20.60	14.67	10.63	Dorset Parallel	n	n	n	n	y
NjHa-1	1259	1.74	3.23	3.85	63.93	19.36	14.02	11.2	Dorset Parallel	n	n	n	n	y
NjHa-1	1261	1.73	3.71	4.31	76.61	18.74	18.99	11.83	Dorset Parallel	n	n	n	n	n
NjHa-1	1263	1.64	2.42	3.12		18.90	15.10	9.16	Dorset Parallel	n	n	n	y	n
PgHb-1	2518	1.05	2.24	2.64	66.04	14.38	12.56	8.69	Dorset Parallel	n	n	n	n	y
PgHb-1	4044	2.16	2.81	3.37	47.79	15.17	13.49	9.35	Dorset Parallel	y	n	n	n	n
PgHb-1	5927	1.56	2.21	3.18	61.96	12.95	13.30	6.84	Dorset Parallel	n	n	n	n	n
PgHb-1	9191	1.48	2.21	2.64	48.15	10.85	8.92	6.36	Dorset Parallel	y	n	n	n	n
PgHb-1	9237	2.29	3.65	4.03	68.86	16.29	16.39	10.4	Dorset Parallel	n	n	n	n	n
PgHb-1	11012	1.94	2.26	3.36	69.51	14.82	13.43	6.6	Dorset Parallel	n	n	n	n	y
QiLd-1	183	1.46	2.95	3.85	72.97	18.77	20.06	6.64	Dorset Parallel	n	n	n	n	y
QiLd-1	455	2.08	2.60	3.80	65.73	18.72	13.00	9.11	Dorset Parallel	y	n	n	n	y
QiLd-1	501	1.40	1.99	3.07	38.09	12.68	11.12	6.11	Dorset Parallel	n	n	n	n	y
QiLd-1	608	1.95	3.05	4.10	85.56	19.11	19.51	8.06	Dorset Parallel	n	n	n	n	y
QiLd-1	1035	0.97	1.47	2.08	36.87	11.18	10.23	5.82	Dorset Parallel	n	n	n	n	y
QiLd-1	1465	1.06	1.45	1.84	31.14	8.68	7.07	4.98	Dorset Parallel	n	n	n	n	y
QiLd-1	1551	1.13	1.53	1.59	45.52	9.94	8.95	6.97	Dorset Parallel	n	n	n	n	y
QiLd-1	1686	1.19	1.88	2.94	55.79	14.93	14.24	5.78	Dorset Parallel	n	n	n	n	y
QiLd-1	1937	0.92	1.05	1.73	49.48	9.93	9.62	6.6	Dorset Parallel	n	n	y	n	n
QiLd-1	2169	1.54	1.83	2.81	54.85	12.19	12.16	5.76	Dorset Parallel	n	n	n	n	n
QiLf-25	68	1.64	2.54	3.54	67.35	19.13	13.87	8.34	Dorset Parallel	y?	n	n	n	n
QiLf-25	78	2.04	2.34	3.44	69.06	20.34	15.28	7.85	Dorset Parallel	y?	n	n	n	y

Borden	Artefact #	Slot Prox	Slot Med	Slot Dist	Length	Width	Thickness	Slot length	Type	Sliced	Lashing Groove	Securing Hole	Decoration	Complete
QjJx-1	93	1.76	2.68	3.61	87.41	19.26	15.00	7.76	Dorset Parallel	n	n	n	n	y
QjJx-1	137	2.50	2.69	3.73	81.51	15.43	16.86	7.77	Dorset Parallel	n	n	n	n	y
QjJx-1	157	1.18	1.64	2.85	44.36	11.65	10.18	7.03	Dorset Parallel	n	n	n	n	y
QjJx-1	307	1.81	2.75	2.85	46.02	17.83	17.70	11.42	Dorset Parallel	n	n	n	n	n
RaJu-1	193	1.82	2.20	3.04	91.95	19.84	17.95	5.81	Dorset Parallel	n	n	n	n	y
RaJu-1	427	2.68	3.53		88.49	21.60	20.31	7.42	Dorset Parallel	n	n	n	n	y
RaJu-1	428	1.83	2.55	3.00	50.82	18.37	7.54	4.93	Dorset Parallel	n	n	n	n	y
RaJu-3	6	1.64	2.42	3.74	85.70	19.81	18.28	4.1	Dorset Parallel	n	n	n	n	y
RaJu-3	7	2.43	2.56	3.07	94.83	22.05	16.36	6.4	Dorset Parallel	n	n	n	n	y
RaJu-4	3	1.66	2.97	3.88	85.50	17.66	17.12	8.65	Dorset Parallel	n	n	n	y	n
SgFm-17	58	1.21	2.64	3.47	83.62	18.15	19.69	8.65	Dorset Parallel	n	n	n	n	y
SgFm-3	21	1.55	2.06	2.51	84.70	17.51	17.15	7.15	Dorset Parallel	n	n	y	y	y
SgFm-3	22	1.50	2.24		78.57	14.23	15.13	2.52	Dorset Parallel	n	n	y	n	n
SgFm-3	101	1.60			87.11	20.83	15.79		Dorset Parallel	n	n	n	n	n
SgFm-3	125	1.57	1.86	3.05	72.64	14.97	14.77	6.3	Dorset Parallel	n	n	n	n	n
SgFm-3	191	1.31	2.04	3.30	83.67	13.93	17.14	6.86	Dorset Parallel	n	n	n	n	n
SgFm-3	336	1.21	1.95	3.23	52.79	11.96	12.78	3.63	Dorset Parallel	n	n	n	y	y
SgFm-3	350	1.52	2.62	3.60	81.44	19.91	18.80	8.65	Dorset Parallel	n	n	y	y	y
SgFm-5	2	1.39	2.61	3.96	83.34	16.26	18.39	5.56	Dorset Parallel	n	n	n	n	n
SgFm-5	18	1.61	2.05	3.80	90.93	19.35	20.46	5.36	Dorset Parallel	n	n	n	n	y
SgFm-5	150	1.01			60.78	10.35	12.95	3.49	Dorset Parallel	n	n	n	y	n
NiHf-1	112	5.86	7.33	8.08	92.27	20.66	17.05	17.22	Pre-Dorset	n	n	n	n	y
JaDb-10	3465	1.80	2.74	3.34	59.32	12.17	12.07	6.54	Pre-Late Dorset	n	n	n	n	y
KeDe-14	745	1.11	1.75	2.15	41.17	10.80	8.03	6.01	Pre-Late Dorset	n	n	n	n	y
KeDe-14	845	1.96	2.27	1.65	37.62	11.81	8.00	7.06	Pre-Late Dorset	y	n	n	n	y
KeDe-14	846	1.22	1.70	2.09	38.09	10.68	9.16	7.19	Pre-Late Dorset	n	n	n	n	y
KeDe-14	855	1.49	2.12	3.25	38.37	10.38	7.40	7.4	Pre-Late Dorset	y	n	n	n	y
KeDe-14	950	1.96	2.56	3.16	43.51	13.49	12.44	10.4	Pre-Late Dorset	n	n	n	n	y
KeDe-14	958	1.44	2.14	2.47	50.29	10.12	6.63	7.13	Pre-Late Dorset	y	n	n	n	y
KeDe-14	1005	1.93	2.39	3.36	48.41	11.62	9.05	6.92	Pre-Late Dorset	y	n	n	n	y
KeDe-14	1012	1.14	1.98	3.25	50.41	10.72	8.66	7.78	Pre-Late Dorset	y	n	n	n	y
KeDe-14	1092	1.61	2.12	2.94	53.41	12.76	10.29	7.74	Pre-Late Dorset	y	n	n	y	y

Borden	Artefact #	Slot Prox	Slot Med	Slot Dist	Length	Width	Thickness	Slot length	Type	Sliced	Lashing Groove	Securing Hole	Decoration	Complete
NhHd-3	45	1.50	1.97	2.57	41.64	10.51	9.21		Pre-Late Dorset	y	n	n	n	y
NhHd-3	60	1.79	3.07	3.42	57.67	15.72	13.55		Pre-Late Dorset	?	n	n	n	y
NhHd-3	166	1.64	2.28	2.60	47.93	12.37	9.89		Pre-Late Dorset	y	n	n	n	y
NiHa-1	59	1.21	2.13	2.89	65.41	16.69	13.09	6.47	Pre-Late Dorset	n	n	n	n	y
NiHa-1	60	1.86	2.29	3.27	64.14	16.40	14.47	7.54	Pre-Late Dorset	n	n	n	n	y
NiHf-3	140	1.57	2.29	2.42	37.33	10.59	7.37	7.85	Pre-Late Dorset	y	n	n	n	y
NiHf-3	279	1.33	2.21	2.79	53.42	17.33	10.02	11.55	Pre-Late Dorset	y	n	n	n	y
NiHf-3	821	1.71	2.47	2.70	46.44	14.94	10.17	9.51	Pre-Late Dorset	y	n	n	n	y
NiHf-3	823	1.26	1.97	2.72	42.10	12.15	7.93	9.01	Pre-Late Dorset	y	n	n	n	y
NiHf-4	702	1.93	2.93	3.80	49.53	15.37	11.92	11.07	Pre-Late Dorset	y	n	n	n	y
NiHf-45	998	1.52	2.00	2.42	60.29	12.55	8.53	4.47	Pre-Late Dorset	n	n	n	n	y
NiHf-47	180	1.51	2.20	2.57	43.05	11.03	9.64	6.75	Pre-Late Dorset	y	n	n	n	y
NjHa-1	111	1.03	2.75	3.10	47.14	9.53	8.16		Pre-Late Dorset	y?	n	n	n	y
NjHa-1	112	1.45	1.82	2.24	43.63	11.21	9.49		Pre-Late Dorset	y	n	n	n	y
NjHa-1	117	2.20	2.75	3.39	48.59	24.65	17.48		Pre-Late Dorset	n	n	n	n	y
NjHa-1	123	1.04	1.96	2.27	50.21	10.43	8.62		Pre-Late Dorset	y	n	n	n	y
NjHa-1	176	1.64	1.86	2.80		12.58	11.21	5.66	Pre-Late Dorset	n	n	n	n	n
NjHa-1	1264	1.51	2.24	2.67	50.01	17.32	12.88	8.07	Pre-Late Dorset	n	n	n	n	y
NjHa-1	1265	1.58	2.34	2.67	51.10	15.33	12.49	10.76	Pre-Late Dorset	y	n	n	n	y
NjHa-1	1269	1.43	2.08	2.49	49.74	11.49	9.82	9.23	Pre-Late Dorset	y	n	n	n	y
NjHa-1	1271	1.30	1.88	2.40	37.50	8.54	7.58	6.24	Pre-Late Dorset	n	n	n	n	y
NjHa-1	1592	1.49	2.72	3.39	47.32	17.03	11.83	8.64	Pre-Late Dorset	y	n	n	n	y
NjHa-1	1826	1.08	2.04	2.50	45.43	11.71	6.81	7.67	Pre-Late Dorset	y	n	n	n	y
NjHa-1	1827	1.36	1.93	2.24	46.45	12.36	9.03	9.48	Pre-Late Dorset	y	n	n	n	y
NjHa-1	1947	0.96	1.42	1.99	33.01	10.49	6.23	5.85	Pre-Late Dorset	n	n	n	n	y
PgHb-1	4036	2.00	2.76		40.75	11.83	9.75	4.81	Pre-Late Dorset	y	n	n	n	y
PgHb-1	4039	1.27	2.06	2.78	49.81	12.85	7.55	6.35	Pre-Late Dorset	n	n	n	y	y
PgHb-1	7456	0.96	1.84	3.07	42.80	9.82	10.26	8.04	Pre-Late Dorset	n	n	n	n	n
QiLd-1	1645	1.58	1.89	2.46	38.72	12.50	7.62	7.94	Pre-Late Dorset	n	n	n	n	y
NiHf-4	1150	0.99	1.27	1.89	56.64	19.56	10.38	8.75	Type G	n	n	y	n	y
NiHf-4	1192	0.64	1.38	1.66	49.85	15.55	9.68	7.12	Type G	n	n	n	n	y
NiHf-4	2078	0.99	1.40	1.65	57.10	18.40	7.27	5.84	Type G	n	n	y	n	y
NiHf-4	4339	1.54	2.11	2.48	70.94	22.68	9.00	6.32	Type G	n	n	n	n	y
NiHf-4	4741	1.18	1.45	2.27	40.23	8.71	6.69	7.2	Type G	n	y	n	n	y

Borden	Artefact #	Slot Prox	Slot Med	Slot Dist	Length	Width	Thickness	Slot length	Type	Sliced	Lashing Groove	Securing Hole	Decoration	Complete
NiHf-4	4889	0.97	1.26	1.27	61.81	17.94	8.44	8.4	Type G	n	n	y	n	y
NiHg-1	34	1.77	2.12	2.94	62.15	23.81	9.31	7.22	Type G	n	n	n	n	y
NiNg-17	26	1.73	2.55	3.02	52.57	14.64	6.69	5.69	Type G	n	n	y	n	y
NjHa-1	2007	1.48	2.88	3.84	73.06	20.87	16.63	11.24	Type G	n	n	y	n	y
PgHb-1	5977	0.93	1.37	1.99	59.77	16.50	7.24	4.95	Type G	n	n	n	n	y
QiLa-3	174	0.87	1.38	1.67	51.75	13.98	8.02	7.63	Type G	n	n	y	n	y
QiLd-1	33	1.18	2.00	3.85	67.99	15.01	11.32	9.58	Type G	n	n	n	n	y
QiLd-1	342	0.88	1.36	2.08	59.70	17.64	6.62	8.87	Type G	n	n	n	n	y
QiLd-1	411	1.13	1.63	2.14	41.87	15.88	5.94	6.36	Type G	n	n	n	n	y
QiLd-1	474	1.33	1.90	2.53	70.29	15.22	8.84	9.85	Type G	n	y	n	n	y
QiLd-1	504	1.58	1.83	2.99	67.13	11.21	9.65	9.06	Type G	n	y	n	n	n
QiLd-1	558	0.88	1.22	2.05	48.67	18.27	6.05	7.11	Type G	n	n	y	n	y
QiLd-1	602	0.80	1.07	1.70	60.89	13.75	7.57	8.92	Type G	n	n	y	n	y
QiLd-1	646	1.11	1.55	1.82	61.22	14.84	8.15	3.95	Type G	n	n	y	n	y
QiLd-1	766	1.05	1.31	1.77	33.71	11.97	7.00	7.29	Type G	n	n	n	n	y
QiLd-1	931	0.57	0.89	1.38	51.37	11.44	6.35	6.01	Type G	n	n	y	n	y
QiLd-1	955	1.05	1.57	3.07	66.55	15.12	10.74	10.61	Type G	n	y	n	n	y
QiLd-1	956	1.51	1.84	2.12	50.50	11.10	8.32	4.62	Type G	n	n	n	n	y
QiLd-1	973	1.52	2.13	2.90	60.82	14.21	6.90	14.38	Type G	n	y	n	n	y
QiLd-1	1466	1.19	1.31	1.50	55.94	13.33	7.78	15.1	Type G	n	n	n	n	y
QiLd-1	1467	0.93	1.26	1.49	57.58	13.36	7.59	13.24	Type G	n	n	n	n	y
QiLd-1	1471	1.04	1.10		47.68	16.68	6.85	2.43	Type G	n	n	n	n	y
QiLd-1	1484	0.93	1.50	1.81	64.14	13.61	7.14	7.56	Type G	n	y	n	n	y
QiLd-1	1493	1.35	1.73	2.35	53.38	14.51	7.23	10.79	Type G	n	y	n	n	y
QiLd-1	1494	1.67	1.52	2.01	55.35	12.00	8.81	11.53	Type G	n	y	n	n	y
QiLd-1	1625	1.00	1.35	2.02	62.32	11.39	9.56	9.19	Type G	n	n	n	n	n
QiLd-1	1628	1.25	1.41	2.51	56.25	13.67	11.02	6.38	Type G	n	n	y	n	n
QiLd-1	1653	0.95	1.08	1.38	61.70	15.58	8.32	12.65	Type G	n	y	n	n	y
QiLd-1	1655	0.93	1.32	1.72	48.01	14.63	7.52	9.1	Type G	n	n	y	n	y
QiLd-1	1756	0.83	1.55	2.31	55.21	11.55	8.55	12.45	Type G	n	y	n	n	n
QiLd-1	1816	1.00	1.29	1.84	9.30	17.04	9.64	8.04	Type G	n	n	y	n	y
QiLd-1	1947	1.03	1.20	1.56	65.02	16.33	7.97	5.43	Type G	n	n	y	n	n
QiLd-1	2110	1.27	1.75	2.62	52.97	17.02	6.98	8.01	Type G	n	y	n	n	y
QiLd-1	2198	1.05	1.37	1.73	64.78	15.24	9.10	11.12	Type G	n	n	y	n	n

Borden	Artefact #	Slot Prox	Slot Med	Slot Dist	Length	Width	Thickness	Slot length	Type	Sliced	Lashing Groove	Securing Hole	Decoration	Complete
QiLd-1	2208	0.79	1.12	1.67	52.54	18.32	7.38	7.81	Type G	n	n	y	n	y
QiLd-1	2226	1.35	1.99	2.93	63.88	15.01	10.41	7.57	Type G	n	n	y	n	n
QiLd-1	2233	1.15	1.55		62.23	12.96	8.29	10.7	Type G	n	y	n	n	y
QiLd-1	2245	1.52	2.02	2.41	53.79	11.00	8.47	10.76	Type G	n	y	n	n	n
QiLd-1	2365	1.34	1.34	1.52	51.78	14.34	8.37	7.8	Type G	n	y	n	n	y
QiLd-1	2478	1.57	1.99	2.82	46.53	11.27	8.98	11.28	Type G	n	y	n	n	n
QiLd-1	2493	1.17	1.50	2.20	61.54	18.15	10.54	9.74	Type G	n	n	y	n	n
QiLf-25	132	1.02	2.10	2.74	47.64	18.57	7.82	6.24	Type G	n	n	y	n	y
QiLf-25	168	1.22	1.39	1.89	47.36	16.30	7.94	3.14	Type G	n	n	n	n	y
QjJx-1	94	0.96	1.22	1.86	59.18	19.66	9.31	6.79	Type G	n	n	y	n	y
QjJx-1	95	1.01	2.11	2.39	53.98	15.21	8.31	6.3	Type G	n	n	y	n	y
QjJx-1	96	1.21	1.61	2.26	63.36	20.36	8.37	11.45	Type G	n	y	n	n	y
QjJx-1	98	1.37	2.17		57.60	16.94	7.82	3.13	Type G	n	n	n	n	y
QjJx-1	100	0.91	1.04	1.24	61.82	20.47	10.37	8.13	Type G	n	n	y	n	y
QjJx-1	126	1.77	2.80	4.24	72.30	21.34	9.54	12.48	Type G	n	y	n	n	y
QjJx-1	132	1.23	2.23	2.66	49.47	13.40	8.82	5.5	Type G	n	n	n	n	y
QjLd-25	191	0.96	1.11	1.33	62.75	15.42	9.14	3.6	Type G	n	n	y	n	y
RaJu-1	429	2.26	3.57	4.21	76.61	18.01	9.95	5.78	Type G	n	n	n	n	y
SgFm-12	20	1.75	2.81	4.79	71.13	16.16	9.42	6.06	Type G	n	n	n	n	y
SgFm-17	22	1.42	1.81	2.56	45.45	11.57	5.61	6.27	Type G	n	y	n	y	y
SgFm-3	20	1.67			61.96	19.14	6.83	5.48	Type G	n	n	n	n	n
SgFm-3	288	1.87	2.72	3.54	61.46	14.50	10.39	6.22	Type G	n	n	n	n	y
SgFm-3	335	1.27	1.79	2.46	49.99	16.77	8.49	7.86	Type G	n	y	y	y	y
SgFm-3	337	0.91	1.28	1.62	42.00	11.82	7.08	3.78	Type G	n	n	y	y	y
SgFm-3	338	1.65	2.17	2.33	65.48	14.91	8.55	9.01	Type G	n	n	y	y	y
SgFm-3	349	1.28	1.84	2.32	62.42	21.18	8.80	7.99	Type G	n	n	y	y	y
SgFm-3	360	0.95	1.45	1.83	65.70	14.78	9.74	8.31	Type G	n	y	n	n	y
SgFm-5	77	0.68	0.99	1.27	45.44	11.28	4.55	1.93	Type G	n	n	n	n	y
SgFm-5	90	1.03	1.37	1.52	62.73	14.76	5.49	6.12	Type G	n	n	n	y	y
SgFm-5	165	1.02	1.52		62.30	16.18	10.48	8.88	Type G	n	y	y	n	y
SiFi-4	87	0.87	1.19	1.55	61.86	14.19	8.92	8.56	Type G	n	n	y	n	y
SiFi-4	91	1.23	0.95	1.10	62.09	15.68	7.17	13.32	Type G	n	y	n	n	y
SiFi-4	92	1.22	1.44	2.21	61.44	18.53	9.97	12.12	Type G	n	y	n	n	y
SiFi-4	93	1.12	1.23		61.60	18.20	8.69	12.83	Type G	n	n	y	n	y

Borden	Artefact #	Slot Prox	Slot Med	Slot Dist	Length	Width	Thickness	Slot length	Type	Sliced	Lashing Groove	Securing Hole	Decoration	Complete
SlHq-1	30	0.94	1.25	1.96	62.20	18.85	8.42	3.9	Type G	n	n	n	n	y

Handles

Borden	Artefact #	Slot Prox	Slot Med	Slot Dist	Length	Width	Thickness	Slot Length	End- or Side-Hafted	Region	Complete
NiHf-4	1160	1.93	2.58	2.69	65.2	4.07	5.38	13.88	side	FB	Y
NiHf-4	1343	1.15	1.25	1.5	43.58	4.74	10.08	34.89	side	FB	N
NiHf-4	1367	1.48	2.56	3.53	78.79	6.14	7.56	38.98	side	FB	y
NiHf-4	1424	0.94	1.43	1.5	54.49	4.71	9.84	13.3	side	FB	y
NiHf-4	1800	2.26	2.33	2.42	69.09	5.35	10.87	29.15	side	FB	y
NiHf-4	1815	1.01	1.87		82.61	4.58	13.2	24.39	side	FB	n
NiHf-4	2058	1.77	3	3.35	45.59	7.84	10.27		side	FB	n
NiHf-4	2061	2.48	2.97	3.44	28.54	5.38	10.12		side	FB	n
NiHf-4	2163	0.85	0.89	1.03	99.92	4.44	5.6	13.85	side	FB	y
NiHf-4	2163	0.87	1.06	1.12				9.17	side	FB	n
NiHf-4	4254	0.91	1.08		76.64	4.22	10.75	25.55	side	FB	n
NiHf-4	4363	0.64	1.15	1.2	83.87	5.08	8.77	12.75	side	FB	y
NiHf-45	18	1.06	1.48	1.65	67.76	3.89	8.44	12.04	side	FB	y
NiHf-45	580	1.47	2.55	2.86	94.61	5.04	11.49	24.91	side	FB	y
NiHf-45	714	2.19	3	3.64	83.41	5.08	9.78	24.45	side	FB	y
PgHb-1	1430	1.88	2.64	2.53	162.17	6.43	12.78	41.32	side	PgHb-1	y
PgHb-1	5790	1.37	1.68	1.69	102.51	5.98	13.3	22.91	side	PgHb-1	y
PgHb-1	5793	1.86	2.2	2.59	53.58	7.55	15.97	40.02	side	PgHb-1	y
PgHb-1	5801	1.37	1.44	1.71	77.57	5.14	7.76	18.99	side	PgHb-1	y
PgHb-1	5803	2.34	4.38	4.89	100.9	12.1	9.61	41.69	side	PgHb-1	y
PgHb-1	9798	1.4	3.05	2.42	197.75	10.2	13.53	58.38	side	PgHb-1	y
PgHb-1	10084	1.11	1.36	1.91	135.5	15.08	12.43	39.4	side	PgHb-1	y
PgHb-1	10307	1.65	1.92	2.01	122.7	9.32	14.86	29.86	side	PgHb-1	y

Borden	Artefact #	Slot Prox	Slot Med	Slot Dist	Length	Width	Thickness	Slot Length	End- or Side-Hafted	Region	Complete
PgHb-1	12352	1.45	2.04	2.63	149.93	10.85	17.57	52.24	side	PgHb-1	y
PgHb-1	12633	1.72	2.47	2.58	71.58	5.74	8.86	23.18	side	PgHb-1	y
PgHb-1	13371	1.36	1.55	1.93	164.31	6.49	11.33	35.92	side	PgHb-1	y
PgHb-1	13948	3.3	3.93	4.11	171.24	8.93	13.84	33.45	side	PgHb-1	y
PgHb-1	14458	2.2	2.37	2.22	153.26	6.93	8	40.06	side	PgHb-1	y
PgHb-1	16519	2.82	3.13	2.8	182.27	8.9	14.99	38.42	side	PgHb-1	y
QiLa-3	187	1.72	2.65	2.96	93.75	3.71	9.36	27.08	side	CA	y
QiLd-1	32	1.79	1.99		34.08	5.28	13.57	34.08	side	CA	n
QiLd-1	363	1.08	1.62		80.88	4.4	11.89	19.92	side	CA	n
QiLd-1	804	1.32	1.7		87.1	6.09	12.94		side	CA	n
QiLd-1	842	2.12	3.12	3.29	60.22	5.28	10.68	25.89	side	CA	y
QiLd-1	948	0.84	1.1	1.03	98.41	6.23	10.01	28.93	side	CA	y
QiLd-1	1526	0.86	1.49	1.51	93.07	3.73	9.14	27.72	side	CA	y
QiLd-1	1607	0.95	1.29	1.51	62.98	4.17	8.99	22.82	side	CA	y
QiLd-1	1627	1.51	1.49	1.5	40.85	4.41	10.65	23.4	side	CA	n
QiLd-1	1993	1.09	1.29	1.4	37.22	4.32	11.46	27.35	side	CA	n
QiLd-1	2171	1.12	1.34		34.36	3.7	12.61	32.45	side	CA	n
QiLd-1	2325	1.5	1.74	2	27.14	5.13	12.22	27.14	side	CA	n
QjJx-1	111	1.2	2	2.11	15.82	3.78	9.19	15.72	side	CA	n
QjJx-1	199	1.52	2.81	3.28	81.01	5.23	11.94	32.85	side	CA	y
QjJx-1	223	1.01	1.16	1.35	55.73	3.73	8.22	18.77	side	CA	y
QjJx-1	225	0.76	1.01	1.36	30.71	3.98	9.25	16.94	side	CA	n
QjJx-1	233	1.51	2.86	3.14	53.56	5	11.19	16.74	side	CA	y
QjJx-10	387	0.78	1.81	2.1	78.99	4.1	9.76	21.26	side	CA	y
QjJx-10	2107	1.49	2.35	2.67	84.63	5.09	11.7	27.28	side	CA	y
QjJx-10	2975	1.06	1.41	1.49	97.76	4.16	12.11	21.45	side	CA	y
QjJx-10	2977	1.54	1.5	1.5	64.71	3.2	9.46	25.68	side	CA	y
RaJu-1	151	1.24	1.36	1.5	61.37	6.79	3.12	15.11	side	CA	y
RcHh-1	341	1.46	1.7	2.4	86.95	11.94	5.56	36	side	CA	y
RcHw-7	21	1.22	1.51	1.57	60.19	6.6	2.7	17.8	side	CA	y
SiFi-4	30	1.06	1.29		32.38	3.35	10.65	20.77	side	HA	n
SiFi-4	81	1.1	1.27	1.32	84.17	4.42	7.44	24.86	side	HA	y
JaDb-10	2545	2.3	2.49			9.47	12.52		end	HS	

Borden	Artefact #	Slot Prox	Slot Med	Slot Dist	Length	Width	Thickness	Slot Length	End- or Side-Hafted	Region	Complete
JaDb-10	2590	1.5	2.68	3.13	125.55	21.93	11.23	13.37	end	HS	
JaDb-10	2732	2.3	2.52	2.34	113.41	16.07	9.62	12.27	end	HS	
JaDb-10	2794	2.3	2.37	2.05	104.11	16.78	10.77	13.51	end	HS	
JaDb-10	2804	1.5	2.33	2.79	168.51	14.85	11.52	7.45	end	HS	
JaDb-10	3040	2.0			123.7	7.06	8.72		end	HS	
KeDe-14	801	3.3	3.32	4.12	132.4	13.62	14.49	12.68	end	HS	
KeDe-14	885	1.6	2.37	2.89	110.27	10.92	8.41	6.72	end	HS	
KeDe-14	932	1.8	2.21	2.07	75.52	11.14	6.84	5.22	end	HS	
KeDe-14	1031	1.6	1.7	2				3.86	end	HS	
KeDe-14	1031	2.1	2.06	2.5	108.36	10.22	8.45	4.23	end	HS	
KeDe-14	1046	3.4	4.41	5.63	94.85	16.3	10.12	6.86	end	HS	
KeDe-14	1047	3.2	3.23	2.7	53.31	10.86	9	6.71	end	HS	
PgHb-1	5784	2.5	3.15	6.03	132.64	18.16	13.11	10.47	end	BA	
PgHb-1	7372	3.2	3.92		89.69	12.55	10.32		end	BA	
PgHb-1	7373	2.4	2.91	5.87	96.91	17.55	11.12	14.77	end	BA	
PgHb-1	7374	2.2	3.4	4.91	125.84	15.5	11.01	14.97	end	BA	
PgHb-1	9796	2.3	3.15	4.02	128.78	13.29	11.36	8.14	end	BA	
PgHb-1	9801	3.6	3.61	3.27	153.31	18.62	15.54	10.15	end	BA	
PgHb-1	10084	2.5	3.57	5.18	135.5	15.08	12.43	14.02	end	BA	
PgHb-1	12607	3.7	3.18	5.49	162.88	19.11	13.07	17.71	end	BA	
PgHb-1	13089	3.5	4.52	6.6	153.33	21.04	12.95	13.05	end	BA	
PgHb-1	13971	1.5	1.97	2.26	121.13	7.84	6.98	6.24	end	BA	
QjJx-1	127	1.5	1.99	2.33	33.66	12.65	5.43	6.06	end	CA	
SgFm-3	100	1.81	2.07	2.61	107.72	20.02	10.72	18.05	end	HA	

Endblades

Borden	Artefact #	Thick Prox	Thick Med	Thick Dist	Length	Width	Thickness	Thinning	Raw Mat	Concave Base	Uniface	Tip-flute	Complete
FdAw-05	9	2.60	3.20	4.39	32.33	20.71	6.01	8.04		y	y	n	y
FdAw-05	10	1.37	2.40	3.35	28.37	16.46	4.45	7.18		y	n	y	y
FdAw-05	11	1.19	2.04	3.46	19.14	17.91	3.66	5.78		y	y	n	y
FdAw-05	14	2.44	2.53	3.91	19.94	12.41	4.22	3.81	Ramah chert	y	y	n	y
HbGe-4	29	2.22	2.82	3.94	37.11	27.38	4.62	5.77	Grey chert	y	n	n	y
HbGe-5	4	1.89	2.83	3.62	24.72	21.03	3.65	5.39	Ramah chert	y	n	n	y
HcCg-02	38	1.70	2.42	2.93	31.17	16.17	3.81	6.72		y	y	n	y
HcCg-02	82	1.84	2.32	3.79	27.06	17.52	4.96	7.27		y	n	y	y
HcCg-02	124	1.89	2.54	3.16	29.10	16.67	4.13	7.38		y	n	y	y
HcCg-02	238	1.47	2.83	3.53	42.54	22.15	4.91	9.22		y	n	n	y
HcCg-02	363	1.33	2.44	3.42	24.15	20.10	4.00	7.98		n	y	n	n
HcCg-02	373	1.79	2.82	3.98	30.90	21.13	4.38	9.10		y	n	n	y
HcCg-02	411	1.22	3.46	4.45	67.55	23.94	5.55	6.08		y	n	n	y
HcCg-02	649	1.91	2.88	3.46	40.94	18.44	4.52	9.33		y	n	y	y
HcCg-02	650	1.20	2.08	2.87	31.59	19.52	3.85	6.77		y	n	y	y
HcCg-02	652	2.33	2.81	4.37	35.16	23.24	5.21	7.75		y	n	y	y
HcCg-02	701	1.58	3.21	4.14	22.16	24.56	4.71	10.92		y	n	n	n
HcCg-02	1042	1.87	3.52	3.89	42.93	22.78	4.71	13.22		y	y	n	y
HdCh-32	1	1.37	3.11	4.35	32.16	23.76	5.70	6.68	Ramah chert	y	n	n	n
HdCh-32	2	1.59	2.85	5.55	26.74	34.37	6.08	10.51	Ramah chert	y	n	n	n
HeCf-01	11	2.07	2.76	3.71	26.34	19.10	4.52	5.04	Ramah chert	y	n	y	y
HeCf-01	16	1.67	2.49	4.01	30.57	20.85	4.85	8.22	Ramah chert	y	y	n	y
HeCf-01	19	1.42	2.77	3.28	34.88	17.18	5.41	6.95	Ramah chert	y	y	n	y
HeCf-01	24	2.21	2.53	2.57	18.00	13.02	2.60	4.36	Ramah chert	y	y	n	y
HeCf-01	36	1.20	1.82	3.30	40.81	19.70	5.89	6.88	Ramah chert	y	n	y	y
HeCf-01	38	1.20	2.41	3.39	22.72	14.61	4.30	7.11	Ramah chert	y	y	n	y
HeCf-01	57	1.65	2.29	2.66	22.39	13.59	2.70	5.74	Green chert?	y	y	n	y
HeCf-01	80	1.75	2.83	3.70	40.18	17.37	4.75	11.36	Ramah chert	y	n	y	y

Borden	Artefact #	Thick Prox	Thick Med	Thick Dist	Length	Width	Thickness	Thinning	Raw Mat	Concave Base	Uniface	Tip-flute	Complete
HeCf-01	89	1.71	2.27	2.44	20.29	14.56	2.70		Ramah chert	y	y	n	y
HeCf-01	101	1.66	2.21	2.80	25.56	15.49	3.21		Ramah chert	y	y	n	n
HeCf-01	104	1.71	2.63	3.23	38.21	16.83	4.10	8.57	Ramah chert	y	y	n	y
HeCf-01	109	1.54	2.57	3.17	28.66	18.88	3.81	6.72	Ramah chert	y	y	n	y
HeCf-01	179	1.66	2.89	3.62	34.26	18.40	4.30	5.88	Ramah chert	y	y	n	y
HeCf-01	203	1.53	3.36	4.11	34.82	17.67	5.01	9.17	Ramah chert	y	y	n	n
HeCf-01	209	1.40	3.33	4.72	38.74	17.66	6.42	9.60	Ramah chert	y	y	n	y
HeCf-01	234	1.13	2.77	3.30	32.87	19.08	3.67	6.31	Ramah chert	y	n	n	y
HeCf-01	238	2.33	3.18	3.87	31.84	17.93	5.43	8.28	Ramah chert	y	n	y	y
HhCj-05	1	1.90	2.74	3.01	29.99	16.01	3.47	7.17		y	y	n	y
HhCj-05	49	1.39	2.93	3.21	34.42	15.07	4.42	6.60		y	n	y	y
HhCj-05	67	1.70	2.98	4.02	39.71	23.17	4.28	10.87		n	y	n	y
HjCl-03	33	1.20	2.83	3.22	30.68	21.95	3.99	7.57	Ramah chert	y	n	n	y
HjCl-03	34	1.23	2.72	3.69	31.10	24.24	4.72	8.89	Ramah chert	y	n	n	n
HjCl-03	117	1.46	2.31	3.20	29.92	21.97	3.51	5.92	Ramah chert	y	n	n	y
HjCl-03	166	1.27	2.48	4.43	46.94	20.51	6.29	5.98	Ramah chert	y	n	n	y
HjCl-03	167	0.94	1.75	1.79	20.18	11.61	2.20	1.81	Ramah chert	y	y	n	y
HjCl-03	383	1.81	3.05	3.80	38.35	27.19	4.55	6.49	Ramah chert	y	n	n	y
HjCl-03	385	2.10	2.92	3.66	38.17	26.18	4.03	3.87	Ramah chert	y	n	n	y
HjCl-03	491	1.32	3.08	3.65	47.60	31.26	4.92	7.27	Ramah chert	y	n	n	y
HjCl-03	540	1.64	2.44	3.35	66.00	24.36	5.44	9.09	Ramah chert	y	n	n	y
HjCl-03	543	1.63	2.65	3.83	31.47	29.95	6.14	8.28	Ramah chert	y	n	n	n
HjCl-03	606	1.01	2.13	3.15	22.53	15.11	3.54	4.98	Ramah chert	y	y	n	y
HjCl-03	741	1.84	2.19	3.11	36.93	23.93	4.03	7.22	Rama chert	y	y	n	y
HjCl-03	742	1.66	2.54	3.33	32.00	20.45	4.25	8.44	Ramah chert	y	n	n	y
HjCl-03	809	1.52	3.01	3.85	40.48	25.29	4.24	8.68	Ramah chert	y	n	n	y
HjCl-03	862	1.59	3.10	3.94	36.03	24.41	5.08	7.97	Ramah chert	y	n	n	n
HjCl-03	892	1.31	2.71	3.58	41.37	21.72	3.81	7.35	Ramah chert	y	n	n	y
HjCl-03	916	1.88	2.77	3.21	37.66	15.87	3.31	3.70	Ramah chert	y	n	n	y
HjCl-03	958	1.85	3.36	4.61	69.41	25.28	5.15	8.22	Ramah chert	y	n	n	n
IdCq-22	131	1.42	2.66	3.60	47.65	21.52	5.63	7.24	Ramah chert	y	y	n	y
IdCq-22	372	0.81	1.62	2.46	23.11	16.93	3.63	5.75	Ramah chert	y	n	n	n
IdCq-22	373	1.33	3.05	3.69	46.68	16.18	5.31	10.29	Ramah chert	y	n	n	n
IdCq-22	374	1.57	2.53	3.05	29.51	18.49	3.38	5.42	Ramah chert	y	n	n	n

Borden	Artefact #	Thick Prox	Thick Med	Thick Dist	Length	Width	Thickness	Thinning	Raw Mat	Concave Base	Uniface	Tip-flute	Complete
IdCq-22	387	1.11	2.72	3.29	28.36	16.39	4.93	8.88	Ramah chert	y	n	n	n
IdCq-22	390	1.81	3.19	3.99	34.28	31.78	4.52	7.73	Ramah chert	y	n	n	n
IdCq-22	508	1.66	2.68	2.93	45.48	18.36	5.02	6.34	Ramah chert	n	n	y	y
IdCq-22	515	1.19	2.31	3.59	35.12	13.05	6.96	6.89	Ramah chert	n	n	y	y
IdCq-22	911	1.39	1.60	2.35	39.71	13.89	3.63	9.77	Ramah chert	y	n	n	y
IdCq-22	915	1.19	2.18	3.88	34.56	15.05	5.18	7.88	Ramah chert	y	n	y	y
IdCq-22	939	1.74	2.52	3.44	36.47	17.10	3.77	11.09	Ramah chert	y	y	n	y
IdCq-22	1044	1.70	2.59	3.00	41.25	15.25	4.68	9.09	Ramah chert	y	n	y	y
IdCq-22	1066	1.68	2.18	2.60	17.29	13.29	3.63	4.35	Ramah chert	y	n	n	n
IdCq-22	1237	2.10	3.83	4.49	41.38	14.81	7.22	7.99	Ramah chert	n	n	y	y
IdCq-22	1263	1.73	2.17	2.65	37.37	17.69	3.83	8.04	Ramah chert	y	n	y	y
IdCq-22	1278	2.15	2.59	3.34	34.24	18.89	4.35	12.64	Ramah chert	n	n	y	y
IdCq-22	1450	1.36	2.10	2.74	29.22	16.40	4.69	7.17	Ramah chert	y	n	y	y
IdCq-22	1478	1.77	2.40	3.17	28.94	14.09	3.66	9.51	Ramah chert	y	n	y	n
IdCq-22	1554	1.77	2.18	2.51	24.00	16.17	2.87	3.61	Ramah chert	y	y	n	n
IdCq-22	1773	1.80	4.46	6.04	49.44	31.58	7.41	5.72	Ramah chert	n	n	n	y
IdCq-22	1799	1.39	2.13	2.67	34.33	13.58	4.29	6.20	Ramah chert	y	n	y	n
IdCq-22	1812	1.37	2.63	3.17	36.08	14.30	4.17	9.05	Ramah chert	y	n	y	y
IdCq-22	1885	1.40	2.55	3.51	27.74	15.82	4.92	9.99	Ramah chert	n	n	y	y
IdCq-22	1969	1.70	2.72	3.80	49.34	29.65	5.46	7.56	Ramah chert	y	n	n	y
IdCq-22	2047	1.19	2.32	2.96	33.61	17.13	3.85	6.31	Ramah chert	y	n	y	y
IdCq-22	2285	1.11	2.39	2.86	44.32	20.76	3.91	10.72	Ramah chert	y	y	n	y
IdCq-22	2720	1.16	2.10	2.68	24.83	14.73	3.65	6.25	Ramah chert	y	n	y	y
IdCq-22	2782	1.77	3.46	3.91	35.38	16.33	5.38	7.64	Ramah chert	y	n	y	y
IdCq-22	2802	1.15	2.14	2.31	21.88	16.60	2.59	7.81	Ramah chert	y	n	n	y
IdCq-22	2805	1.37	2.39	2.55	28.37	14.01	3.19	3.78	Ramah chert	y	n	y	y
IdCq-22	2903	1.78	2.15	2.62	24.95	9.94	3.00	6.88	Ramah chert	y	y	n	y
IdCq-22	2998	1.35	2.04	3.28	40.78	18.03	6.04	10.28	Ramah chert	y	n	y	y
IdCq-22	3072	1.23	2.64	3.87	47.71	22.77	5.25	5.35	Ramah chert	n	n	y	y
IdCq-22	3119	1.16	2.38	4.32	49.28	23.68	6.19	9.86	Ramah chert	y	n	y	y
IdCq-22	3126	2.40	3.12	3.78	33.94	22.44	4.95	5.75	Ramah chert	n	y	n	n
IdCq-22	3130	1.11	2.78	3.82	36.50	14.55	4.86	5.48	Ramah chert	n	n	y	n
IdCq-22	3244	1.70	2.95	3.40	47.38	18.76	5.27	6.50	Ramah chert	y	n	n	y
IdCq-22	3308	1.74	3.38	3.60	36.20	12.30	5.28	12.35	Ramah chert	y	n	n	y

Borden	Artefact #	Thick Prox	Thick Med	Thick Dist	Length	Width	Thickness	Thinning	Raw Mat	Concave Base	Uniface	Tip-flute	Complete
IdCq-22	3407	1.45	2.22	2.94	28.04	20.72	4.58	7.72	Ramah chert	n	n	n	n
IdCq-22	3526	1.80	2.51	3.14	29.33	16.24	4.21	8.14	Ramah chert	y	n	n	y
IdCq-22	5674	1.61	2.12	2.52	40.11	24.62	3.67	6.85	Ramah chert	y	n	n	y
IdCq-22	6056	1.81	2.48	3.03	51.64	26.95	5.05	10.30	Ramah chert	y	n	n	y
IdCq-22	6073	1.89	3.25	3.61	34.60	16.67	5.00	7.60	Ramah chert	n	n	y	n
IdCq-22	6079	1.14	2.20	2.78	27.44	14.77	4.56	4.71	Ramah chert	y	n	y	y
IdCq-22	6080	1.00	2.43	3.72	40.96	27.74	5.23	6.15	Ramah chert	y	n	n	y
IdCq-22	8441	1.11	2.69	3.67	55.39	19.22	5.52	8.12	Ramah chert	y	y	n	y
IhCw-1	15	2.05	2.58	3.17	30.58	16.86	4.10	9.13	Ramah chert	y	n	y	n
IhCw-1	103	1.92	2.57	3.29	30.54	16.36	4.40	6.62	Ramah chert	y	n	y	y
IhCw-1	186	2.24	4.10	5.30	47.69	25.43	8.25	10.15	Ramah chert	n	n	y	n
IhCw-1	481	1.36	2.67	3.12	31.92	15.86	3.87	6.27	Ramah chert	y	n	y	y
IhCw-1	563	1.23	3.97	6.25	41.95	23.97	7.15	8.16	Ramah chert	y	n	y	n
IhCw-1	662	1.72	2.93	3.71	23.10	21.08	4.28	6.42	Ramah chert	y	n	n	y
IhCw-1	685	1.81	2.22	3.35	21.93	23.41	3.77	6.50	Ramah chert	y	n	n	n
IhCw-1	729	1.19	2.08	2.74	32.39	16.30	3.78	9.89	Ramah chert	y	n	y	y
IhCw-1	805	2.13	2.59	3.52	46.75	26.99	5.98	11.28	Ramah chert	y	n	n	n
IhCw-1	821	1.30	3.34	5.17	49.97	26.74	8.45	10.48	Ramah chert	y	n	y	n
IhCw-1	849	1.54	2.45	3.61	42.22	25.11	4.92	8.22	Ramah chert	y	n	n	y
IhCw-1	867	1.59	2.78	4.20	40.99	19.65	5.48	8.03	Ramah chert	y	n	n	y
IhCw-1	947	1.74	2.27	2.60	29.47	14.97	3.47	3.96	Ramah chert	y	n	y	y
IhCw-1	968	1.00	2.68	3.30	32.53	26.55	3.99	6.57	Ramah chert	n	n	n	y
IhCw-1	1007	1.25	1.99	2.31	24.82	12.42	2.40	3.58	Ramah chert	y	n	n	y
IhCw-1	1349	1.77	2.49	3.84	37.15	28.46	5.05	8.43	Ramah chert	y	n	n	n
IhCw-1	1359	1.88	3.93	6.14	45.68	24.71	7.64	7.83	Ramah chert	n	n	y	y
IhCw-1	1439	1.65	2.13	3.00	26.87	29.87	3.45	4.66	Ramah chert	y	n	n	y
IiCv-06	2	1.75	2.43	3.96	22.71	23.69	4.90	7.96	Ramah chert	y	n	n	n
IiCv-06	4	1.47	2.77	3.50	33.94	18.77	4.46	9.10	Ramah chert	y	n	n	y
IiCv-06	5	1.77	2.67	3.41	39.09	24.31	4.65	7.65	Ramah chert	y	n	n	n
IiCv-06	6	1.82	2.78	3.62	34.12	23.78	4.63	7.62	Ramah chert	y	n	n	n
IiCv-07	13	1.36	1.59	1.74	17.43	9.23	2.08	4.02	Ramah chert	n	n	n	y
IiCv-07	17	1.31	2.87	4.07	26.29	14.88	4.03	7.54	Ramah chert	n	n	n	n
IiCw-08	37	2.13	2.60	3.51	36.43	23.60	4.61	7.07	Ramah chert	y	n	n	y
IiCw-08	44	1.33	2.44	3.40	46.45	22.21	4.68	8.78	Ramah chert	y	n	n	y

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IiCw-08	80	1.09	2.15	3.34	36.18	21.29	3.68	8.45	Ramah chert	y	n	n	y
IiCw-08	85	1.51	2.35	3.23	26.86	23.63	3.97	5.38	Ramah chert	y	n	n	y
IiCw-08	130	1.58	3.78	4.39	42.83	24.88	7.35	13.52	Ramah chert	n	n	n	n
IiCw-08	148	1.72	2.96	4.08	34.00	26.94	4.66	6.52	Mugford chert?	y	n	n	y
IiCw-08	150	1.60	2.73	3.68	41.10	24.54	4.70	10.16	Ramah chert	y	n	n	y
IiCw-08	170	1.54	2.40	3.15	50.59	20.45	5.24	10.13	Ramah chert	y	n	n	y
IiCw-08	180	1.43	2.75	3.55	47.25	24.04	7.06	8.44	Ramah chert	y	n	y	y
IiCw-08	201	1.40	2.94	3.75	35.65	21.39	4.48	8.22	Ramah chert	y	n	n	y
IiCw-08	237	1.60	3.06	3.65	52.62	21.08	4.07	8.05	Ramah chert	y	n	n	y
IiCw-08	255	2.23	2.81	3.54	48.14	23.97	3.77	9.18	Ramah chert	y	n	n	y
IiCw-08	269	1.87	2.48	3.58	39.26	20.99	4.77	8.51	Ramah chert	y	n	n	n
IiCw-08	341	1.32	2.07	2.79	22.84	21.58	3.76	6.88	Ramah chert	y	n	n	n
IiCw-08	419	1.87	2.38	3.56	49.66	24.93	3.63	7.87	Ramah chert	y	n	n	y
IiCw-08	423	2.61	3.42	4.30	64.98	24.24	7.03	6.37	Ramah chert	y	n	y	y
IiCw-08	476	1.07	2.04	2.37	35.38	19.41	2.61	6.75	Ramah chert	y	n	n	y
IiCw-08	848	1.13	2.63	3.17	27.64	16.53	4.06	10.17	Ramah chert	y	n	n	y
IiCw-1	9	1.84	2.20	2.96	26.55	17.01	3.32	4.25	Ramah chert	y	n	n	y
IiCw-1	12	0.96	2.16	3.14	27.04	21.50	3.98	6.54	Ramah chert	y	n	n	y
IiCw-1	26	1.67	2.75	3.59	25.83	30.53	5.58	9.88	Ramah chert	y	n	n	n
IiCw-1	112	1.79	2.68	3.35	27.23	18.16	4.62	7.25	Ramah chert	y	n	n	y
IiCw-1	118	1.90	2.76	3.17	36.90	22.46	4.26	6.07	Ramah chert	y	n	n	y
IiCw-1	128	1.56	1.77	2.30	12.65	14.52	2.62	9.30	Slate	n	n	n	n
IiCw-1	159	2.58	3.66	4.90	38.86	31.04	5.68	6.99	Ramah chert	y	n	n	y
IiCw-1	177	1.09	2.66	3.77	32.82	22.63	4.31	7.57	Ramah chert	y	n	n	y
IiCw-1	178	1.33	2.52	3.57	29.93	23.71	4.14	7.39	Ramah chert	y	n	n	y
IiCw-1	210	1.43	2.62	2.77	38.67	20.77	3.52	7.78	Ramah chert	y	n	n	y
IiCw-1	256	1.44	2.74	3.07	27.90	21.51	3.56	6.36	Ramah chert	y	n	n	y
IiCw-1	303	1.16	2.24	3.98	41.78	21.66	4.08	5.58	Ramah chert	y	n	n	y
JaDb-10	4	1.95	2.96	3.53	40.59	16.89	4.28		Ramah chert	n	y	n	n
JaDb-10	53	0.79	1.91	2.71	40.71	18.60	5.40		Ramah chert	n	y	n	n
JaDb-10	72	0.99	1.25	2.25	29.69	17.01	3.50		Ramah chert	n	n	n	n
JaDb-10	116	1.23	2.42	3.03	42.45	25.93	5.91		Ramah chert	n	n	n	n
JaDb-10	196	0.71	1.94	2.82	43.13	19.63	4.51		Ramah chert	n	n	n	n
JaDb-10	266	0.83	1.92	2.74	31.11	17.39	3.71		Ramah chert	y	n	n	n

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JaDb-10	291	1.11	2.04	3.39	40.76	16.18	5.25		Ramah chert	n	n	y	n
JaDb-10	356	1.08	2.25	3.04	40.34	17.71	5.05	7.14	Ramah chert	y	n	y	n
JaDb-10	379	1.11	2.30	3.24	38.86	27.68	7.79		Ramah chert	y	n	n	n
JaDb-10	383	1.10	2.87	3.29	36.10	20.31	5.81	6.77	Ramah chert	y	n	n	n
JaDb-10	450	1.86	3.30	4.63	44.68	20.90	5.79	9.07	Ramah chert	y	n	n	n
JaDb-10	457	0.73	1.46	2.85	40.01	19.29	5.53	7.33	Ramah chert	y	n	y	n
JaDb-10	487	1.21	2.27	3.45	49.58	22.83	6.23	5.46	Ramah chert	y	y	n	n
JaDb-10	502	1.58	2.68	3.35	47.10	20.79	6.95	6.46	Ramah chert	y	n	n	n
JaDb-10	509	0.89	1.55	2.69	39.10	19.39	3.85	8.23	Ramah chert	y	y	y	n
JaDb-10	515	1.20	1.78	2.58	32.99	13.93	3.45	4.13	Ramah chert	y	n	n	n
JaDb-10	530	0.95	1.57	2.69	33.07	16.05	5.02	5.37	Ramah chert	y	n	n	n
JaDb-10	534	1.21	1.85	2.87	37.10	16.73	4.00	7.86	Ramah chert	y	y	n	n
JaDb-10	553	1.16	2.11	2.66	37.37	14.29	4.88	6.06	Ramah chert	n	n	y	n
JaDb-10	567	0.91	1.79	2.22	26.35	14.89	3.20	7.50	Ramah chert	n	n	n	n
JaDb-10	574	1.16	2.19	3.18	47.47	20.74	4.83	8.43	Ramah chert	y	y	n	n
JaDb-10	614	1.11	2.25	3.25	24.75	12.28	4.11	5.81	Ramah chert	y	n	n	n
JaDb-10	653	1.00	2.15	3.08	19.58	16.14	4.45	4.64	Ramah chert	y	n	n	n
JaDb-10	676	0.92	1.91	3.17	34.87	16.03	4.29	7.45	Ramah chert	y	y	n	n
JaDb-10	698	1.03	1.81	2.54	31.83	12.72	3.14	3.80	Ramah chert	y	y	n	n
JaDb-10	699	0.94	1.00	2.52	21.96	13.70	4.04	2.48	Quartz crystal	y	n	n	n
JaDb-10	804	1.59	1.91	2.67	40.18	16.83	5.81	5.87	Ramah chert	y	n	y	n
JaDb-10	810	1.20	1.94	2.87	20.40	25.55	4.90	7.36	Ramah chert	y	y	n	n
JaDb-10	820	0.86	2.72	3.28	22.93	13.23	3.75	4.31	Ramah chert	y	y	n	n
JaDb-10	828	1.34	3.89	4.53	21.73	24.91	7.21	7.75	Ramah chert	y	n	n	n
JaDb-10	847	1.32	1.93	2.82	29.89	16.08	4.47	7.10	Ramah chert	y	n	y	n
JaDb-10	952	2.22	2.34	3.99	20.90	26.36	5.32		Ramah chert	y	n	n	n
JaDb-10	957	1.60	2.61	4.57	37.71	23.50	6.48	7.00	Ramah chert	y	y	n	n
JaDb-10	1140	1.46	2.60	3.77	39.41	17.54	5.62	3.65	Ramah chert	y	n	n	n
JaDb-10	1252	1.12	1.60	2.45	30.84	16.02	2.88	2.75	Ramah chert	y	n	y	n
JaDb-10	1276	0.88	1.33	2.55	25.02	22.32	5.36	6.75	Ramah chert	y	n	n	n
JaDb-10	1283	0.75	2.04	2.71	33.25	15.56	4.13	7.21	Ramah chert	y	y	n	n
JaDb-10	1302	1.66	2.59	3.94	31.93	17.38	4.84	9.21	Ramah chert	n	n	y	n
JaDb-10	1415	0.83	1.66	2.10	32.20	17.95	4.14	6.40	Ramah chert	y	n	y	n
JaDb-10	1638	2.09	2.88	3.84	54.18	19.55	5.60	10.95	Ramah chert	y	y	n	n

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JaDb-10	1642	1.42	2.33	3.72	43.17	17.44	5.37	9.52	Ramah chert	y	n	y	n
JaDb-10	1781	1.43	2.59	3.47	28.28	14.29	4.44	8.07	Ramah chert	y	y	y	n
JaDb-10	2025	0.90	2.01	3.04	38.51	14.20	4.27	10.59	Ramah chert	y	n	n	n
JaDb-10	2118	1.34	2.57	3.80	28.23	21.68	5.86	8.99	Ramah chert	y	n	n	n
JaDb-10	2167	0.95	2.55	3.21	15.96	13.75	4.43	7.49	Ramah chert	y	y	n	n
JaDb-10	2178	1.87	2.83	4.16	43.37	22.41	5.62	13.83	Ramah chert	n	n	n	n
JaDb-10	2732	1.02	1.51	1.79	23.58	18.71	4.85		Ramah chert	n	n	n	n
KdDq-19	5	1.98	2.88	3.61	35.52	23.45	4.58	5.89	Tan chert	y	n	n	y
KdDq-19	362	1.82	2.27	2.71	18.27	14.19	2.61	2.83	Tan chert	y	n	n	y
KdDq-19	363	1.00	2.23	2.44	31.73	15.39	3.71	5.85	Brown chert	y	n	n	y
KdDq-19	364	1.66	2.26	2.84	23.71	14.26	2.96	4.46	Tan chert	y	n	n	y
KdDq-19	366	1.29	2.34	2.76	24.34	17.16	2.77	3.75	Tan chert	y	n	n	y
KdDq-19	367	1.58	2.60	2.67	25.10	15.63	2.64	3.37	Tan chert	y	n	n	y
KdDq-19	368	1.14	1.98	2.28	19.02	12.97	2.06	2.62	Tan chert	y	n	n	y
KdDq-19	371	2.67	2.95	3.44	23.20	12.31	3.39	4.22	Tan chert	y	n	n	y
KdDq-19	372	1.59	2.47	2.76	18.72	10.26	3.33	3.36	Tan chert	y	n	n	y
KdDq-19	373	1.96	2.99	3.53	44.46	17.58	4.55	4.00	Tan chert	y	n	n	y
KdDq-19	374	1.73	2.56	2.83	19.42	14.25	2.95	4.46	Tan chert	y	n	n	y
KdDq-19	375	1.90	2.63	2.91	21.27	15.48	3.07	3.89	Tan chert	y	n	n	y
KdDq-19	378	2.15	2.41	2.57	20.68	14.34	2.86	2.97	Tan chert	y	n	n	y
KdDq-19	381	1.87	2.50	2.85	18.16	13.86	2.71	4.40	Tan chert	y	n	n	y
KdDq-20	809	1.75	2.08	2.67	21.05	12.54	2.51	4.05	Tan chert	y	n	n	y
NiHf-4	1303	1.23	2.62	3.12	20.91	18.60	3.98	4.70	Pink Chert	y	n	n	n
NiHf-4	1342	1.73	2.58	3.78	41.93	21.79	4.40	7.78	Pink chert	y	n	n	n
NiHf-4	1383	1.61	1.76	2.34	15.30	14.79	2.17		Pink chert	n	n	n	y
NiHf-4	1422	1.42	2.30	3.66	20.90	24.18	4.33	4.98	Pink chert	y	n	n	y
NiHf-4	1741	1.03	2.00	2.47	15.14	11.53	3.03	4.35	Grey chert	n	n	n	y
NiHf-4	1818	2.20	2.34	3.37	27.51	18.00	4.13	5.81	Grey chert	y	n	n	n
NiHf-4	2089	1.53	2.61	3.43	24.53	15.33	3.03	4.21	Tan chert	y	n	n	n
NiHf-4	2094	0.91	1.88	2.06	19.00	20.66	2.74	5.26	Banded chert	y	n	n	y
NiHf-4	2124	1.69	2.96	3.91	24.81	22.10	4.38	5.65	White chert	y	n	n	y
NiHf-4	2150	2.32	2.97	3.45	18.00	15.76	3.77	2.95	Quartz crystal	y	n	n	y
NiHf-4	2270	1.43	2.83	3.51	20.16	19.45	4.31	5.17	Quartz	y	n	n	y
NiHf-4	2820	1.02	1.73	2.43	12.94	11.16	2.62	3.99	White chert	y	n	n	y

Borden	Artefact #	Thick Prox	Thick Med	Thick Dist	Length	Width	Thickness	Thinning	Raw Mat	Concave Base	Uniface	Tip-flute	Complete
NiHf-4	2824	1.15	1.17	2.21	20.73	20.21	3.39	2.75	Grey chert	y	n	n	n
NiHf-4	2877	2.14	2.80	3.09	29.60	17.08	3.48	5.02	Pinkish chert	y	n	n	y
NiHf-4	2887	2.75	3.30	3.86	22.85	14.27	3.95	5.41	Brown chert	n	n	n	y
NiHf-4	2902	1.54	2.45	3.38	20.29	13.49	3.48	5.24	Pinkish white chert	y	n	n	y
NiHf-4	2920	1.61	2.44	3.14	22.24	21.57	3.33	3.85	Grey chert	y	n	n	y
NiHf-4	3730	1.56	2.48	2.96	22.05	17.79	3.27	5.77	Grey chert	y	n	n	y
NiHf-4	3881	2.25	3.49	3.95	28.36	19.92	4.03	5.27	Grey chert	y	n	n	y
NiHf-4	3990	1.66	1.95	2.88	23.47	22.56	3.63	5.26	Grey chert	y	n	n	y
NiHf-4	4334	1.85	2.56	2.93	20.75	20.14	4.02	5.59	White chert	y	n	n	y
NiHf-4	4584	1.87	3.59	4.14	20.21	20.48	4.79	6.20	Grey chert	y	n	n	y
NiHf-4	4587	1.48	2.87	3.68	23.18	12.17	4.04	6.83	Grey chert	n	n	n	y
NiHf-4	4685	2.13	2.90	4.10	23.03	17.72	4.38	6.73	Pink banded chert	y	n	n	y
NiHf-4	4714	1.45	2.78	3.58	20.74	12.52	3.81	4.01	Grey chert	y	n	n	y
NiHf-4	4761	1.82	2.90	3.37	19.56	13.33	3.85	5.22	Grey chert	y	n	n	y
NiHf-4	4783	1.42	2.25	3.33	26.77	22.49	3.46	4.34	Grey chert	y	n	n	y
NiHf-4	4920	1.19	2.34	3.27	21.23	13.63	4.19	4.51	Grey chert	y	n	n	y
NiHf-4	4970	2.01	3.04	3.65	27.95	24.46	4.70	5.66	White chert	y	n	n	y
NiHf-45	19	1.54	2.63	2.66	24.96	16.84	2.49	6.00	Pink mottled chert	y	n	n	y
NiHf-45	68	2.13	2.87	3.04	17.42	11.41	3.14		Dolomite?	n	n	n	n
NiHf-45	75	1.91	2.61	2.67	18.80	18.07	2.70	6.12	Grey chert	y	n	n	y
NiHf-45	89	1.18	2.28	2.45	18.42	13.63	2.02	3.53	Tan chert	y	n	n	y
NiHf-45	119	2.07	2.54	2.62	17.46	14.17	2.80	4.57	Pink chert	y	n	n	y
NiHf-45	135	1.65	2.39	2.86	27.74	16.51	3.41	6.59	Grey chert	y	n	n	y
NiHf-45	138	1.15	2.86	2.84	3.11	5.26	3.04		Grey chert	y	n	n	n
NiHf-45	292	1.36	2.27	2.87	21.18	19.18	3.59	5.60	Pinkish chert	y	n	n	y
NiHf-45	367	2.06	2.92	3.14	30.50	17.93	3.14	7.04	Grey chert	y	n	n	y
NiHf-45	463	1.87	2.30	2.70	20.04	19.08	3.61	5.20	Grey chert	y	n	n	n
NiHf-45	817	1.82	2.76	3.10	30.47	21.04	3.21	5.28	Grey chert	y	n	n	y
NiHf-45	1378	1.00	2.77	3.28	21.63	13.84	3.27	3.32	Grey chert	y	n	n	y
NiHf-47	138	1.69	1.87	1.95	11.12	8.65	2.35	5.11	Grey chert	y	n	n	y
NiHf-47	188	1.71	3.25	3.40	19.58	15.54	3.21	10.74	Grey chert	n	n	n	n
NiHf-47	218	1.65	2.05	2.23	16.50	11.45	2.57	4.48	Grey chert	y	n	n	y
NiHf-47	278	1.90	2.35	2.61	18.03	10.37	2.66	4.67	Red chert	y	n	y	y
NiHf-47	311	0.89	1.42	1.75	8.86	6.95	1.86	4.85	White chert	n	n	n	y

Borden	Artefact #	Thick Prox	Thick Med	Thick Dist	Length	Width	Thickness	Thinning	Raw Mat	Concave Base	Uniface	Tip-flute	Complete
PgHb-1	835	0.96	2.72	4.00	43.64	23.79	4.49	8.20	Brown chert	y	n	n	n
PgHb-1	1724	1.32	3.24	3.51	29.50	17.48	4.53	6.56	Black chert	y	n	n	y
PgHb-1	1725	1.12	2.26	3.18	30.41	19.33	4.02	7.20	Grey chert	n	n	n	n
PgHb-1	1726	2.44	4.01	4.33	21.26	26.71	4.52	6.79	Grey chert	y	n	n	n
PgHb-1	2845	1.40	2.33	3.24	25.29	17.41	3.61	6.41	Grey chert	y	n	n	y
PgHb-1	2849	2.38	3.32	4.58	23.09	23.50	5.06	6.00	Grey chert	n	n	n	n
PgHb-1	2898	1.35	1.91	1.94	14.81	10.42	2.26	4.73	Red Chert	n	n	n	y
PgHb-1	2899	1.27	2.12	2.48	14.60	13.65	2.80	3.98	Pink banded chert	y	n	n	n
PgHb-1	2900	1.14	2.25	2.81	27.89	19.28	3.02	4.18	Grey chert	n	n	n	n
PgHb-1	2916	1.37	2.06	2.36	27.72	16.42	3.03	8.10	Tan chert	y	n	n	y
PgHb-1	2952	1.76	2.83	3.77	18.36	17.05	3.67	5.32	Grey chert	y	n	n	y
PgHb-1	2954	1.85	3.15	3.60	21.56	17.09	3.84	4.35	Grey chert	y	n	n	y
PgHb-1	2958	1.85	4.02	4.75	35.75	25.19	5.92	6.76	Grey chert	y	n	n	y
PgHb-1	3113	1.96	4.50	5.46	30.43	24.13	5.96	8.46	Brown chert	y	n	n	y
PgHb-1	3294	1.48	1.68	2.04	18.85	10.18	2.09	4.55	Grey chert	y	n	n	y
PgHb-1	3505	1.43	1.90	2.41	26.99	10.64	2.64	6.57	White chert?	y	n	y	y
PgHb-1	3522	1.66	1.94	2.54	25.25	13.67	2.85	4.27	Brown chert	n	n	n	y
PgHb-1	3523	1.68	3.08	4.04	21.91	16.05	3.89	4.76	Grey chert	y	n	n	y
PgHb-1	3524	1.66	2.77	3.28	19.48	13.00	3.32	5.05	Brown chert	y	n	n	y
PgHb-1	3598	1.45	2.08	2.99	22.92	12.17	3.82	6.65	Grey chert	y	n	n	y
PgHb-1	3600	1.56	1.75	2.35	24.18	13.42	2.60	4.95	Brown chert	n	n	n	n
PgHb-1	3601	1.55	2.31	3.20	22.52	13.57	4.06	5.50	Grey chert	y	n	n	y
PgHb-1	3619	1.35	2.11	2.62	18.16	13.53	2.90	6.32	Mottled chert	y	n	n	y
PgHb-1	3761	1.76	2.56	2.81	16.96	15.37	2.88	3.69	Mottled chert	y	n	n	n
PgHb-1	4144	1.38	1.98	2.48	27.31	10.74	3.07	7.72	Grey chert	n	n	y	y
PgHb-1	4170	1.04	2.40	3.20	22.06	13.13	4.03	6.44	Grey chert	n	n	n	y
PgHb-1	4172	1.67	2.30	2.57	19.20	15.37	2.50	6.75	Grey chert	y	n	n	y
PgHb-1	4174	2.05	2.85	3.77	20.81	17.25	4.10	5.99	Grey banded chert	y	n	n	n
PgHb-1	4175	2.03	3.24	3.47	23.58	17.41	3.82	5.29	Grey chert	y	n	n	y
PgHb-1	4176	1.49	2.62	2.98	16.78	16.32	3.60	4.79	Brown chert	y	n	n	y
PgHb-1	4177	1.81	2.23	3.03	23.11	13.47	3.36	4.04	Grey chert	y	n	n	y
PgHb-1	4197	1.67	3.22	4.12	21.30	20.36	3.82	8.36	Brown chert	y	n	n	n
PgHb-1	5768	1.52	2.33	3.33	20.56	17.59	3.37	7.39	Grey chert	y	n	n	n
PgHb-1	6317	2.77	3.25	4.18	34.52	22.44	4.78	6.22	Grey chert	y	n	n	y

Borden	Artefact #	Thick Prox	Thick Med	Thick Dist	Length	Width	Thickness	Thinning	Raw Mat	Concave Base	Uniface	Tip-flute	Complete
PgHb-1	6318	1.09	2.42	3.38	20.50	14.01	3.59	4.05	Grey chert	y	n	n	y
PgHb-1	6319	1.78	2.58	3.10	14.68	15.54	3.26	3.57	Brown chert	y	n	n	n
PgHb-1	6320	1.65	2.72	3.55	25.49	21.44	4.73	7.02	Mottled chert	y	n	n	n
PgHb-1	7493	1.44	1.64	2.96	20.00	8.28	3.46	4.49	Grey chert	n	n	n	y
PgHb-1	7494	1.44	1.94	2.03	17.86	9.87	2.52	6.58	Grey chert	y	n	n	n
PgHb-1	7495	1.08	1.92	2.17	13.66	7.71	2.40	3.27	Grey chert	y	n	n	n
PgHb-1	7496	1.47	1.64	1.87	14.88	9.24	2.01	3.85	Brown chert	n	n	n	y
PgHb-1	8227	1.48	2.35	2.60	17.15	12.04	2.87	4.17	Brown chert	y	n	n	y
PgHb-1	8612	1.77	2.10	2.85	27.48	16.30	3.61	4.54	Grey chert	y	n	n	y
PgHb-1	8716	1.63	2.77	3.36	27.39	16.42	3.82	5.13	Tan chert	y	n	n	y
PgHb-1	9636	1.27	2.84	3.41	21.10	13.16	3.54	4.56	Brown chert	y	n	n	y
PgHb-1	9723	1.32	3.10	3.42	26.64	16.63	3.61	5.42	Brown chert	y	n	n	y
PgHb-1	9724	1.79	2.71	3.35	30.62	17.04	3.90	5.13	Brown chert	y	n	n	y
PgHb-1	9725	2.25	3.25	4.16	23.05	16.75	4.23	5.11	Grey chert	y	n	n	y
PgHb-1	9726	1.33	1.94	2.12	11.94	13.71	2.18	4.22	Grey chert	y	n	n	n
PgHb-1	9935	1.64	2.53	3.32	21.54	21.02	3.93	6.37	Grey chert	y	n	n	n
PgHb-1	10280	1.70	2.41	3.22	22.88	15.03	3.54	4.86	Grey chert	y	n	n	y
PgHb-1	10438	0.92	2.18	2.82	21.70	12.93	3.34	6.05	Grey chert	y	n	n	y
PgHb-1	10478	1.31	2.96	3.21	22.46	15.07	3.86	5.68	Grey chert	y	n	n	y
PgHb-1	10717	1.38	1.93	2.01	14.45	11.70	2.34	4.07	Grey chert	y	n	n	y
PgHb-1	10756	1.67	3.02	4.42	39.26	27.70	4.70	7.58	Grey chert	y	n	n	y
QiLa-3	133	2.01	2.96	3.58	26.37	26.82	3.22	8.08	Grey chert	y	n	n	n
QiLa-3	146	1.35	2.94	3.08	26.00	27.96	3.81	9.44	Grey chert	y	n	n	n
QiLa-3	152	1.72	3.10	3.49	32.33	24.78	4.05	6.33	Grey chert	y	n	n	y
QjJx-1	92	1.56	2.42	3.85	37.90	16.89	3.92	12.87	Antler	n	n	n	y
QjJx-1	319	1.14	2.58	2.61	28.43	11.72	2.96	3.25	Grey chert	y	n	n	y
QjJx-1	419	1.15	2.10	3.00	23.53	19.63	3.34	6.40	Tan chert	y	n	n	y
QjJx-1	512	1.67	3.63	3.97	35.62	24.92	5.21	10.74	Grey banded chert	n	n	n	y
QjJx-1	594	1.56	2.76	3.25	26.76	23.36	2.93	5.29	Grey chert	y	n	n	y
QjJx-1	606	1.37	2.08	2.29	22.58	13.64	2.95	4.97	Grey chert	y	n	n	y
QjJx-1	905	1.82	2.30	2.89	35.02	31.15	3.72	6.17	Grey chert	y	n	n	y
QjJx-1	954	1.50	2.88	3.27	40.67	25.88	3.80	6.98	Grey chert	y	n	n	y
QjJx-1	985	1.44	3.15	3.29	35.34	24.20	4.28	6.62	Grey chert	y	n	n	y
QjJx-1	987	1.90	3.83	4.21	54.15	23.48	4.80	11.44	Grey chert	y	n	n	y

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QjJx-10	2342	1.25	2.82	3.67	26.16	15.45	4.53	6.48	Grey chert	y	n	n	n
QjJx-10	2343	1.80	2.40	2.50	30.22	22.00	3.10	7.31	Grey chert	y	n	n	n
QjJx-10	3143	0.95	2.38	3.42	24.54	21.45	3.71	7.27	Grey chert	n	n	n	y
QjJx-10	3151	1.64	3.22	3.47	17.76	20.58	3.70	4.69	Grey chert	y	n	n	n
QjJx-10	3297	2.03	3.29	3.35	20.76	12.87	3.51	5.18	Grey chert	n	n	n	y
QjJx-10	3388	1.87	3.02	3.55	27.06	14.06	4.14	5.84	Tan chert	y	n	n	y
QjJx-10	3417	1.56	2.87	3.37	26.77	21.56	3.48	6.38	Grey chert	y	n	n	y
QjJx-10	3468	1.13	1.44	1.92	12.08	11.16	2.06	4.37	Pink chert	n	n	n	y
QjJx-10	3554	1.25	1.91	1.96	16.84	11.96	2.18	2.94	Grey chert	y	n	n	y
QjJx-10	3576	1.33	3.25	3.39	24.42	13.37	3.35	6.76	Grey chert	n	n	n	y
QjJx-10		1.66	3.03	3.55	12.29	25.94	3.55		Grey chert	y	n	n	n
QjLd-21	1	1.63	1.79	2.66	31.80	16.26	4.31	5.76	Grey chert	y	n	y	y
QjLd-21	127	1.07	2.08	2.72	20.89	15.64	3.35	5.28	Grey chert	y	n	y	y
QjLd-24	96	1.29	1.69	2.03	20.09	13.26	2.78	7.33	Grey chert	n	y	n	y
QjLd-24	126	1.36	1.67	2.09	17.67	11.28	2.14	5.75	Pink chert	n	y	n	y
QjLd-25	73	1.78	2.57	2.95	16.68	20.02	3.13	4.92	Grey chert	y	n	n	n
QjLd-25	73	1.66	2.69	2.93	16.69	20.16	3.38	5.63	Grey chert	y	n	n	n
RaJu-1	95	1.38	2.69	4.06	32.54	22.47	4.08	7.79	Grey Chert	y	n	n	y
RaJu-1	371	2.12	3.11	3.40	32.67	33.94	4.92	8.15	Grey chert	y	n	n	n
RaJu-1	390	1.62	2.74	2.90	27.96	25.48	3.89	7.93	Grey chert	n	n	n	y
RaJu-1	409	1.95	2.50	3.82	47.76	30.54	4.50	11.05	Grey chert	y	n	n	n
RcHh-1	259	1.48	2.59	3.04	31.85	22.38	3.55	6.14	Grey chert	y	n	n	y
RcHh-1	397	1.29	2.58	3.58	28.48	20.49	3.53	5.62	Grey chert	y	n	n	y
SfFk-18	50	1.40	2.41	3.10	22.57	18.77	3.24	4.95	Grey chert?	y	n	n	y
SfFk-18	57	1.42	2.35	2.97	27.77	30.37	3.90	7.21	Grey chert?	y	n	n	n
SfFk-18	213	0.95	1.42	1.98	21.50	16.26	2.17	4.01	Grey chert?	y	n	n	y
SgFm-3	3	1.56	2.17	3.41	28.79	25.30	4.02	5.21	Grey chert?	y	n	n	n
SgFm-3	45	1.43	2.23	2.86	51.77	30.02	3.60	6.61	Grey chert?	y	n	n	y
SgFm-3	46	1.09	2.61	2.83	28.10	24.86	3.65	3.66	Grey chert?	y	n	n	y
SgFm-3	214	2.31	3.04	3.51	35.72	21.75	4.05	6.49	Brown chert?	n	n	n	n
SgFm-3	232	1.16	2.11	3.07	30.14	27.90	4.15	6.85	Grey chert?	n	n	n	y
SgFm-3	664	2.05	2.73	3.65	37.45	21.07	4.25	5.98	Grey chert	y	n	n	y
SgFm-3	706	1.94	2.22	2.47	51.46	6.63	3.67	21.25	Bone/Ivory	n	n	n	n
SgFm-5	103	2.13	2.75	3.73	21.05	23.97	4.49	6.48	Dark grey chert	n	n	n	n

Borden	Artefact #	Thick Prox	Thick Med	Thick Dist	Length	Width	Thickness	Thinning	Raw Mat	Concave Base	Uniface	Tip-flute	Complete
SgFm-5	131	1.05	2.15	2.46	26.95	22.25	3.98	5.79	Grey chert	y	n	n	y
SiFi-4	11	1.45	2.68	2.97	21.90	14.68	3.37	4.89	Grey chert	n	n	n	n
SiFi-4	14	1.46	2.57	3.27	20.54	18.52	3.46	5.26	Grey chert	y	n	n	n
SiFi-4	37	1.52	2.54	3.39	35.38	19.96	4.93	6.01	Grey chert	n	n	n	y

Knives

Borden	Artefact #	Thick Prox	Thick Med	Thick Dist	Thinning	Length	Width	Thickness	Raw Mat	Uniface	Notched	Stem	Complete
HbGe-4	28	1.95	3.85	5.08	11.66	56.34	25.44	6.63	Ramah chert	n	n	y	y
HbGe-4	32	1.47	2.85	3.25	4.87	31.58	15.16	3.99	Grey chert?	n	n	n	y
HbGe-5	5	2.44	4.33	5.7	6.66	56.26	24.01	8.4	Chert?	n	n	n	y
HbGe-5	7	2.2	3.28	4.16	5.7	30.54	14.01	5.81	Grey chert	n	n	n	y
HbGe-5	10	1.57	2.29	3.22	4.83	32.53	13.39	4.22	Ramah chert	n	n	n	y
HcCg-02	46	2.3	3.68	4.7	7.63	55.82	27.06	5.48	Ramah chert	n	y	n	y
HcCg-02	160	1.82	2.83	4.55	7.34	28.29	25.36	5.82	Ramah chert	n	y	n	n
HcCg-02	356	1.37	4.36	5.49	6.07	33.18	19.29	6.46		n	y	n	y
HcCg-02	426	1.76	2.66	4.16	6.48	55.14	20.45	6.16	Black chert	n	y	n	y
HcCg-02	614	2.1	3.69	4.56	5.21	19.18	22.24	6.92	Black chert	n	y	n	n
HcCg-02	623	2.68	3.8	4.65	6.22	24.52	25.57	6.37	Ramah chert	n	y	n	n
HcCg-02	688	1.64	3.51	4.35	9.68	18.1	23.69	7.17	Ramah chert	n	y	n	n
HcCg-02	838	2.7	3.05	3.82	12.59	40.36	23.11	6.18	Ramah chert	n	y	n	n
HeCf-01	7	1.63	2.92	4.45	9.53	23.15	22.46	4.63	Ramah chert	n	y	n	n
HeCf-01	88	2.2	4.27	4.78	8.42	44.24	22.2	6.21	Ramah chert	n	y	n	y
HeCf-01	183	1.79	2.93	3.29	4.25	30.88	18.12	3.96	Ramah chert	n	y	n	y
HhCj-05	35	2.57	3.71	5.18	9.2	59.82	22.37	5.61	Ramah chert	y	n	n	y
HjCl-03	116	2.13	3.32	4.72	9.2	79.12	44.99	7.72	Ramah chert	n	n	n	y
HjCl-03	121	1.63	3.02	3.5	5.62	15.6	31.98	6.52	Ramah chert	n	y	n	n

Borden	Artefact #	Thick Prox	Thick Med	Thick Dist	Thinning	Length	Width	Thickness	Raw Mat	Uniface	Notched	Stem	Complete
HjCl-03	168	1.91	2.77	3.81	6.54	28.2	10.38	4.03	Ramah chert	n	n	y	y
HjCl-03	170	1.57	3.32	4.36	6.9	39.84	22.92	5.2	Ramah chert	n	y	y	n
HjCl-03	175	2.22	3.69	4.52	8.47	26.37	26.78	4.51	Ramah chert	n	n	n	n
HjCl-03	353	2.3	3.75	5.19		44.54	29.53	5.88	Ramah chert	y	n	y	n
HjCl-03	354	2.38	3.25	3.45	5.58	32.06	21.01	4.5	Ramah chert	n	n	y	y
HjCl-03	394	2.06	2.65	2.72		33.15	21.91	3.04	Ramah chert	y	n	y	n
HjCl-03	395	2.3	2.79	2.95	6.97	30.91	17.03	3.03	Ramah chert	y	y	y	n
HjCl-03	492	1.54	2.57	3.29	6.77	30.79	12.48	3.38	Ramah chert	n	n	y	y
HjCl-03	545	2.65	4.29	4.65	6.04	41.11	29	8.04	Ramah chert	n	n	y	n
HjCl-03	574	3.02	3.4	4.55	10.33	60.9	37.42	6.12	Ramah chert	n	n	y	y
HjCl-03	641	1.57	3.45	5.3	6.75	20.55	31.76	6.84	Ramah chert	n	y	n	n
HjCl-03	694	2.03	2.95	3.35	6.9	38.99	15.08	4.13	Ramah chert	y	y	y	n
HjCl-03	811	2.13	4.95	5.37	7.52	22.82	39.39	6.11	Green chert?	n	n	n	n
HjCl-03	812	1.57	3.02	3.69	5.93	20	32.94	6.82	Ramah chert	n	y	n	n
HjCl-03	815	1.42	1.45	1.6		32.29	26.46	2.03	Ramah chert	n	n	y	n
HjCl-03	868	2.18	3.11	3.34	6.81	41.29	17.78	4.56	Ramah chert	y	y	y	y
HjCl-03	949	2.8	4.19	6.36	8.41	50.97	34.61	9.18	Ramah chert	n	n	n	n
IdCq-22	369	0.84	1.8	2.08	7.31	26.28	14.99	3.85	Ramah chert	n	y	n	y
IdCq-22	371	1.72	3.28	4.71	6.52	59.1	32.02	6.09	Ramah chert?	n	y	n	y
IdCq-22	382	1.95	3.58	5.21		66.11	36.76	7.16	Ramah chert?	n	y	n	y
IdCq-22	389	1.9	3.36	4.14	7.36	55	27.61	5.88	Ramah chert	n	y	n	y
IdCq-22	392	1.58	1.68	1.7		21.6	11.65	2.36	Ramah chert	n	y	n	n
IdCq-22	512	1.57	1.85	3.25	4.64	26.4	10.72	4.14	Ramah chert	n	y	n	y
IdCq-22	795	1.9	3.02	4.13	6	17.6	14.45	3.89	Ramah chert	n	y	n	n
IdCq-22	826	1.48	2.43	3.05	7.75	18.05	33.94	6.05	Ramah chert	n	y	n	n
IdCq-22	981	2.02	4.1	5.01	6.03	50.84	30.89	9.18	Ramah chert	n	n	y	y
IdCq-22	1764	4.82	4.9	5.4	12.76	52.49	35.56	6.21	Ramah chert	n	n	n	y
IdCq-22	1802	1.55	3.18	5.28	13.57	41.9	21.68	5.91	Ramah chert	n	n	n	y
IdCq-22	1935	2.5	3.77	4.34	4.88	46.11	42.83	7.65	Ramah chert	n	n	y	n
IdCq-22	2269	1.09	2.85	3.52	6.41	26.88	24.27	5.93	Ramah chert	n	n	y	n
IdCq-22	2426	1.67	3.45	4.26	5.28	47.61	31.04	7.94	Ramah chert	n	n	y	y
IdCq-22	2435	1.94	3.41	4	8.1	22.52	60.62	8.75	Ramah chert	n	n	y	n
IdCq-22	2436	1.9	3.14	4.33	8.77	42.87	18.81	7.63	Ramah chert	n	n	n	n
IdCq-22	2750	1.55	3.97	4.28	6.8	52.36	20.04	5.33	Ramah chert	n	y	n	y

Borden	Artefact #	Thick Prox	Thick Med	Thick Dist	Thinning	Length	Width	Thickness	Raw Mat	Uniface	Notched	Stem	Complete
IdCq-22	2916	1.35	2.2	3.44	7.74	15.24	30.05	5.84	Ramah chert	n	y	n	n
IdCq-22	3058	2.35	3.88	4.15	7.12	50.47	25.17	4.57	Ramah chert	n	n	y	y
IdCq-22	3151	2.01	3.07	3.65	7.2	40.27	17.29	4.12	Ramah chert	n	n	y	y
IdCq-22	3192	1.47	2.59	3.36	6.72	20.5	25.44	4.8	Ramah chert	n	y	n	n
IdCq-22	3622	1.14	2.05	2.73	6.88	31.26	29.41	4.67	Ramah chert	n	y	n	n
IdCq-22	5635	2.78	3.77	4.61	6.16	74.14	32.64	8.25	Ramah chert	n	y	n	y
IdCq-22	6014	2.09	2.26	3.02	5.7	13.55	25.3	4.68		n	y	n	n
IdCq-22	6095	3.69	5.77	7.15		76.16	29.55	7.23	Ramah chert	n	n	y	y
IdCq-22	6099	2.84	5.06	6.48		56.51	26.01	6.9	Ramah chert	n	n	y	y
IhCw-1	152	2.07	3.79	5.31	11.27	36.72	35.09	6.6	Ramah chert	n	y	n	n
IhCw-1	200	2.4	3.42	3.83	6.45	27.1	21.32	4.27	Ramah chert	n	y	n	n
IhCw-1	422	2.38	3.08	4.18	8.69	22.6	20.41	5.07	Ramah chert	n	y	n	n
IhCw-1	559	2.07	3.88	5.16	8.07	18.37	38.19	7.98	Ramah chert	n	y	n	n
IhCw-1	650	1.67	2.86	4.08	6.61	14.78	24.66	5.16	Ramah chert	n	y	n	n
IhCw-1	735	1.42	2.29	2.66	5.27	11.48	24.12	3.84	Ramah chert	n	y	n	n
IhCw-1	883	1.83	3.57	4.47	7.31	19.5	26.53	5.87	Ramah chert	n	y	n	n
IhCw-1	1587	2.58	3.88	4.78	7.14	20.18	22.64	6.01	Ramah chert	n	y	n	n
IiCv-06	10	2.95	3.21	4.94	11.31	45.89	24.03	7.07	Ramah chert	n	n	y	n
IiCv-06	21	1.84	3.24	4.49	8.38	61.55	29.29	7.33	Ramah chert	n	n	y	y
IiCv-06	33	3.08	5.08	6.39	11.93	30.19	35.31	7.14	Ramah chert	n	y	n	n
IiCv-06	36	2.4	3.99	4.39		11.3	23.94	4.45	Ramah chert	n	n	n	n
IiCv-06	40	1.69	2.08	2.94	5.65	30.91	9.61	3.01	Ramah chert	y	n	y	y
IiCw-08	17	2.08	3.02	5.14	6.21	18.54	39.34	6.63	Ramah chert	n	y	n	n
IiCw-08	21	1.44	3.24	3.35	5.31	46.47	20.76	4.53	Ramah chert	y	n	n	y
IiCw-08	40	1.4	2.02	2.81	5.57	32.86	18.88	4.17	Ramah chert	n	n	n	n
IiCw-08	79	2.89	3.59	5.26	7.09	46.33	26.05	6.84	Ramah chert	n	n	y	y
IiCw-08	96	3.2	4.18	5.88	6.92	47.67	23.24	7.05	Ramah chert	n	n	y	y
IiCw-08	111	1.53	2.9	4.52	7.52	76.93	17.91	5.54	Ramah chert	y	y	n	y
IiCw-08	129	1.62	2.95	3.39	5.17	45.6	34.15	6.06	Ramah chert	n	y	n	n
IiCw-08	142	2.34	3.33	5.77	9.65	62.3	28.88	9.32	Ramah chert	n	n	y	y
IiCw-08	143	1.74	3.29	4.02	5.26	51.58	26.35	6.48	Ramah chert	y	y	n	y
IiCw-08	162	2.04	3.35	3.89	4.1	17.84	20.95	4.33	Ramah chert	n	y	n	n
IiCw-08	266	1.38	2.64	3.38	5.66	29.93	22.92	4.52	Ramah chert	n	y	n	n
IiCw-08	276	2.49	2.65	2.65		38.01	17.12	2.66	Slate? Schist?	n	n	y	y

Borden	Artefact #	Thick Prox	Thick Med	Thick Dist	Thinning	Length	Width	Thickness	Raw Mat	Uniface	Notched	Stem	Complete
IiCw-08	449	2.41	3.59	4.33	5.08	49.69	28.3	6.66	Ramah chert	n	n	n	n
IiCw-1	13	3.18	3.98	5.3	13.08	48.41	37.32	10.21	Ramah chert	y	n	y	n
IiCw-1	89	1.41	2.3	2.61	6.15	39.78	20.69	3.84	Ramah chert	n	y	n	y
IiCw-1	325	3.02	4.66	7.24	12.52	57.64	36.26	8.83	Ramah chert	y	n	n	y
JaDb-10	103	1.3	3.2	4.08	8.21	37.93	29.23	6.63	Ramah chert	n	y	n	n
JaDb-10	111	1.63	2.23	4.65		57.58	27.79	8.78	Ramah chert	n	y	n	n
JaDb-10	138	1.45	1.97	2.57	5.14	10.15	19.05	2.64	Ramah chert	n	y	n	n
JaDb-10	212	1.5	2.48	3.14	3.77	54.13	26.09	5.55	Ramah chert	n	y	n	y
JaDb-10	421	1.88	2.06	2.94	14.14	37.26	19.13	3.76	Ramah chert	y	y	n	n
JaDb-10	533	1.87	3.3	4.33	9.43	56.33	39.92	5.6	Ramah chert	n	y	n	y
JaDb-10	538	1.4	2.38	3.37	7.09	39.43	18.49	4.3	Ramah chert	n	y	n	n
JaDb-10	554	2.08	3.85	4.75	7.85	20.07	30.16	6.73	Ramah chert	n	y	n	n
JaDb-10	561		4.46			57.45	34.79	6.54	Ramah chert	y	n	y	n
JaDb-10	599	2.21	2.85	3.34	5.2	24.86	24.67	5.6	Ramah chert	n	y	n	n
JaDb-10	606	2.44	3.94	4.09	6.68	34.2	21.08	5.36	Ramah chert	n	y	n	n
JaDb-10	697	2.17	3.7	4.51	10.05	70.69	25.12	6.71	Ramah chert	n	y	n	y
JaDb-10	702	0.97	2	2.83	5.81	17.9	23.09	5.52	Ramah chert	n	y	n	n
JaDb-10	728	3.56	3.56	3.56		29.33	23.45	3.94	Slate	y	y	n	n
JaDb-10	822	1.46	2.8	3.3	6.23	25.35	30.78	4.91	Ramah chert	n	y	n	n
JaDb-10	830	1.74	3.29	3.8	11.97	45.43	20.58	5.63	Ramah chert	y	y	n	n
JaDb-10	940	1.21	2.11	2.97	8.66	16.09	22.45	3.7	Ramah chert	n	y	n	n
JaDb-10	984	1.41	1.92	3.34	7.08	18.46	26.04	4.48	Ramah chert	n	y	n	n
JaDb-10	1011	1.21	2.03	2.73	3.49	9.75	17.72	3.33	Ramah chert	n	y	n	n
JaDb-10	1018	1.26	2.58	3.19	8.86	54.93	22.39	6.36	Ramah chert	n	y	n	y
JaDb-10	1074	1.7	2.31	2.98	10.1	18.68	21.29	4.63	Ramah chert	n	y	n	n
JaDb-10	1160	1.36	2.13	3.8	8.56	25.43	43.23	7.34	Ramah chert	n	y	n	n
JaDb-10	1236	1.48	2.31	2.82	5.06	28.47	23.64	4.31	Ramah chert	n	y	n	n
JaDb-10	1277		4.28			46.73	31.83	6.73	Ramah chert	y	y	y	n
JaDb-10	1317	1.9	2.58	3.81	9.62	25.46	29.51	6.52	Ramah chert	n	y	n	n
JaDb-10	1318	1.39	2.26	3.83	10.07	39.77	21.41	5.8	Ramah chert	n	y	n	n
JaDb-10	1408	1.17	2.35	2.8	6.13	26.92	17.47	4.16	Ramah chert	n	y	n	n
JaDb-10	1419	1.44	3.19	4.21	9.84	41.01	31.7	6.71	Ramah chert	n	n	n	n
JaDb-10	1471	1.26	1.79	2.86	16.24	37.4	19.4	5	Slate	n	y	n	n
JaDb-10	1491		2.86			50.33	26.91	6.06	Ramah chert	y	n	n	n

Borden	Artefact #	Thick Prox	Thick Med	Thick Dist	Thinning	Length	Width	Thickness	Raw Mat	Uniface	Notched	Stem	Complete
JaDb-10	1612	2.04	3.32	5.22	7.84	41.42	38.11	7.45	Ramah chert	n	y	n	n
JaDb-10	1620	1.28	2.63	3.34	13.31	41.39	20.88	4.94	Ramah chert	n	y	n	n
JaDb-10	1747	1.12	4.27	7.44	18.56	52.72	28.95	9.36	Ramah chert	n	n	n	y
JaDb-10	1779	1.73	2	2.9	7.39	51.54	21.02	4.15	Ramah chert	n	y	n	y
JaDb-10	1791	1.41	1.88	2.3	5.98	26.81	19.71	3.91	Ramah chert	n	y	n	n
JaDb-10	1809	1.73	3.07	3.78	10.93	18.95	23.13	6.19	Ramah chert	n	y	n	n
JaDb-10	2069	1.23	2.82	3.58	9	72.73	26.66	5.98	Ramah chert	n	y	n	y
JaDb-10	2135		3.16			49.3	23.18	5.07	Ramah chert	y	y	y	n
JaDb-10	2181	1.23	2.5	3.75	6.42	21.46	18.88	5.35	Ramah chert	n	y	n	n
JaDb-10	2343	1.13	2.35	3.4	5.61	14.04	33.44	4.84	Ramah chert	n	y	n	n
JaDb-10	2401	1.9	3.2	4.63	5.53	46.85	29.49	6.35	Ramah chert	n	n	n	n
KdDq-19	424	1.97	2.39	2.96	3.94	25.75	15.64	3.99	Tan chert	n	n	n	y
KdDq-19	425	1.52	2.49	2.92	3.92	25.28	11.4	3.49	Tan chert	n	n	n	y
KdDq-19	427	1.52	2.92	4.55	3.52	21.08	16.18	5.31	Tan chert	n	n	n	y
KdDq-19	428	1.68	2.09	2.23	4.21	23.17	11.33	2.6	Tan chert	n	n	n	y
KdDq-19	429	1.35	1.54	2.62	3.37	19.72	9.78	2.78	Tan chert	n	n	n	y
KdDq-19	457	1.91	2.92	4.9	5.89	45.08	21.62	6.92	Tan chert	n	n	n	y
KdDq-20	6	3.37	4.42	5.5	7.69	25.08	21.23	6.8	Quartzite?	n	n	n	y
KdDq-20	9	2.17	3.36	3.77	3.67	26.92	12.98	5.07	Tan chert	n	n	n	y
NiHf-4	1246	2.32	3.56	4.17		32.68	17.53	4.72	Chert	n	n	y	n
NiHf-4	1377	1.88	2.42	3.25	5.42	29.88	19.69	4.18	White chert	n	n	y	y
NiHf-4	1456	2.6	4.21	5.15	5.11	33.67	21.83	6.07	Grey chert	n	n	y	n
NiHf-4	1673	1.9	2.53	3.55	7.22	17.8	18.56	3.06	Pinkish white chert	n	n	n	n
NiHf-4	1827	2.17	3.68	4.36	7.71	44.27	17.84	5.75	Pink chert	n	n	n	y
NiHf-4	1858	1.33	2.04	3.49	5.83	17.35	16.67	3.71	Grey chert	n	y	n	n
NiHf-4	2143	1.38	2.3	3.04	8.76	27.48	17.71	3.84	Grey chert	n	n	y	y
NiHf-4	2162	1.55	2.93	3.46	11.18	17.9	28.79	3.75	Pink chert	n	n	n	n
NiHf-4	2218	1.13	2.19	2.74	9.05	18.41	12.76	3.13	Grey chert	n	n	y	y
NiHf-4	2248	1.8	4.81	5.22	13.26	34.8	20.65	7.57	White chert	n	y	n	y
NiHf-4	2774		3.53	4.42	7.79	28.07	19.17	4.72	White chert	n	n	y	n
NiHf-4	2776	2.19	4.29	5	9.09	25.61	17.44	5.32	White chert	n	n	y	n
NiHf-4	2791	2.59	4.92	6.12	14.55	20.55	34.47	6.77	Quartz	n	n	n	n
NiHf-4	2807	2.61	4.02	4.66	6.43	25.84	16.29	5.48	Grey chert	n	y	n	y
NiHf-4	2814	2.61	3.31	3.69	5.29	25.51	8.91	3.63	Grey chert	n	n	y	y

Borden	Artefact #	Thick Prox	Thick Med	Thick Dist	Thinning	Length	Width	Thickness	Raw Mat	Uniface	Notched	Stem	Complete
NiHf-4	2816	2.03	2.71	3.69	5.47	23.56	28.97	5.22	White chert	n	n	n	n
NiHf-4	2825	2.35	3.58	3.71	3.26	16.52	16.2	3.7	Grey chert	n	n	n	n
NiHf-4	2826	1.47	3.17	3.3	8.42	33.54	13.22	4.66	Tan chert	y	y	n	y
NiHf-4	2862	1.62	3.33	3.8	6	29.3	12.71	6.04	Grey chert	n	y	n	y
NiHf-4	2891	2.99	4.38	5.25	8.56	38.66	22.89	6.55	Tan chert	n	n	y	n
NiHf-4	2908	1.4	3.65	5.37	6.69	21.77	16.11	8.1	Quartz	n	n	y	n
NiHf-4	2914	2.71	4.21	5.76	11.96	40.47	22.43	5.2	Tan chert	n	n	y	y
NiHf-4	3023	2.2	2.45	3.9	7.22	22.35	25.18	6	Red banded chert	n	y	n	n
NiHf-4	3409	1.73	2.83	4.15	7.51	11.98	23.99	4.91	Banded chert	n	n	n	n
NiHf-4	3444	1.93	3.03	4.38	7.31	31.8	20.5	5.47	Grey/Pink chert	n	y	n	y
NiHf-4	3446	2.17	2.76	3.77	5.64	14.98	14.17	4.46	Pinkish chert	n	n	n	n
NiHf-4	4326	2.05	3.11	3.84	10.7	32.29	12.15	4.45	Grey chert	n	n	y	y
NiHf-4	4360	2.66	5.95	7.56	15.44	45.15	27.11	7.7	Quartz	n	n	y	y
NiHf-4	4361	2.25	3.52	4		26.23	16.32	4.63	Grey chert	n	n	y	n
NiHf-4	4583	1.99	3.39	3.79	5.67	28.35	15.74	4.18	Grey chert	n	n	y	y
NiHf-4	4592	2.44	2.68	3.01	15.25	35.07	11.46	3.43	Slate	n	n	n	n
NiHf-4	4594	1.98	3.78	5.06	5.53	13.05	21.66	5.69	White chert	n	n	n	n
NiHf-4	4595	1.91	2.1	2.44	7.1	11.97	16.52	2.87	White chert?	n	n	n	n
NiHf-4	4604	1.43	2.96	3.21	5.54	24.86	14.25	3.64	Grey chert	n	y	n	y
NiHf-4	4631	2.15	3.15	3.27		39.35	14.66	3.64	Greenstone? Slate? Nephrite?	n	n	y	y
NiHf-4	4725	2.08	4.09	6.01	4.09	35.8	20.47	6.95	Pinkish chert	n	y	n	y
NiHf-4	4753	1.71	3.53	4.46	7.59	43.46	16.75	5.96	White chert	n	y	n	y
NiHf-4	4806	1.5	2.85	3.31	5.92	17.64	15.96	4.65	White chert?	n	y	n	n
NiHf-4	4902	1.45	1.9	1.99	7.58	18.04	8.03	1.92	Slate	n	n	y	y
NiHf-4	4955	2.27	4.64	5.77	9.88	30.34	27.51	9.43	White chert	n	n	n	n
NiHf-4	4972	1.49	2.67	3.13		10.17	13.82	4.04	Grey chert	n	n	n	n
NiHf-45	54	1.58	2.8	3.58	4.53	31.05	15.69	5.84	White chert	n	y	n	y
NiHf-45	104	1.52	2.76	3.27	13.62	97.61	27.02	3.85	Slate	n	n	y	n
NiHf-45	112	2.48	2.92	3.57	4.4	25.06	19.34	5.41	Grey chert	n	n	n	y
NiHf-45	308	1.65	1.9	2.47	5.28	30.82	8.54	2.43	Grey chert	n	n	y	y
NiHf-45	357	1.94	2.1	2.88	5.27	28.69	12.71	3.62	Brownish chert	n	y	n	y
NiHf-45	360	2.23	3.41	3.68	5.67	10.51	15.28	4.4	Grey chert	n	y	n	n
NiHf-45	400	2.21	3.29	4.62	4.48	29.34	17.84	5.97	Black chert?	n	n	n	y

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NiHf-45	503	0.88	2.1	2.62	3.42	20.99	10.39	3.35	Grey chert	n	y	n	y
NiHf-45	593	1.99	2.71	3.19	3.41	25.19	12.29	4.05	Grey chert	n	y	n	y
NiHf-45	642	1.44	2.85	4.14	4.38	21.93	12.69	4.22	White chert	n	n	n	y
NiHf-45	947	1.93	2.67	3.84	8.11	28.34	17.98	5.36	Chert?	n	y	n	y
NiHf-45	971	2.32	2.9	4.15	4.18	27.62	18.84	4.69	Mottled chert	n	n	y	y
NiHf-45	1343	2.52	2.73	3.01	5.37	21.52	9.76	3.06	Grey chert	n	y	n	y
NiHf-47	181	2.28	3.01	3.2		19.61	22.28	3.2	Slate	n	y	n	n
NiHf-47	234	2.28	4.42	5.86	6.65	11.95	15	6.88	Chert	n	y	n	n
PgHb-1	792	2.23	3.52	3.92	7.2	26.43	13.9	4.63	Brown chert	n	y	n	y
PgHb-1	793	1.56	2.56	3.86	7.19	28.22	16.97	5.16	Grey chert	n	y	n	y
PgHb-1	816	1.01	1.47	1.74	3.82	18.33	16.7	1.77	Grey chert	n	y	n	n
PgHb-1	1728	1.03	1.66	2.41	4.69	25.7	14.56	2.4	Grey chert	y	n	y	y
PgHb-1	2471	2.74	3.67	4.29	9.04	56.2	18.66	6.08	Brown chert	n	n	y	y
PgHb-1	2472	1.54	2.74	4.41	5.32	25.9	16.12	5.96	Grey chert	n	n	n	y
PgHb-1	2475	1.7	3.64	3.97	6.48	30.12	15.53	4.08	Grey chert	n	y	n	y
PgHb-1	2495	2.14	3.76	5.07	4.44	29.16	17.86	5.63	Grey chert	n	n	n	y
PgHb-1	2652	2.65	4.06	4.73	6.68	15.61	18.16	5.9	Grey chert	n	n	n	n
PgHb-1	2844	1.76	2.78	3.65	7.53	28.76	13.96	4.73	Grey chert	n	n	n	y
PgHb-1	2850	1.03	2.67	3.15	5.58	22.37	12.59	4.67	Grey chert	n	n	n	y
PgHb-1	2870	1.59	2.13	3.39	5.91	25.23	14.02	4.57	Grey chert	n	n	n	y
PgHb-1	2896	1.96	3.87	5.92	5.71	14.82	18.21	6.75	Grey chert	n	n	n	n
PgHb-1	2918	2.2	2.63	3.06	4.05	35.02	11.49	4.21	White chert	n	y	n	n
PgHb-1	2950	2.67	3.63	5.57	6.15	47.77	18.87	5.96	Grey chert	n	n	y	y
PgHb-1	2955	2.46	2.64	4.56	4.35	30.19	16.24	6.12	Grey chert	n	y	n	y
PgHb-1	2959	2.4	4.11	4.71	4.87	29.33	15.78	6.18	Grey chert	n	y	n	y
PgHb-1	2960	1.49		3.99	4.93	26.35	13.52	5.08	Grey chert	n	n	n	n
PgHb-1	2965	1.64	3.2	3.77	6.81	31.4	16.19	3.5	Grey chert	n	y	n	y
PgHb-1	2971	1.44	1.77	1.98	6.28	26.25	13.01	2.63	Grey chert	y	n	y	n
PgHb-1	3088	2.03	3.66	4.44	4.33	19.09	14.32	5.06	Brown marbled chert	n	y	n	y
PgHb-1	3089	1.72	2.23	2.55	5.58	29.03	13.69	3.81	Grey chert	y	y	n	y
PgHb-1	3117	2.14	4.22	5.92	17.78	35.24	16.39	7.16	Brown chert.	n	n	n	n
PgHb-1	3118	1.82	4.08	4.33	5.86	18.39	14.89	4.8	Brown chert	n	n	n	n
PgHb-1	3327	2.11	3.44	4.34	6	16.1	12.45	4.61	White chert	n	y	n	n
PgHb-1	3865	1.93	2.95	4.02	4.49	28.68	16.13	4.42	White chert	n	n	y	n

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PgHb-1	3874	1.72	2.95	4.33	6.73	13.82	17.54	4.9	White chert	n	y	n	n
PgHb-1	3875	2.02	3.2	3.78	4.86	15	14.03	5.5	Brown chert	n	y	n	n
PgHb-1	3877	2.67	3.49	3.68	6.73	25.53	15.73	4.7	White chert	n	y	n	n
PgHb-1	4193	1.71	1.98	3.24	10.33	28.79	18.78	4.37	Grey chert	y	n	y	y
PgHb-1	5755	1.98	3.38	4.13	5.55	28.17	13.96	5.94	Tan banded chert	n	n	n	y
PgHb-1	6298	2.62	4.12	5.29	5.28	37.12	19.63	6.86	Grey chert	n	n	n	y
PgHb-1	6299	2.51	3.59	4.9	5.67	29.48	17.46	6.54	Grey banded chert	n	n	n	y
PgHb-1	6316	2.11	3.84	5	6.67	21.75	22.97	5.99	Grey chert	n	n	n	n
PgHb-1	7950	2.49	2.85	3.32	4.26	25.4	11.7	3.58	Quartz crystal	n	n	y	y
PgHb-1	8223	1.89	2.81	4.2	5.67	31.2	15.24	5.28	Brown chert	n	n	n	y
PgHb-1	8232	2.43	3.58	4.42	5.12	21.15	16.4	5.86	Grey chert	n	y	n	n
PgHb-1	8504	2.54	4.49	5.08	6.73	42.48	18.25	5.34	Brown chert	n	n	y	y
PgHb-1	8505	1.65	3.17	4.11	6.01	29.99	15.7	5.27	Grey chert	n	n	n	y
PgHb-1	8528	1.82	2.75	4.72	5.13	27.35	15.95	4.43	Brown chert	n	n	y	y
PgHb-1	8529	1.44	2.38	3.55	5.8	26.35	14.49	5.16	Grey chert	n	n	y	y
PgHb-1	8678	1.75	2.56	3.27	5.12	33.92	11.66	3.7	Grey chert	n	n	n	y
PgHb-1	8713	2.05	3.47	4.15	6.4	32.45	11.23	4.94	Grey chert	n	n	y	y
PgHb-1	8714	1.85	2.32	3.2	5.55	36.388	13.88	4.35	Tan chert	n	n	y	n
PgHb-1	9639	1.86	2.6	3.71	5.32	10.63	16.32	4.58	Grey chert	n	y	n	n
PgHb-1	9728	1.19	2.77	4.46	7.33	31.65	15.18	4.96	Brown chert	n	y	n	y
PgHb-1	9729	2.28	3.14	3.85	7.35	27.53	14.75	4.65	Grey chert	n	y	n	y
PgHb-1	9730	1.47	2.77	3.83	6.78	26.18	16.59	5.46	Grey chert	n	y	n	y
PgHb-1	9936	2.88	3.15	3.6	9.41	29.25	17.37	3.46	Brown chert	n	n	y	y
PgHb-1	10437	1.93	2.84	3.41	5.36	14.18	14.93	4.75	Grey chert	n	y	n	n
PgHb-1	10440	2.48	3.59	4.74	5.77	20.42	15.32	4.96	Grey banded chert	n	n	n	n
PgHb-1	10446	1.93	3.3	4.76	6.77	20.37	15.03	4.46	Grey chert	n	n	y	n
PgHb-1	10477	2.32	3.48	3.68	5.84	32.63	16.71	5.44	Grey chert	n	n	n	n
PgHb-1	10479	1.47	2.14	2.83	5.27	23.9	13.97	4.2	Grey banded chert	n	y	n	y
PgHb-1	10484	2.57	2.95	3.81	7.96	32.77	21.54	4.2	Grey chert	n	n	y	y
PgHb-1	10715	2.81	3.59	4.48	11.08	36.64	18.23	4.59	Grey chert	n	n	y	y
PgHb-1	10716	1.82	2.76	3.21	4.52	20.64	13.91	4.18	Grey banded chert	n	n	n	y
QiLa-3	74	1.74	2.46	2.88	7.1	38.23	21.29	4.02	Grey chert	y	y	n	y
QiLa-3	122	2.45	3.41	4.39	6.11	38.18	19.54	4.93	Quartzite	n	n	y	n
QiLa-3	128	1.21	3.67	4.43	6.16	25.24	14.2	5.33	Grey chert	n	y	y	y

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QiLd-1	1121	2.14	2.99	3.81	5.98	37.21	18	5.13	White chert	n	y	n	y
QiLd-1	1128	5.87	5.87	5.87		28.99	21.02	5.58	Grey chert	n	n	y	y
QiLd-1	1195	1.84	2.64	2.91	7.02	27.12	16.74	3.37	Grey chert	n	y	n	y
QiLd-1	1210	1.71	2.95	3.64	7.16	27.18	17.66	4.64	Grey chert	n	y	n	n
QiLd-1	1232	2.05	2.27	2.41	4.31	24.16	11.89	2.74	Grey chert	n	n	n	y
QjJx-1	340	1.99	2.75	2.79	7.91	11.01	15.22	3	Grey banded chert	n	y	n	n
QjJx-1	365	2.68	3.86	4.9	6.05	33.27	14.95	4.91	Grey chert	n	n	n	y
QjJx-1	370	1.96	2.8	4.26	7.62	16.85	26.03	5.07	Tan chert	n	n	n	n
QjJx-1	371	1.73	2.33	3.56	3.34	9.01	16.04	2.96	Grey chert	n	n	n	n
QjJx-1	386	1.39	2.68	3.71	9.64	14.88	15.69	4	Grey chert	n	n	n	n
QjJx-1	596	3.39	3.79	4.01	7.7	36.52	9.36	3.55	Grey chert	n	n	n	y
QjJx-1	842	1.31	2.26	3.62	5.85	32.55	19.94	4.04	Grey chert	n	y	n	y
QjJx-1	983	1.31	2.32	2.65	4.27	32.88	22.58	3.31	Grey chert	y	y	n	y
QjJx-1	1004	2.34	4.4	6.65	10.53	47.47	20.02	7.29	Dark grey chert	n	n	n	y
QjJx-10	98	1.89	4.06	5.16	8.76	53.56	26.71	5.59	Grey chert	n	n	y	y
QjJx-10	2008	1.65	3.6	4.46	6.94	41.43	19.95	5.61	Grey Chert	n	y	n	y
QjJx-10	2335	1.74	2.08	2.19	3.58	30.89	23.25	2.73	Grey chert	y	y	n	y
QjJx-10	3042	1.53	1.81	2.21	3.53	18.67	9.65	2.31	Grey chert	n	n	n	y
QjJx-10	3097	1.26	1.95	2.13	4.96	10.03	6.24	2.25	Grey chert	y	n	y	n
QjJx-10	3387	2.38	3.1	5.33	7.95	35.91	25.35	5.61	Grey chert	n	n	y	y
QjJx-10	3411	1.62	3.64	4.03	3.35	10.44	11.39	4.33	Grey chert	n	n	n	n
QjJx-10	3472	1.58	1.96	1.87	3.5	21.91	10.63	1.8	Tan chert	n	n	y	y
QjJx-10	3548	1.36	2.75	2.89	3.64	20.66	14.17	2.86	Grey chert	n	n	y	n
QjJx-10	3563	1.58	2.51	2.78	3.62	17.87	12.34	3.76	Grey chert	n	n	n	n
QjJx-10	3614	1.45	1.69	2.25	5.95	21.55	10.91	2.45	Grey chert	n	n	y	n
QjLd-21	6	1.56	1.88	2.4	4.66	13.51	10.22	2.6	Brown chert	n	y	n	n
QjLd-21	35	2.35	3.04	4.09	7.09	30.05	18.01	4.99	Pink chert	n	y	n	y
QjLd-21	114	2.06	3.22	4.07	4.93	30.93	18.2	4.74	Grey chert	n	y	n	y
QjLd-21	174	1.73	2.41	3.14	4.51	10.9	15.24	4.04	Pink chert	n	y	n	n
QjLd-22	73	1.11	2.29	3.27	6.15	29.18	19.22	4.43	Pink chert	n	n	n	y
QjLd-22	86	1.14	2.45	4.09	9.63	32.8	17.75	4.66	Grey chert	n	n	n	y
QjLd-22	87	1.49	2.71	2.86	3.54	18.26	12.81	4.49	Grey chert	n	n	y	y
QjLd-22	88	1.36	2.4	3.09	4.28	7.57	15.85	3.97	Grey chert	n	y	n	n
QjLd-24	130	1.47	3.36	3.79	6.82	11.06	18.69	4.43	Pink chert	n	y	n	n

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QjLd-24	296	0.92	1.14	1.46		37.2	13.16	2.75	Grey chert	n	n	y	n
QjLd-25	4	1.19	2.16	2.85	5.17	23.75	9.69	3.14	Grey chert	n	n	y	y
RaJu-1	9	2.25	2.53	3.98	4.15	17.16	26.38	6	Grey chert	n	y	n	n
RaJu-1	10	1.94	3.11	4.09	4.99	19.22	19.01	5	Grey Chert	n	n	n	n
RaJu-1	11	2.14	3.16	3.84	5.38	16.19	22.16	4.3	Grey Chert	n	y	n	n
RaJu-1	14	1.17	1.39	1.52	5.26	20.19	12.09	1.56	Grey chert	y	n	y	y
RaJu-1	15	1.54	2	2.94	3.14	22.35	11.8	2.91	Grey chert	n	n	y	y
RaJu-1	17	1.71	2.86	3.01	5.39	14.71	11.49	3.33	Grey chert	n	n	y	n
RaJu-1	78	3.49	4.84	5.79	8.63	51.96	28.07	8.79	Grey chert	n	y	n	y
RaJu-1	94	3.95	4.65	5.14	6.24	37.25	17.54	2.56	Grey chert	y	n	y	y
RaJu-1	182	3.62	4.57	5.25	7.23	56	33.19	6.81	Grey chert	n	y	n	y
RaJu-1	192	1.59	2.87	3.55	4.43	51.26	10.43	4.43	Grey chert	n	n	y	n
RaJu-1	195	2.7	3.89	5.66	8.3	46.41	20.19	7.65	Grey chert	n	n	n	y
RaJu-1	263	2.73	3.4	4.01		18.87	22.86	3.94	Grey chert	n	n	y	n
RaJu-1	264	1.86	3.33	4.34	13.97	53.27	29.89	7.66	Grey chert	n	y	n	y
RaJu-1	266	1.39	3.02	4.1	11.21	30.5	20.92	5.48	Grey chert	y	y	y	y
RaJu-1	294	1.92	3.32	4.43	6.72	55.32	34.54	6.06	Grey chert	n	n	y	y
RaJu-1	342	1.54	2.36	3.6	6.51	38.29	14.61	4.44	Grey chert	n	y	n	y
RaJu-1	345	1.48	3.29	4.03	7.15	12.99	20.8	5.96	Grey chert	n	y	n	n
RaJu-1	346	1.98	2.86	3.31	4.5	23.09	15.6	3.93	Grey chert	n	n	n	n
RaJu-1	379	2.64	4.56	5.29	6.39	16.21	18.84	5.02	Grey chert	n	n	n	n
RaJu-1	388	1.72	3.12	3.15	14.74	54.24	21.69	4.95	Grey chert	n	n	n	y
RaJu-1	389	1.82	2.61	3.52	13.04	33.56	15.66	4.32	Grey chert	n	n	n	y
RaJu-1	391	2.43	3.24	3.87		27.07	14.78	5.08	Grey chert	n	n	n	n
RaJu-1	406	1.55	3.06	3.71	9.94	17.02	22.91	4.17	Grey chert	n	n	n	n
RaJu-1	414	2.2	3.16	5.06	7.58	19.72	28.62	7.38	Grey chert	n	y	n	n
RaJu-1	13a	2.85	3.33	3.77	5.9	48.38	19.6	4.1	Grey Chert	y	n	y	y
RaJu-2	1	1.16	2.54	3.12	4.75	39.83	15.08	5.34	White chert?	n	y	n	y
RaJu-3	73	0.95	2.33	2.53	4.81	29.71	16.27	3.34	Grey chert	n	y	n	y
RaJv-1	1	1.46	2.8	3.78	8.55	29.35	13.68	4.3	Grey chert	y	y	n	y
RcHh-1	417	1.52	1.87	2.26	6.2	25.53	6.61	2.51	Grey chert	y	n	y	y
SfFk-18	22	2.66	3.91	5.49	5.07	50.09	23.13	5.67	Chert?	n	n	y	y
SfFk-18	44	2.61	3.68	4.96	6.88	43.94	23.18	5.67	White chert	n	y	n	y
SfFk-18	163	2.68	3.31	5.62	4.56	61.03	31.22	7.81	Grey chert	n	n	y	y

Borden	Artefact #	Thick Prox	Thick Med	Thick Dist	Thinning	Length	Width	Thickness	Raw Mat	Uniface	Notched	Stem	Complete
SgFm-3	1	1.91	3.08	3.67	3.86	14.2	22.2	5.52	Grey chert	n	y	n	n
SgFm-3	47		2.4	3.24		26.58	19.24	3.74	Grey chert	n	y	n	n
SgFm-3	103	1.91	3.05	3.65	7.67	29.9	17.38	4.86	Grey chert	n	y	n	n
SgFm-3	202	1.54	3.91	4.78	12.75	59.87	22.02	6.01	White/Grey chert?	n	n	n	y
SgFm-3	249	2.15	2.85	3.75	6.6	49.27	30.39	5.37	Grey chert	n	n	y	y
SgFm-3	250	2.56	2.85	3.52	8.22	83.55	24.51	5.37	Grey chert	y	y	n	y
SgFm-3	269	2.69	3.03	3.39	5.13	64.31	14.69	4.75	Grey chert	n	y	n	y
SgFm-3	282	1.45	2.35	2.86	8.76	17	23.52	3.68	Grey chert	n	n	n	n
SgFm-3	320	1.52	2.58	3.31	5.43	36.87	13.56	3.93	Grey chert	n	y	n	y
SgFm-3	391	1.66	2.27	2.34	3.55	20.73	11.38	3.55	White chert?	y	y	n	y
SgFm-3	400	1.28	2.51	3.58	5.39	32.23	13.72	3.75	Grey chert?	n	n	y	y
SgFm-3	408	2.4	4.74	5.26	12.23	78.58	47.96	6.51	White chert	n	n	y	y
SgFm-3	409	2.88	4.26	4.93	11.14	73.71	28.96	6.69	White chert.	n	n	y	y
SgFm-3	410	1.67	3.92	4.1	8.39	64.53	24.36	6.11	Chert?	n	n	y	y
SgFm-3	411	2.33	4	4.22	7.84	46.87	24.66	5.15	Brown chert.	n	n	y	y
SgFm-3	463	1.56	2.58	3.54	7.68	40.85	13.47	4.26	Grey chert	y	y	n	y
SgFm-3	465	2.53	3.14	3.59	9.56	19.65	17.58	3.23	Grey chert	n	n	y	n
SgFm-3	472	1.84	2.5	3.44	5.82	22.49	18.48	4.31	Grey chert	n	n	y	n
SgFm-3	558	2.47	3.06	3.81	5.73	18.47	22.04	3.74	Grey chert	n	n	y	n
SgFm-3	600	2.18	2.54	2.79	7.36	35.46	16.4	3.56	Tan chert	n	y	y	y
SgFm-3	604	1.84	2.92	4.3	8.96	40.46	17.3	5.48	White chert?	n	n	y	y
SgFm-3	614	1.51	2.36	3.24	6.45	30.12	15.72	4.22	Grey chert	y	y	y	y
SgFm-3	622	1.64	3.06	3.79	8.61	44.72	23.02	4.92	Grey chert	y	y	n	y
SgFm-3	673	2.7	3.34	3.68	5.96	21.05	22.98	4.73	White chert.	n	y	n	n
SgFm-5	94	1.66	2.56	3.17	10.3	35.08	24.15	3.83	Grey chert	n	n	n	y
SgFm-5	142	1.94	2.78	3.64	6.16	51.38	21.83	7.14	Grey chert	n	y	n	y
SgFm-5	144	1.83	2.65	3.78	7.95	54.81	21.69	6.17	Grey chert	n	y	n	y
SiFi-4	8	1.62	1.92	2.39	16.71	26.53	18.06	3.88	Grey chert	y	n	y	n
SiFi-4	55	2.04	2.17	2.38	8.87	21.61	12.28	2.81	Grey chert	n	n	y	y

Scrapers

Borden	Artefact #	Basal Thick	Length	Width	Thickness	Raw Mat	End-scraper
HcCg-02	121	3.24	39.75	33.98	6.61	Grey chert	y
HcCg-02	168	4.35	42.52	33.72	6.63	White chert	y
HcCg-02	621	4.06	32.65	21.86	7.66	Grey chert	y
HcCg-02	634	5.37	24.91	23.83	6.4	Grey chert	y
HcCg-02	664	4.11	25.99	20.93	5.12	Grey chert	y
HcCg-02	687	3.29	33.79	41.55	6.45	Grey chert	y
HcCg-02	905	5.68	30.38	22.53	8.12	Grey chert	y
HeCf-01	49	3.69	21.78	20.18	6.64	Grey chert	y
HeCf-01	98	3.66	32.01	34.18	9.21	Grey chert	y
HeCf-01	193	3.21	25.07	24.38	4.48	Grey chert	y
HeCf-01	217	3.73	22.49	22.34	6.8	Grey chert	y
HeCf-01	262	6.81	25.21	24.91	4.53	Grey chert	y
HhCj-05	34	4.24	21.89	22.18	6.56	Grey chert	y
HjCl-03	1	4.43	24.54	16.06	7.44	Grey chert	y
HjCl-03	55	4.42	25.51	25.37	7.14	Dark Brown chert	y
HjCl-03	59	2.5	29.96	13.24	4.82	Grey chert	y
HjCl-03	138	4.42	28.7	19.92	6.14	Tan chert	y
HjCl-03	356	3.91	24.79	15.6	7.24	Grey chert	y
HjCl-03	503	3.33	32.83	15.19	8.01	White chert	y
HjCl-03	504	5.82	30.55	24.07	5.57	Pinkish white chert	y
HjCl-03	550	4.93	28.19	22.16	11.14	Pinkish chert	y
HjCl-03	612	2.97	28.26	29.47	3.89	Brown chert	y
HjCl-03	718	4.07	46.01	27.84	9	Ramah chert	y
HjCl-03	778	4.53	38.88	25.51	7.88	Ramah chert	y
HjCl-03	790	3.61	43.24	26.16	6.54	Ramah chert	y
IdCq-22	376	2.46	27.96	28.75	6	Ramah chert	y
IdCq-22	400	2.41	32.87	23.02	6.95	Ramah chert	y

Borden	Artefact #	Basal Thick	Length	Width	Thickness	Raw Mat	End-scraper
IdCq-22	405	3.24	25.56	23.73	7.44	Ramah chert	y
IdCq-22	518	4	36.22	24.85	9.27	Ramah chert	y
IdCq-22	909	3.37	30.53	26.13	10.98	Ramah chert	y
IdCq-22	987	3.52	33.75	26.85	6.65	Ramah chert	y
IdCq-22	1407	3.64	35.49	25.08	5.55	Ramah chert	y
IdCq-22	1458	2.74	43.36	28.91	11.21	Ramah chert	y
IdCq-22	1774	2.78	33.64	23.51	8.14	Ramah chert	y
IdCq-22	2262	3.39	24.77	17.03	5.5	Ramah chert	y
IdCq-22	2277	1.85	33.07	28.3	5.87	Ramah chert	y
IdCq-22	2905	4.05	26.21	24.63	5.06	Ramah chert	y
IdCq-22	3106	2.79	35.45	27.37	6.64	Ramah chert	y
IdCq-22	3224	4.75	28.51	17.47	6.22	Ramah chert	y
IdCq-22	3324	4.55	26.65	21.36	4.74	Ramah chert?	y
IdCq-22	3403	4.58	30.23	26.71	5.69	Ramah chert	y
IdCq-22	3808	3.98	20.68	21.07	4.3	Ramah chert	y
IdCq-22	8442	7.24	24.82	22.95	5.08	Ramah chert	y
IhCw-1	20	3.05	32.45	34.77	7.7	Ramah chert	y
IhCw-1	125	5.38	45.36	34.92	7.6	Ramah chert	y
IhCw-1	176	4.7	32.46	25.96	6.47	Ramah chert	y
IhCw-1	186	4.17	39.42	22.67	6.21	Ramah chert	y
IhCw-1	225	4.04	39.4	27.41	7.6	Ramah chert	y
IhCw-1	304	4.99	31.23	22.94	5.92	Ramah chert	y
IhCw-1	321	4.39	34.54	33.69	6.81	Ramah chert	y
IhCw-1	922	3.95	18.89	25.14	6.51	Ramah chert	y
IhCw-1	981	4.44	68.27	24.7	9.66	Ramah chert	y
IhCw-1	1073	3.41	45.12	20.74	7.69	Ramah chert	y
IiCv-06	30	3.77	31.66	31.6	4.64	Ramah chert	y
IiCw-08	35	2.76	39.37	28.14	4.88	Ramah chert	y
IiCw-08	123	4.93	42.71	27.22	6.22	Ramah chert	y
IiCw-08	127	2.27	46.48	27.89	7.86	Ramah chert	y
IiCw-08	209	2.45	52.99	21.92	8.11	Ramah chert	y
IiCw-08	280	4.05	35.87	28.29	7.71	Ramah chert	y
IiCw-08	430	3.21	29.46	23.11	7.29	Ramah chert	y
JaDb-10	48	4.06	46.5	27.13	9.06	Ramah chert	y

Borden	Artefact #	Basal Thick	Length	Width	Thickness	Raw Mat	End-scraper
JaDb-10	65	6.22	45.4	27.08	6.68	Ramah chert	y
JaDb-10	87	5.07	37.5	23.93	8.18	Ramah chert	y
JaDb-10	146	3.52	34.18	14.46	3.84	Ramah chert	y
JaDb-10	148	3.06	39.22	29.8	10.4	Ramah chert	y
JaDb-10	177	2.31	29.58	25.97	7.14	Black chert	y
JaDb-10	208	4.13	24.94	24.72	7.2	Ramah chert	y
JaDb-10	269	4.95	23.14	34.22	4.42	Ramah chert	y
JaDb-10	290	3.46	45.67	22.33	8.11	Ramah chert	y
JaDb-10	514	3.4	38.73	34.16	6.79	Black chert	y
JaDb-10	516	3.17	44.26	15.95	6.33	Ramah chert	y
JaDb-10	537	4.19	47.21	29.82	5.68	Ramah chert	y
JaDb-10	611	2.81	33.45	30.93	8.74	Ramah chert	y
JaDb-10	672	2.14	31.64	25.81	4.94	Ramah chert	y
JaDb-10	688	4.25	20.86	20.52	4.52	Brown chert? Groswater?	y
JaDb-10	691	3.7	48.11	24.69	11.58	Ramah chert	y
JaDb-10	1373	2.31	52.3	31.95	10.65	Ramah chert	y
JaDb-10	1635	3.88	22.55	17.75	5.21	Ramah chert	y
JaDb-10	1663	5.08	24.93	22.5	9.13	Ramah chert	y
JaDb-10	1743	4.5	43.64	24.18	7.4	Ramah chert	y
JaDb-10	1767	4.51	26.22	17.67	7.07	Black chert	y
JaDb-10	2367	4.37	27.79	31.21	8	Ramah chert	y
JaDb-10	2368	3.54	45.7	29.75	6.1	Ramah chert	y
JaDb-10	2374	3.05	43.24	27.95	6.67	Ramah chert	y
JaDb-10	2380	3.62	34.22	23.95	6.86	Ramah chert	y
NiHf-4	1822	3.47	31.65	27.46	6.01	Ramah chert	y
NiHf-4	1826	2.28	33.25	22.83	5.48	Ramah chert	y
NiHf-4	2792	3.51	30.8	20.49	7.83	Ramah chert	y
NiHf-4	2834	4.85	42.09	20.14	4.03	Grey chert	n
NiHf-4	3673	3.96	38.25	18.32	2.97	Grey chert	n
NiHf-4	3744	4.82	3.12	3.82	4.54	Grey chert	n
NiHf-4	4423	2.9	51.18	19.78	4.85	Grey chert	n
NiHf-45	945	4.22	31.2	13.5	3.67	Grey chert	n
PgHb-1	2473	3.73	33.1	13.36	4.19	Grey chert	n

Borden	Artefact #	Basal Thick	Length	Width	Thickness	Raw Mat	End-scraper	Borden	Artefact #
PgHb-1	3539	3.03	28.97	15.03	3.89	Grey chert	n		
QiLa-3	6	3.96	30.21	12.94	2.5	Brown chert	n		
QiLd-1	316	3.21	42.25	23.48	7.72	Ramah chert	n		
QjJx-1	373	4.5	60.82	19.5	5.72	Ramah chert	n		
RaJu-1	41	3.08	59.71	19.35	6.19	Ramah chert	n		
RaJu-1	197	3.24	49.68	19.54	4.26	Ramah chert	n		
RaJu-1	392	4.14	30.63	19.14	3.77	Ramah chert	n		
RaJu-2	3	4.36	32.15	15.05	5.24	Ramah chert	n		
RaJu-3	72	4.38	34.21	21.88	3.78	Ramah chert	n		
RcHh-1	90	4.28	45.64	22.83	4.13	Ramah chert	n		
SfFk-18	129	3.49	60.58	15.39	5.09	Ramah chert	n		
SgFm-17	56	4.3	44.61	18.86	7.47	Ramah chert	n		
SgFm-17	65	2.63	40.26	17.68	5.69	Ramah chert	n		
SgFm-3	383	3.84	61.88	17.83	6.42	Ramah chert	n		
SgFm-3	390	4.5	55.92	23.21	10.47	Ramah chert	n		
SgFm-3	401	4.51	50.74	15.48	4.91	Ramah chert	n		
SgFm-3	416	2.31	59.44	13.63	6.56	Ramah chert	n		
SgFm-3	504	2.72	49.88	19.53	4.67	Ramah chert	n		
SgFm-3	556	4.85	36.08	9.38	2.94	Ramah chert	n		
SgFm-3	613	5.39	50.62	14.63	4.19	Ramah chert	n		
SgFm-3	615	2.29	37.02	14.36	4.58	Ramah chert	n		

Burin-Like-Tools

Borden	Artefact #	Basal Thick	Length	Width	Thickness	Raw Mat
HhCj-05	77	1.76	2.56	2.81		
HjCl-03	14	1.91	26.06	11.78	3.04	A Slate?
HjCl-03	70	2.78	31.09	15.47	5.2	Basalt? Slate?
HjCl-03	109	3.45	29.18	13.81	5.33	Brown chert
HjCl-03	678	3.19	21.76	11.57	4.42	Brown chert
IdCq-22	98	2.9	20.89	11.01	3.99	Brown chert
IiCw-1	213	2.71	25.6	11.63	3.77	Brown chert
IiCw-1	228	3.28	20.81	7.52	3.69	Chalcedony
IiCw-1	279	2.74	19.54	10.16	2.94	Chalcedony
JaDb-10	96	2.34	19.31	11.79	3.6	Chalcedony
JaDb-10	362	2.61	19.51	8.48	2.96	Chalcedony?
JaDb-10	511	2.44	29.77	8.28	2.86	Chert, white
JaDb-10	1657	2.86	20.32	10.65	3.3	Grey Chert
JaDb-10	1709	2.31	34.87	16.94	5.31	Grey chert
JaDb-10	2184	3.64	20.96	14.75	3.6	nephrite
NiHf-4	1792	3.21	35.37	22.47	3.1	Nephrite
NiHf-4	2121	3.17	31.3	21.26	2.89	Nephrite
NiHf-4	2815	2.68	18.35	10.16	2.84	Nephrite
NiHf-4	4032	2.57	24.68	18.26	2.68	Nephrite
NiHf-4	4879	2.42	17.79	8.65	2.56	Nephrite
NiHf-47	174	2.4	26.24	19.55	2.4	nephrite
PgHb-1	799	2.3	46.9	23.65	2.66	nephrite
PgHb-1	2970	2.05	17.77	13.02	2.08	nephrite
PgHb-1	3084	1.31	20.93	15.3	1.9	nephrite
PgHb-1	3593	1.47	33.55	20.81	2.11	Nephrite
PgHb-1	3761	2.89	40.06	14.24	2.89	Nephrite
QjJx-10	2390	1.94	21.92	11.05	2.64	Nephrite?
RcHh-1	266	2.87	28.34	11.36	2.95	Nephrite? Black slate?
SfFk-18	110	1.59	22.01	12.95	2.34	Nephrite? White?

Microblades

Borden	Artefact #	Thick Prox	Thick Lateral	Length	Width	Thickness	Raw Mat
HdCh-32	7	2.49	1.77	14.48	6.19	2.66	Quartz crystal
HdCh-32	8	2.64	1.36	17.93	10.2	3.06	Quartz crystal
HhCj-05	3	1.99	2.35	29.32	11.22	2.78	Quartz crystal
HhCj-05	55	2.4	2.64	26.75	8.98	2.88	Grey chert?
HhCj-05	74	2.38	1.9	29.07	11.16	3.07	Black chert
HjCl-03	63	2.21	1.7	27.13	10.22	2.61	Ramah chert
HjCl-03	65	1.33	1.05	56.9	10.92	4.15	Ramah chert
HjCl-03	368	2.47	1.5	52.22	17.75	3.25	Ramah chert
HjCl-03	429	2.83	4.14	54.62	16.41	5.11	Ramah chert
HjCl-03	432	2.04	2.31	34.92	13.73	4.36	Grey chert
HjCl-03	509	3.55	4.4	16.51	6.16	1.7	Brown chert
HjCl-03	516	2.76	4.29	18.63	7.59	2.66	Black chert
HjCl-03	517	2.9	2.45	23.79	10.26	4.1	Quartz
HjCl-03	752	3.19	3.54	19.25	5.4	2.59	Quartz crystal
HjCl-03		2.53	1.45	25.23	10.89	3.15	Quartz crystal
IdCq-22	411	1.89		32.56	12.67	3.3	Ramah chert
IdCq-22	412	2.89	2.38	27.12	8.88	2.1	Quartz crystal
IdCq-22	422	1.81	1.62	31.19	7.91	1.89	Ramah chert?
IdCq-22	756	2.65		40.69	9.8	4.86	Ramah chert
IdCq-22	773	2.34	2.66	55.19	15.41	4.69	Ramah chert
IdCq-22	944	0.9	1.48	18.95	4.92	1.5	Quartz crystal
IdCq-22	1254	3.08	3.86	56	12.09	4.35	Ramah chert
IdCq-22	1527	2.83	4.09	42.58	16.66	5.34	Ramah chert
IdCq-22	1597	1.96	1.96	28.94	8.19	2.09	Ramah chert
IdCq-22	1865	4.09	3.43	27.12	13.02	3.13	Ramah chert
IdCq-22	1870	1.63	2.14	51	14.81	3.87	Ramah chert
IdCq-22	2738	2.76	3.36	46.91	15.58	6.4	Ramah chert
IdCq-22	2908	1.79	1.67	22.47	6.87	1.99	Quartz crystal
IdCq-22	2930	2.61	1.65	23.53	8.77	1.98	Quartz crystal

Borden	Artefact #	Thick Prox	Thick Lateral	Length	Width	Thickness	Raw Mat
IdCq-22	2969	1.67	1.51	13.16	6.12	1.7	Quartz crystal
IdCq-22	3023	1.81	1.07	18.72	8.32	1.39	Ryan's quartz
IdCq-22	3096	1.65	0.95	18.86	6.82	1.06	Ramah chert
IdCq-22	3129	2.09	2.07	19.11	6.97	2.6	Quartz cry
IdCq-22	3138	1.98	1.79	29.49	10.01	2.21	Ramah chert
IdCq-22	3498	2.24	3.21	50.17	9.88	3.48	Ramah chert
IdCq-22	3570	1.77	2.18	34.78	13.55	2.34	Ramah chert
IdCq-22	3604	2.04	3.76	49.67	13.37	7.26	Ramah chert
IdCq-22	3708	1.85	1.83	25.16	6.34	2.78	Ramah chert
IdCq-22	8491	2.65	3.24	44.72	12.86	4.95	Ramah chert
IiCv-06	15	4.17	3.34	17	21.18	5.05	Ramah chert
IiCv-06	16	4.14	5.23	70	12.87	6.54	Ramah chert
IiCv-06	20	3.31	1.63	27.29	11.85	3.83	Ramah chert
IiCw-08	9	2.2	1.19	17.71	6.92	3.19	Grey chert
IiCw-08	42	2.29	2.9	19.57	9.11	2.62	Grey chert
IiCw-08	53	3.26	2.7	17.57	9.8	3.08	Quartz crystal
IiCw-08	126	2.12	1.37	36.8	11.52	5.13	Ramah chert
IiCw-08	200	1.56	2.99	26.99	10.54	1.9	Ramah chert
IiCw-08	213	2.94	2.24	34.19	12.38	5.04	Ramah chert
IiCw-08	257	1.8	2.33	45.76	16.49	4.53	Ramah chert
IiCw-08	374	3.02	4.26	31.06	13.8	4.02	Ramah chert
IiCw-08	383	2.19	1.97	27.88	13.84	4.64	Ramah chert
IiCw-08	412	3.32	2.4	44.21	16.88	4.29	Ramah chert
IiCw-1	8	2.45	1.69	50.58	13.54	4.08	Ramah chert
IiCw-1	22	1.8	1.74	46.01	12.85	4.16	Ramah chert
IiCw-1	39	3.4	2.06	19.51	4.14	2.5	Ramah chert
IiCw-1	47	3.52	3.19	35.11	11.85	3.02	Ramah chert
IiCw-1	160	1.81	2.06	24	7.95	2.47	Ramah chert
IiCw-1	180	2.01	1.97	26.08	7.55	3.8	Quartz crystal
IiCw-1	292	1.11	1.11	14.52	6.13	1.36	Quartz crystal
IiCw-1	302	2.25	2.78	23.5	13.66	3.86	Ramah chert
IiCw-1	324	2.96	2.75	28.28	5.44	2.57	White chert
JaDb-10	144	2.19	2.01	50.94	18.38	5.28	Ramah chert

Borden	Artefact #	Thick Prox	Thick Lateral	Length	Width	Thickness	Raw Mat
JaDb-10	326	3.38		15.76	7.76	1.68	Ramah chert
JaDb-10	671	3.2	3.53	28.69	10.6	3.49	Ramah chert?
JaDb-10	784	2.62	2.7	24.68	6.59	2.11	Ramah chert
JaDb-10	871	2.48	2.79	58.89	14.79	3.16	Ramah chert
JaDb-10	884	2.65	2.54	33.14	8.86	2.85	Ramah chert
JaDb-10	1042	3.7	2.82	25.53	6.41	2.69	Quartz crystal?
JaDb-10	1304	2.02	1.98	33.08	9.06	3.12	Ramah chert
JaDb-10	1324	1.91	1.43	29.02	7.73	1.74	Quartz crystal?
JaDb-10	1354	2.05	2.82	29.44	7.53	3.19	Ramah chert
JaDb-10	1388	1.72	2.35	38.37	9.83	2.8	Ramah chert
JaDb-10	1621	2.46	5.21	40.18	14.38	3.18	Ramah chert
JaDb-10	1794	2.44	2.88	30.52	10.21	3.72	Ramah chert
JaDb-10	1815	2.98	3.84	44.01	13.7	4.04	Ramah chert
JaDb-10	1869	3.52	1.27	29.22	17.32	3.29	Ramah chert
JaDb-10	1937	2.01	2.51	45.2	17.43	3.55	Ramah chert
JaDb-10	2280	2.46	2.16	42.42	9.22	3.22	Ramah chert
JaDb-10	2321	2.53	3.01	43.42	12.07	3.77	Ramah chert
JaDb-10	2453	2.98	2.07	27.89	7	4.79	Ramah chert
JaDb-10	2494	1.58	1.51	23.91	14.56	6.45	Ramah chert
NiHf-4	1821	2.96	1.23	20.45	9.1	2.84	Grey chert
NiHf-4	1852	2.12	1.71	37.75	11.02	2.43	White chert
NiHf-4	2178	2.75	1.56	25.49	6.89	3.76	Grey chert
NiHf-4	2183	1.83	1.48	18.42	6.1	2.42	Quartz crystal
NiHf-4	2195	1.93	2.03	20.54	6.81	2.22	White chert
NiHf-4	2251	2.42	2.35	31.73	12.99	3.53	Grey chert
NiHf-47	82	3.48	1.81	25.74	12.72	2.65	Grey chert
PgHb-1	2486	2.02	1.37	32.96	9.14	2.36	Grey chert
PgHb-1	2486	1.98	1.68	32.56	7.8	2.72	Grey chert
PgHb-1	2486	1.68	1.91	22.92	6.94	1.96	Grey chert
PgHb-1	2486	1.63	1.49	22.82	5.39	2.03	Light grey chert
PgHb-1	3086	2.61	1.3	24.13	6.37	2.68	Brown chert
PgHb-1	3506	2.25		25.67	8.09	2.2	Grey chert
PgHb-1	3531	1.43		22.66	6.23	1.74	Grey chert
QiLf-25	37	1.77	1.56	21.41	9.5	2.67	Grey chert

Borden	Artefact #	Thick Prox	Thick Lateral	Length	Width	Thickness	Raw Mat
QiLf-25	38	1.6	1.51	18.96	11.14	1.83	Grey chert
QiLf-25	58	2.53	1.05	20.88	11.01	1.93	Grey chert
RaJu-1	20	3	1.41	39.18	7.01	2.29	Grey chert
RaJu-1	33	1.1	1.9	47.47	8.29	1.81	Grey chert
RaJu-1	98	2.91	2.26	32.69	9.28	1.92	Grey chert
RaJu-1	99	2.65	1.89	27.93	7.31	3.02	Grey chert
RaJu-1	138	3	1.37	46.75	10.18	2.68	Grey chert
RaJu-1	169	3.33	2.4	29.97	15.19	5.43	Grey chert
RaJu-1	297	2.42	1.29	36.42	8.9	2.15	Grey chert
RaJu-1	360	3.17		30.68	11.09	4.32	Grey chert
RaJu-1	378	2.86	1.89	38.9	10.73	3.11	Brown chert
RaJu-1	393	1.94		43.76	11.75	2.72	Grey chert
RaJu-1	410	3.03	2.57	23.97	9.05	2.99	Grey chert
RaJu-1	411	2.55	1.7	30	13.5	3.36	Grey chert
RaJv-1	12	2.59	2.06	35.85	8.03	2.8	White chert
RaJv-1	13	2.38	2.57	34.14	5.26	1.86	White chert
RaJv-1	18	1.44	1.26	25.59	8.5	2.55	Grey chert
RcHh-1	364	1.83	2.31	35.88	12.66	3.59	Grey chert
SfFk-18	109	1.78	1.7	19.2	8.79	2.26	Grey chert
SfFk-18	130	1.04	1.43	32.67	15.27	2.96	Grey chert
SfFk-18	136	2.36	1.64	23.26	10.01	2.17	Grey chert
SfFk-18	164	2.58	1.33	25.86	10.03	2.07	Grey chert
SfFk-18	167	2	2.29	23.57	9.19	2.44	Grey chert
SfFk-18	170	1.74	1.69	44.65	10.85	3.45	Grey chert
SfFk-18	173	1.61	1.69	26.22	14.29	3.08	Grey chert
SfFk-18	175	2.2	1.79	25.23	7.55	2.17	Grey chert
SfFk-18	217	2.52	2.5	37.79	9.33	3.33	Grey chert
SgFm-12	10	1.45	0.65	47.6	10.82	2.68	Grey chert
SgFm-12	12	1.71	1.41	16.54	6.36	1.73	Quartz crystal
SgFm-12	31	2.07	1.3	15.74	6.43	1.71	Quartz crystal
SgFm-3	52	4	2.94	65.79	13.85	2.72	Grey chert
SgFm-3	99	2.72	1.76	71.26	10.52	2.91	Grey chert
SgFm-3	134	1.59	1.61	55.02	8.36	2.46	Grey chert

Borden	Artefact #	Thick Prox	Thick Lateral	Length	Width	Thickness	Raw Mat
SgFm-3	135	1.47	1.48	29.94	6.92	1.91	Grey chert
SgFm-3	150	1.82	2.79	19.91	6.37	1.88	Grey chert
SgFm-3	188	1.74	2.17	30.58	11.98	2.89	Grey chert
SgFm-3	372	2.04	1.45	29.94	7.09	2.76	Grey chert
SgFm-3	418	1.35	0.76	32.31	7.65	1.55	Grey chert
SgFm-3	502	3.7	2.57	28.14	16.06	4.02	Grey chert
SgFm-3	602	2.42	1.68	35.35	7.27	3.44	Grey chert
SgFm-3	617	1.49	3.39	49.43	13.52	3.06	Grey chert
SgFm-3	764	1.55	2.13	24.19	9.14	2.5	Grey chert
SgFm-3	765	1.87	1.19	24.13	8.65	2.63	Grey chert
SgFm-5	168	1.91	2.16	43.89	8.69	3.04	Grey chert

Appendix III: Summary of Microscopy Results

Harpoon Heads

Catalogue Number	Identifiable Residue	Confidence	Notes	Included in Metric?
SiFi-4:63	Iron oxide	Certain	Ivory Type G with securing hole	No
SiFi-4:87	Iron oxide	Certain	Ivory Type G with securing hole	Yes
SiFi-4:93	Iron oxide	Possible	Antler Type G with securing hole	Yes
SiFi-4:92	Iron oxide	Certain	Antler Type G with lashing grooves	Yes
SgFm-3:335	Iron oxide	Possible	Ivory (?) Type G	Yes
SgFm-3:338	Red ochre or iron oxide	Certain	Antler Type G with securing hole and lashing grooves	Yes
SgFm-3:349	Red ochre or iron oxide	Certain	Antler Type G with securing hole	Yes
SgFm-5:18	Iron oxide	Possible	Ivory Dorset Parallel	Yes
SgFm-5:165	Iron oxide	Certain	Ivory Type G (decorated) with securing hole and lashing groove	Yes
QiLd-1:342	Iron oxide	Possible	Antler Type G with securing notch (very faint)	Yes
QiLd-1:474	Iron oxide	Certain	Antler Type G with lashing grooves	Yes
QiLd-1:602	Iron oxide (?) Tree resin (?)	Possible	Antler Type G with a securing hole and residue on outside of blade bed	Yes
QiLd-1:931	Iron oxide (?) ochre (?)	Possible	Antler Type G with securing hole	Yes
QiLd-1:955	Iron oxide	Possible	Antler Type G with lashing grooves	Yes
QiLd-1:1069	Iron oxide	Possible	Antler Type G with securing notch and longitudinal groove	No

QiLd-1:1466	Iron oxide or tree resin	Possible	Antler Type G with resin/fat also on outside	Yes
QiLd-1:1467	Iron oxide or tree resin	Possible	Antler Type G with residue also on outside	Yes
QiLd-1:1493	Iron oxide or resin	Possible	Antler Type G with lashing groove	Yes
QiLd-1:1494	Iron oxide or tree resin	Possible	Antler Type G with lashing groove	Yes
QiLd-1:1551	Iron oxide	Possible	Ivory Dorset Parallel	Yes
QiLd-1:1645	Iron oxide	Possible	Ivory Single Line Hole (Middle Dorset?)	Yes
QiLd-1:1756	Iron oxide	Possible	Ivory Type G with lashing grooves (very faint residue)	Yes
QiLd-1:1816	Iron oxide	Possible	Ivory Type G with securing hole (very faint residue)	Yes
QiLd-1:2226	Iron oxide	Possible	Antler Type G with securing hole	Yes
QiLd-1:2233	Iron oxide	Certain	Antler Type G with lashing grooves	Yes
QiLd-1:2478	Iron oxide	Certain	Antler Type G with lashing grooves	Yes
QjLd-25:191	Iron oxide	Certain	Antler Type G with securing notch	Yes
NiHf-4:1332	Iron oxide	Possible	Ivory Dorset Parallel	No
NiHf-4:4741	Iron oxide	Possible	Antler Type G with lashing grooves	Yes
NiHf-4:4889	Iron oxide	Possible	Antler Type G with securing hole	Yes

Side-Hafted Handles

Catalogue Number	Identifiable Residue	Confidence	Notes	Included in Metric?
SiFi-4:30	Iron oxide	Possible	Antler side-hafted knife handle, soil material left in place	Yes
SiFi-4:81	Iron oxide	Possible	Antler side-hafted knife handle	Yes
RcHh-1:341	Iron oxide (?)	Possible	Antler side-hafted knife handle	Yes
QjJx-1:220	Iron oxide	Certain	Antler/bone side-hafted knife handle	No
QiLd-1:32	Iron oxide	Possible	Antler/bone side-hafted knife handle	Yes
QiLd-1:1526	Iron oxide AND resin/fat	Certain	Antler/bone side-hafted handle with iron oxide stain on the inside of slot and fat/resin stain on outside	Yes
NiHf-4:1815	Iron oxide	Possible	Antler side-hafted handle	Yes
NiHf-4:4363	Iron oxide	Possible	Antler side-hafted handle	Yes