

**MACRO-REGIONAL MEADOWOOD: A COMPARATIVE APPROACH TO
EARLY WOODLAND LITHIC TOOL PRODUCTION IN THE MARITIMES
AND ONTARIO**

By

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BA, University of New Brunswick 2014

A Thesis Submitted in Partial Fulfillment of
the Requirements for the Degree of

Master of Arts

in the Graduate Academic Unit of Anthropology

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This thesis is accepted by the
Dean of Graduate Studies

THE UNIVERSITY OF NEW BRUNSWICK

May, 2016

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ABSTRACT

For several decades, the Archaic—Woodland transition, and, in particular, interpretations of the Early Woodland Meadowood phenomenon, have been controversial aspects of the culture-history sequence for the Northeast. The focus of most past studies has been the identification of diagnostic artifacts, and the spatial and temporal distributions of these diagnostics, leading to conceptions of Meadowood as a homogenous phenomenon encompassing much of the Northeast. The distributions of these diagnostic artifact types have been interpreted at a macroregional scale using a variety of political, social and economic models. In the research reported here, I compared three spatially and chronologically constrained Early Woodland archaeological assemblages from interior New Brunswick (traditional Wolastoq'kew territory) and southern Ontario. I found that similar artifact forms were produced in the two areas during the Early Woodland period, using different lithic reduction strategies applied to different lithic material types. These differences may warrant a broader re-examination of the utility of the Meadowood concept in Maritime Peninsula prehistory.

Keywords: Early Maritime Woodland, Early Woodland, Meadowood, Maritime Peninsula, Great Lakes Basin, Cache Bifaces, Cache Blades, Quaternary Blanks, Multidimensional Hyperspace, Onondoga Chert, Jemseg Crossing, Fulton Island, Beaverbrook Site

ACKNOWLEDGEMENTS

This thesis was not a lone effort, but was made possible by the support of two organizations and some very supportive individuals. Archaeological Services New Brunswick allowed me to analyze artifacts from the Jemseg Crossing site and the Fulton Island site in their facilities in Fredericton, New Brunswick. I am grateful for their readiness and assistance to work on these collections in a timely manner. I so appreciated the flexibility of Timmins Martelle Heritage Consultants, in particular Dr. Peter Timmins, in allowing me to have the Beaverbrook site artifacts on loan. When no one else had the time to answer my inquiries about sites in the region, Dr. Timmins came through with a truly fascinating site.

I would not be at this point without the support of my graduate committee: my supervisor, Dr. Susan Blair; my tutor and internal reader, Dr. David Black; my external reader, Dr. Matthew Sears; the Directors of Graduate studies, Dr. Victoria Gibbon and Dr. Melanie Wiber; as well as the other Anthropology Department members, Dr. Evie Plaice, Dr. Christiane Paponnet-Cantat and Dr. Ryan Gibbon. I am also grateful for the support of my fellow graduate students; their encouragement gave me strength and knowing they were going through the same thing reinforced that I could do it. I hope I supported them in turn.

I met Dr. Susan Blair in my final year of high school, when I was deciding what I was going to study for my undergraduate degree. The day I met her was the day that I decided I would attend the University of New Brunswick, Fredericton and that I would study archaeology, ultimately pursuing my Master of Arts under her supervision. I would not have done this with any other person. From the very start she has supported

my sometimes-harebrained ideas and mentored me, putting countless hours into my education, encouraging me to keep going and setting me straight when I was going off course. I can only hope she knows what an inspiration she is to me and how much I appreciate her.

To my Mom and Dad, thank you for inspiring me to pursue my dreams and always supporting me, even when I was discouraged. I never doubted your love or desire to help when I needed a hand with school or life. I could not have asked for more patient and loving parents.

Most importantly, I cannot even express my gratitude for my “partner in crime,” Alex Bezeau, who encouraged me to push on when I was laying face down on the couch considering a possible career as a “garbage lady” (I wish I could say that this was an isolated incident). He was there taking me out of the house for a break from research and writing to go on our many drives and even Photoshopped the cat hair out of the Plates found throughout this thesis. Thank you for your constant support and love, even when I was so absent minded.

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Chapter 1: Introduction

In Northeastern North America, the Early Woodland period, between ca. 3000 and 2200 BP, was a period where forms of particular tool classes, and broad cultural patterning has led to some defining macroregional culture-historical units. Increasingly, archaeologists working in the Northeast are seeking to situate lithic technology within these macroregional constructs, and to critically evaluate the structure of lithic production. One of the challenges inherent in the analysis of Early Woodland lithic technology is that it is often understood through the lens of culture-historical manifestations like the Meadowood phenomena:

...culture-historical models and essentialist ontologies have dominated archaeological unit construction in the Maritime Peninsula. Using these models, archaeologists have circumscribed and defined the Maritime Woodland or Ceramic, in some cases distinguishing early, middle, and late periods. They have tended to typify the Early Maritime Woodland (or Ceramic) Period through a series of phases and complexes originally defined in regions at some distance from the Maritime Peninsula (such as Meadowood, Adena, and Middlesex), and the Middle and Late Maritime (or Ceramic) Period based on a series of important type sites, such as Oxbow, Fulton Island, and Goddard. (Blair 2004a:387)

In this thesis, I explore this tension between technology and culture-history, and between local and macroregional manifestations. To accomplish this, I focused on particular classes of formal and informal stone tools as a way of examining Early Maritime Woodland lithic technology in the Maritime Peninsula (Figure 1). Furthermore, I related the technological systems used to produce these Early Maritime Woodland tools with Early Woodland tool production systems found in the Great Lakes Basin area (Figure 2). I intended to evaluate Early Woodland steep-edged and bifacial lithic production processes and assess the extent to which these processes and end products were informed by some kind of shared understanding or intent. This analysis critically evaluated current archaeological notions about the meaning of convergence of lithic tool

forms in the Early Woodland that has manifested in broadly distributed, similar end products. Some researchers have recently situated Early Woodland lithic end products, in particular, tools such as "quaternary blanks," side-notched projectile points, and bifacial scrapers, as a part of a broader shared understanding that developed in the Northeast, at ca. 2500 BP, that involves ideas of value, prestige, form and material (Taché 2008, 2011a, 2011b). I argue that this interpretation has not been a fully integrated study of similarities and differences in the analysis of lithic tools, and has been guided by detailed analysis from one part of the Northeast (the Great Lakes Basin). Given that the larger interpretation rests on a degree of homogeneity at various local levels, I conducted a detailed analysis of Early Woodland lithic tools from outside the Great Lakes Basin to evaluate these assumptions and their implications for larger interpretations.

The analysis presented herein reinforces the perception that while archaeologists must be mindful of larger processes, the local level must be the foundation upon which archaeologists construct their analysis. Blair (2004a:111) captures this notion:

The perceptions of regional researchers are conflated by exposure to taxonomic models from elsewhere in the Northeast; when we think of interacting groups, we think big (like Meadowood), invoking interaction spheres that encompass all of northeastern North America. It is less grandiose but perhaps more satisfying to begin with local interactions.

Further, I would argue that while it is important to seek macroregional understandings, these must be grounded in extensive research conducted at several scales, including the local. This is particularly true in the context of the larger scale of northeastern North America, and the way that widespread but variable phenomenon like the Meadowood, fit into it. Most of the debate surrounding the Meadowood phenomenon has been focused on identifying index fossils, as Taché (2008, 2011a, 2011b) and others (Blair 2004a;

Brose 1979; Brown 2005; Dragoo 1976; Ellis and Ferris 1990; Fiedel 2001; Granger 1978; McEachen 1996; Rutherford 1991; Turnbull 1976) have largely done in the search to identify "diagnostic" Meadowood tools, such as cache bifaces (Blair 2004a:183). This approach shifts research away from describing relationships among artifacts and artifact types, radiometrically dated features and sites, to "the presence and sufficiency of diagnostic artifacts" (Blair 2004a:183; see also Hegmon 1992:527).

Based on a review of Early Woodland lithic analysis, I have concluded that the identification and analysis of Early Woodland end products needs to emerge through direct investigation of complete lithic tool subassemblages, so as to avoid privileging particular tool forms in the analysis. Given this, I pursued sampling for my thesis that involved extracting chronologically-controlled lithic tool assemblages in their entirety (including formal and informal types), and then subsampling steep-edged and bifacial tools, recording attributes including the degree and nature of bifacial modification only after this subsample was extracted. In doing so, I am following Banning's (2000:56) advice that it is unrealistic to fully analyze or develop a typological framework with partial, limited assemblages.

For my thesis, I intend to add to the possibilities for future regional syntheses by developing and explicating a local view of technology, materials and form. To accomplish this, I analyze lithic assemblages from the Jemseg Crossing (BkDm-14; Figure 3) and Fulton Island (BlDn-12; Figure 3) sites in New Brunswick, and compare them with a site from the Great Lakes Basin, the Beaverbrook site (AfHh-386; Figure 4). All of these sites have Early Woodland components containing Meadowood-like artifact forms, but rather than selecting these forms, I followed the lead of Blair (2004a) by seeking subassemblages from these sites that represented chronologically controlled

units (ideally units that were either radiometrically dated or stratigraphically distinct), and proceeded with an analysis of whatever tools (both formal and informal) occur in those subassemblages. Although I examined assemblages from three different sites, the scale and scope of my research was controlled through this sampling process, such that most sites were assessed through the lens of a few, carefully selected samples (see below).

This approach allowed me to make careful observations about the nature of tool production in the Maritime Peninsula in a period of critical change, between 3000 and 2200 BP, and in particular, to test notions about the place of steep-edged and bifacial tools in those production systems. By employing a similar selection strategy to identify and analyze a Great Lakes Basin subassemblage, I was able to control for differences that resulted from my sampling that might have prevented me from comparing my results with those of other analysts who have interpreted the nature of Meadowood tool production in the Northeast (i.e. Granger 1978; Taché 2008, 2011a, 2011b). Through this I remained mindful of how important it is to think of stone tools as being on a continuum or within a multidimensional hyperspace (Figure 5), because tools are not static, but result from complex production and use trajectories and culturally entangled (Hodder 2011).

BACKGROUND

For the purposes of this research, I considered the Early Woodland period to extend from ca. 3000 to ca. 2200 BP (Blair 2004a:37; Sanger 1979:99; Taché 2011b:8). Archaeologists working in the Northeast generally have subdivided the Woodland period into three sub-periods: the Early Woodland, the Middle Woodland (ca. 2200 to

1400 BP) and the Late Woodland (ca. 1400 to the contact period, around 500 BP; Blair 2004a, 2004b). In this analysis, I recognize that there are some regional variations. The Woodland period, including the subdivision of the "Early Woodland," is a broad term that has developed out of the concept of the Woodland Pattern, as first defined through the Midwestern Taxonomic System (McKern 1939). Willey and Phillips (1953) transformed this taxonomy into the culture-history period that has become one of the fundamental units of classification in the region, shifting the focus towards artifact assemblages and technologies.

The Woodland concept, both in McKern's (1939) earlier idea as a lifeway, and Willey and Phillips (1953) use as a historical (or quasi-evolutionary) stage, has not been evenly adopted in the Maritime Peninsula. Some have suggested that the Maritime Peninsula should be distinguished from other parts of the Northeast, and have proposed the use of regionally specific terms, substituting "Ceramic" for "Woodland" (eg. Snow 1980; Sanger 1979). In this research, I intend to follow the lead of Keenlyside (1984), Black (1992), Leonard (1995), and Blair (1999, 2004a), and adopt the term "Maritime Woodland" as a way of signaling the importance of the local and regional context (Maritime) while acknowledging the substrate of shared manifestations and expressions (Woodland).

The term "Meadowood," is a way of designating a particular constellation of material culture traits that appear in the archaeological record of northeastern North America roughly 3000 to 2200 years ago (Blair 2004a:37; Granger 1978; Ritchie 1965; Sanger 1979:99; Taché 2011b:8). Although it was originally defined in the Great Lakes Basin, there have been many archaeologists (Deal 1984, McEachen 1996, Taché 2008,

2011a, 2011b) who have argued that it also occurred on the Maritime Peninsula, a region that includes the Canadian Maritimes, and parts of Quebec and Maine (Hoffman 1955).

Entities such as the Meadowood have been identified in this period as widespread but brief phenomenon at an artifact level, horizon styles characterized (at least in the Maritime Peninsula) by shared and possibly introduced stone tool technologies and materials, and the development or introduction of new technologies like pottery (Blair 2004a:30). Although there has been considerable debate about what this indicates, most would agree that the Meadowood was a part of a broader set of reorganizations (social, economic and/or religious) or replacements (population and/or political) of some kind in the region (Blair 2004a). While some might argue that the recognition of this organization has been fueled by a series of reorganizations or replacements that punctuated the Woodland period, others have suggested more sweeping changes (Blair 2004a). In the Maritime Peninsula, this was manifested in a shift from Archaic assemblages that were largely made up of ground-stone implements, to Transitional (or Terminal) Archaic and Woodland period assemblages becoming dominated by lighter, portable flaked stone technologies (Blair 2004a:28). While there was considerable variation among regional traditions in the earlier Archaic (Robinson 1996, 2001), with significant differences in technology and form among the traditions on the Maritime Peninsula, in southern New England, Newfoundland and Labrador, the Saint Lawrence region, and in the Great Lakes Basin, later periods, especially after 3000 BP, were characterized by widespread but comparatively brief periods of shared technology and form (Snow 1980). From this perspective Meadowood could be seen as a part of this reorganization where small bifacial tools become increasingly important in larger technological systems.

The Early Maritime Woodland represents a part of this broad period of change and from a materialist perspective may be an extension of the Terminal Archaic. In both the Maritime Peninsula, and on the larger scale of northeastern North America, key aspects of transitional technologies were distinctive bifacial reduction strategies focused on particular kinds of projectile points and scrapers, the introduction of pottery making, ground slate gorgets and birdstones, and flaked and ground stone axes (Blair 2004a:28), which in the Meadowood phenomena included side-notched points, bifacial scrapers and Vinette I ceramics (Blair 2004a; Snow 1980; Taché 2008, 2011a, 2011b).

In 1978, Granger attempted to shift the focus of Early Woodland analysis broadly (through a focused examination of Meadowood sites and tools) from types and end products to production sequences and technological systems. To do so, he assessed several Early Woodland assemblages from the Great Lakes Basin. He interpreted Meadowood lithic technology as characterized by the production of thin, well-made, triangular bifaces, typically of Onondaga chert, which served as blanks for a suite of other forms, and could be employed in both economic and ideological exchanges (Granger 1978, 1981). These bifaces, which he called quaternary blanks were therefore a stage in a reduction process, but also a means of storing and trading lithic potential (Granger 1978). With a quaternary blank, a Meadowood tool maker could choose to make a range of final forms, including scrapers (by retouching the base), hafted projectile points (by side-notching them), and drills (by aggressively reshaping the lateral margins; see Figure 6).

In this view, Meadowood was interpreted as an adaptive strategy that was manifested in a particular approach to lithic reduction (Blair 2004a:40). For Granger

(1978:296), Meadowood represented an integrated system concerned with the production of bifaces:

Manufacture activities produced a wide range of chert tools on all Meadowood habitation components. There was, however, a systematic economy to the process, whereby blanks were produced from the raw material. By-products, fortuitous or otherwise, were reutilized as derived tool types; however the manufacture of quaternary blanks, or "cache blades," appeared to be the desired end product. These blanks were being produced far in excess of the need for modification to projectile points, as the high frequency of unworked fragments attest. This end product could be modified into a projectile point, knife, or drill and may have represented an alteration of high-grade raw material into an easily transportable form for introduction into an exchange network.

While some have continued to promote a view of Meadowood as some kind of technological transformation (Taché 2008, 2011b), the extension of Meadowood typological forms as indicators suggests that these technologies continue to be defined and measured along culture-history lines. As an example, some continue to view Meadowood as identified by the outcomes of the process (e.g., through the presence of particular typological end products, like bifacial scrapers and side-notched points, McEachen 1996), rather than considering the way technology is expressed in broader assemblages (debris, cores and all tool forms, e.g. Blair 2004a).

One of the major problems in the study of the Meadowood in the Maritime Peninsula is that outside entities (such as Meadowood manifestations in the Great Lakes Basin) have done little to give insight into what people were doing locally during the Early Woodland, as macroregional narratives have tended to override any local understandings. This is likely the result of several factors: as the foundational work of culture history began in the Midwest, archaeological work in the Maritimes was languishing; a much greater number of archaeologists have worked in the Midwest than in the Maritimes, even in more recent decades; and much of the relevant research in the

Maritimes remains in the grey literature. It is my intention to address the issue of identifying Meadowood assemblages by analyzing Early Woodland lithic technology more broadly, and directly assessing and comparing the nature of Early Woodland reduction, rather than by using what some have called "index fossils" (Lyman et al. 1997). I tackled this by examining the processes that were used to retouch working edges and create formal tools, seeking to compare these processes with Granger's model. This methodology has allowed me to adopt a hypothesis testing approach: Either similar lithic reduction strategies were employed in the two areas, lending clarity to the nature of interaction within the Meadowood phenomenon, or different strategies were employed, underlining the need for more locally grounded understandings of Early Woodland technologies.

THESIS OUTLINE

The body of this thesis is divided into four main chapters. Chapter 2 is the **Literature Review**, where I summarize the current and past research from which I developed my research project. Chapter 3 is the **Methods** section, where I specify how I conducted my research. Chapter 4 is the **Results** chapter, where I discuss the data that I collected through the methods that I applied to the assemblages I selected for analysis. Chapter 5 is the **Analysis** section, including my interpretations of the results; it includes a discussion of how my interpretations relate to the literature on the Meadowood phenomenon. Chapter 6 presents a summary of my main **Conclusions**.

Chapter 1 Images

Figure 1. Map of the Maritime Peninsula.

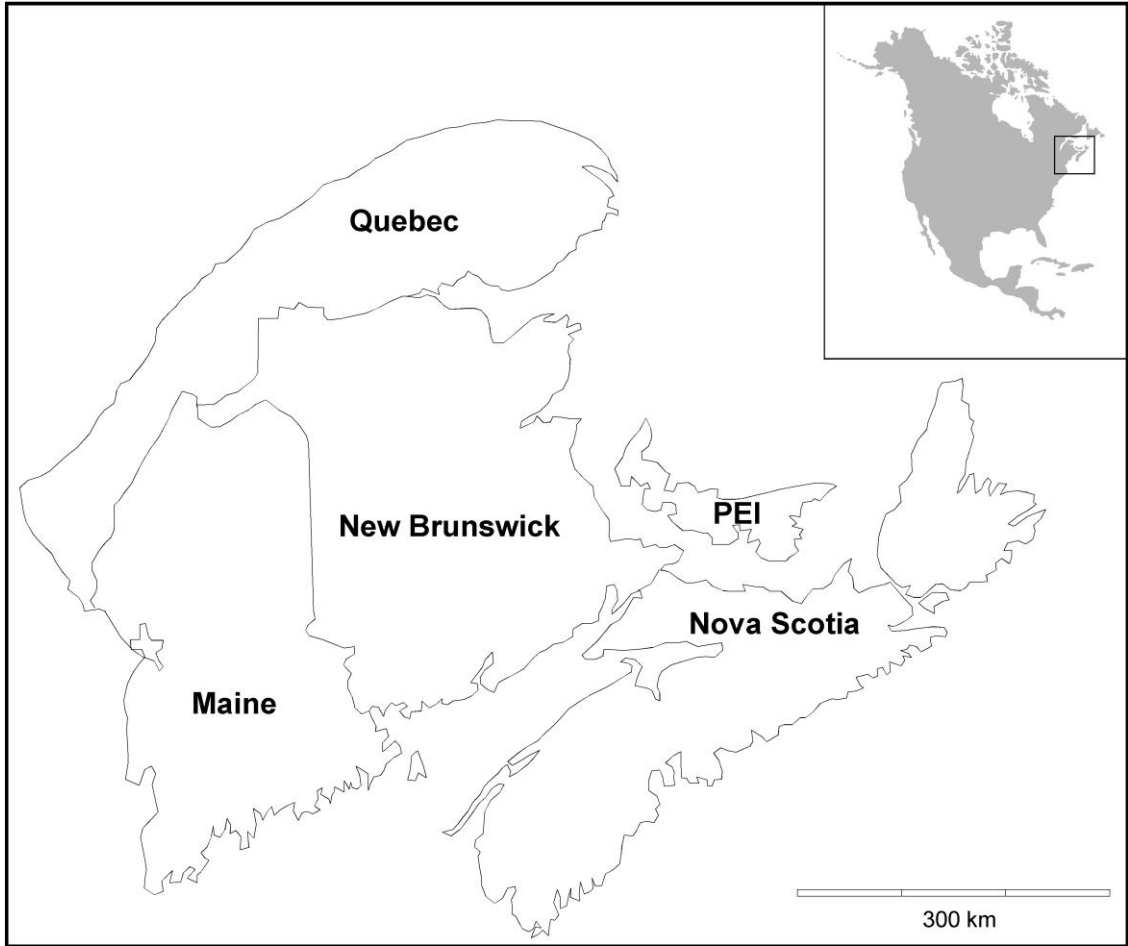


Figure 2. Location of the Great Lakes Basin and Meadowood distribution in the Northeast. The darker shade corresponds with Taché’s areas of higher density Meadowood artifacts, while the lighter is the maximal extent of Meadowood-like tools (adapted from Taché 2011a:49).

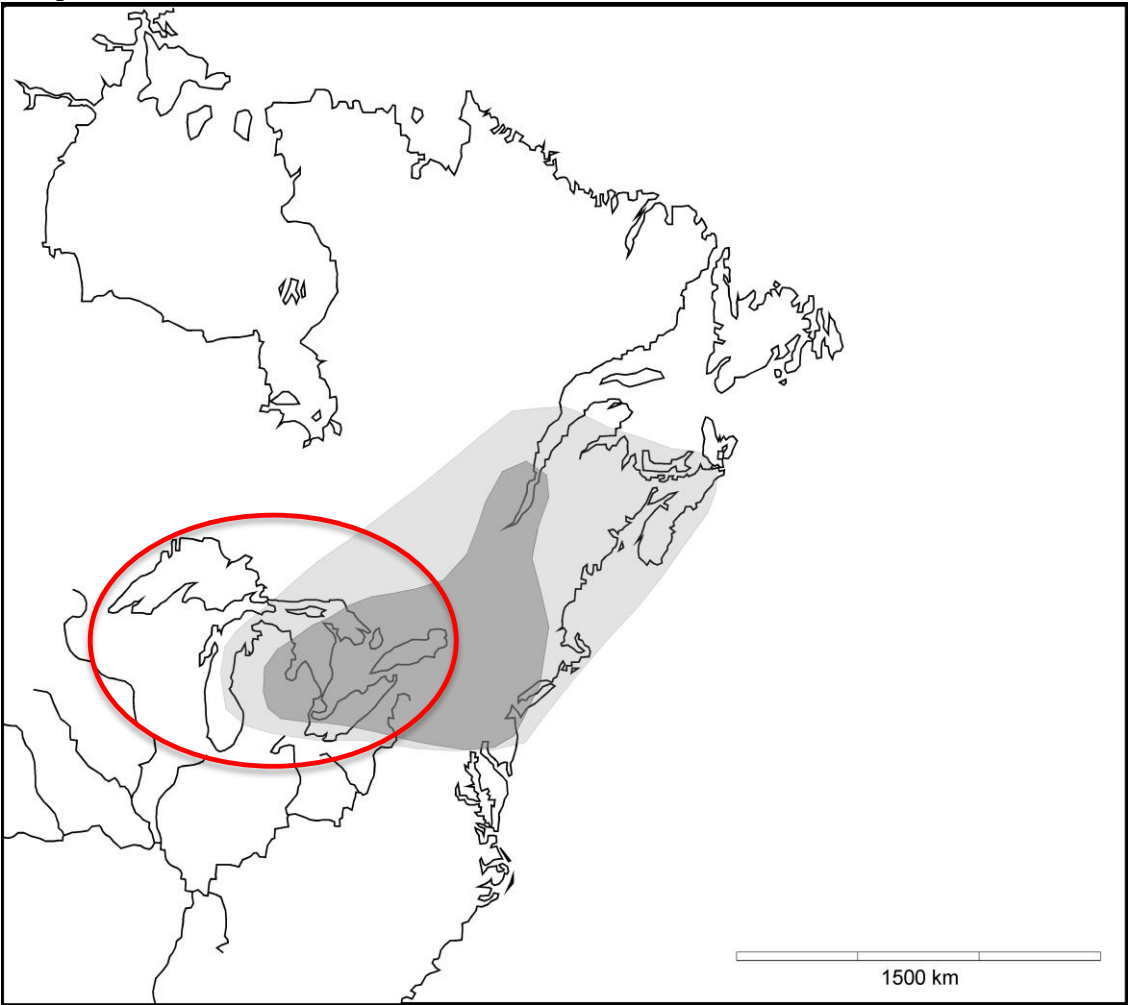


Figure 3. Map of the Lower Saint John River, with Fulton Island and Jemseg Crossing sites indicated (adapted from Blair 2004a).

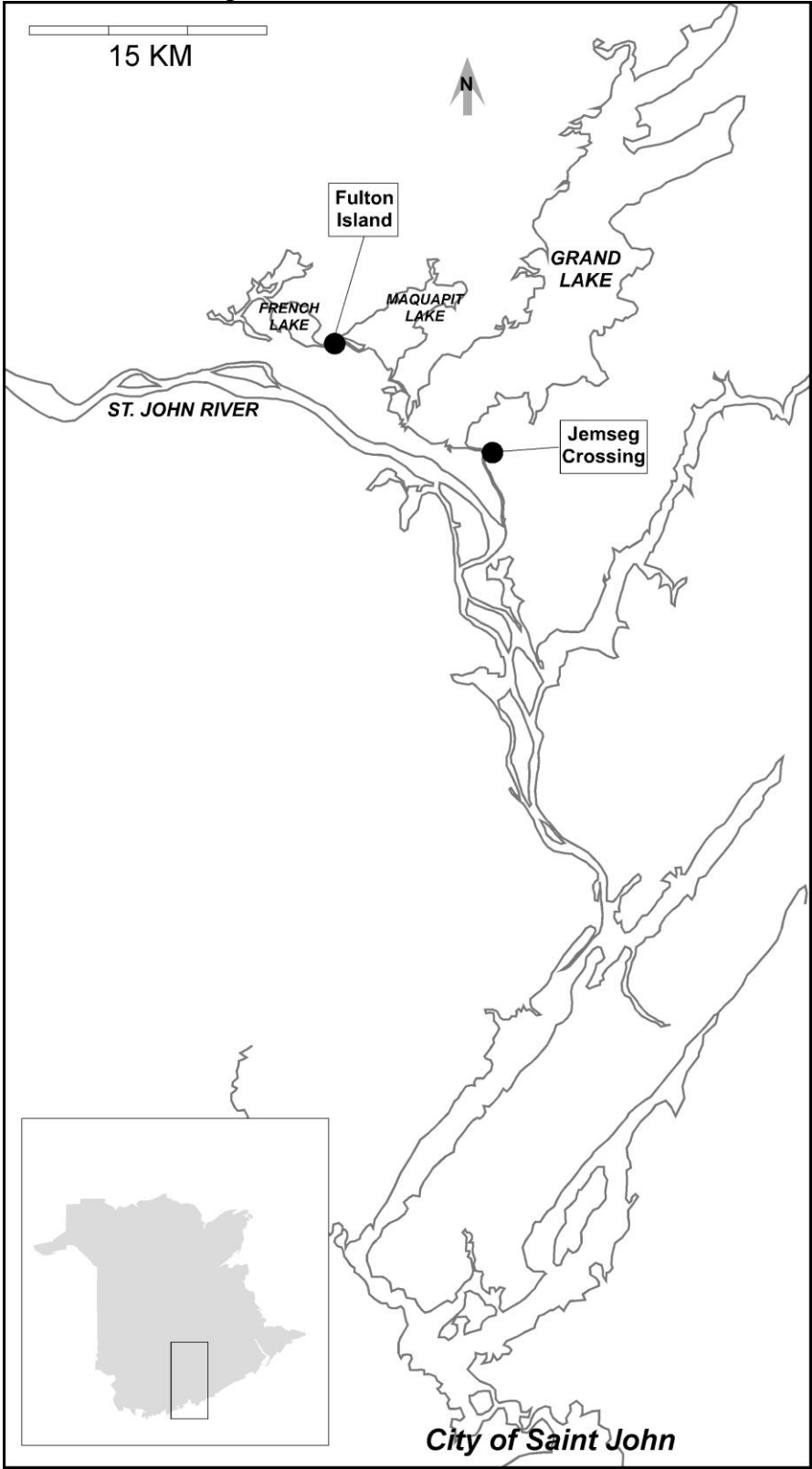
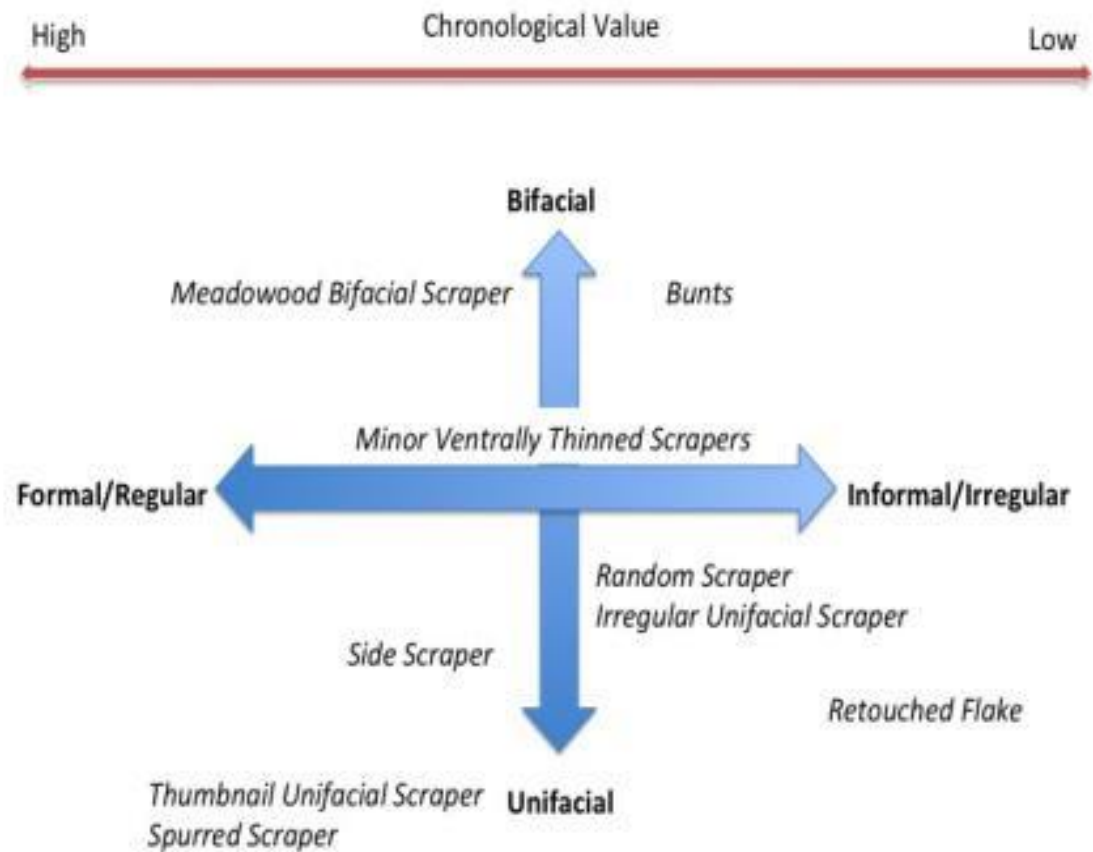
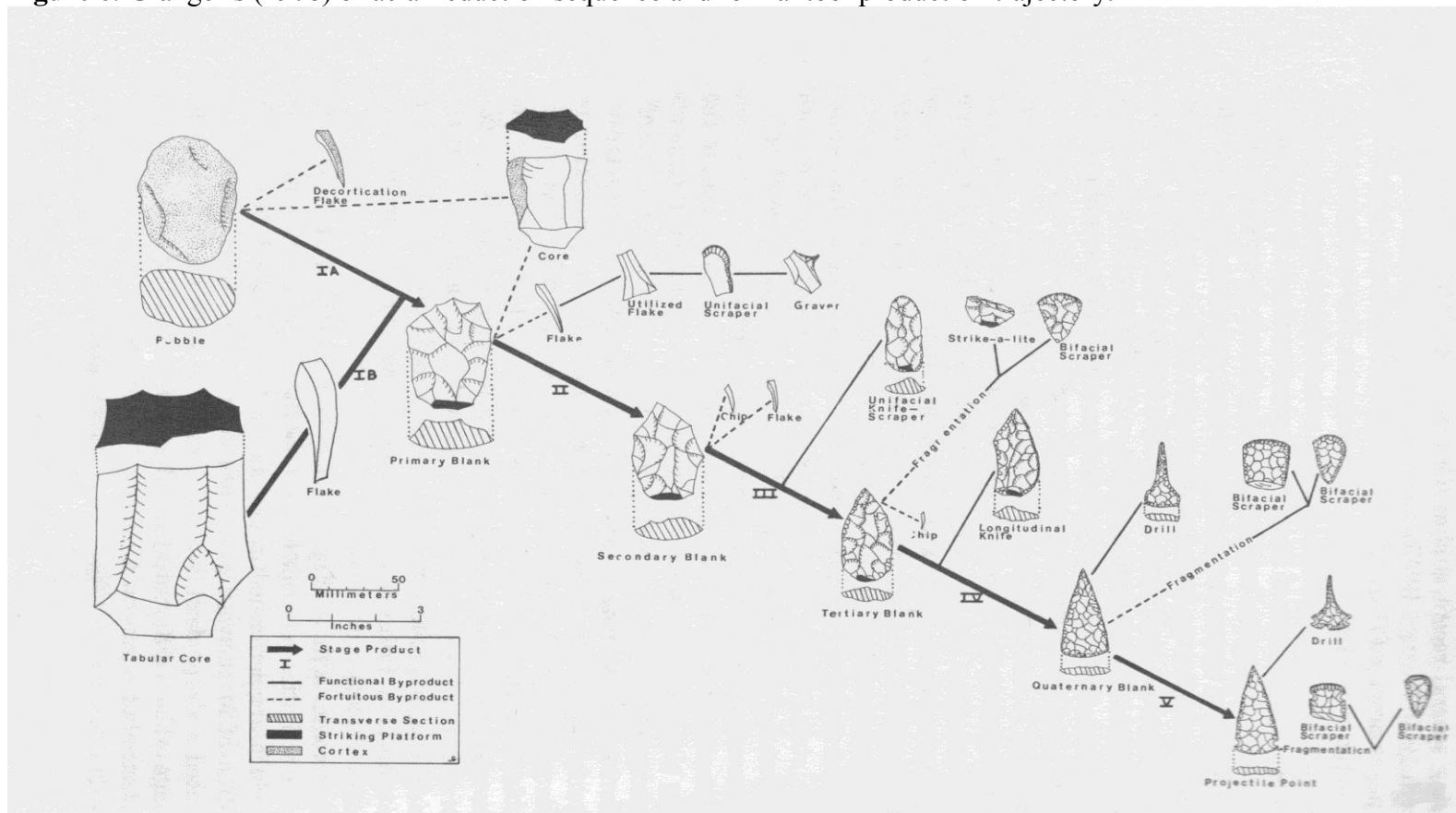


Figure 5. The Multidimensional Hyperspace is a model aligned with a materialist ontology, where formality and bifacialness are assessed along continua. Chronological value is a dependent variable, determined by where any particular artifact intersects the bifacialness and formality continua. Any bifacial (stemmed/notched and unstemmed) or unifacial tool can be placed on this continua, though for the purposes of this research I chose to highlight bifacial scrapers as they tend to be anomalous, while there are agreed upon conventions regarding bifaces (stemmed/notched and unstemmed; Allen 1980) that I have followed throughout this research.



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Figure 6. Granger's (1978) bifacial reduction sequence and formal tool production trajectory.



Chapter 2: Background and Culture-Historical Context

Although culture-historical entities were a key focus of North American archaeology in the mid-twentieth century, the processual framework that moved through the discipline in the 1960s shifted theoretically grounded analysis away from viewing cultural manifestations as distinct cultural units (Lyman et al. 1997; Trigger 1989). In the 1970s and 1980s some attempted to recast culture-history units, including the Meadowood phenomenon as economic structures, linking them to settlement systems (Granger 1978, 1981; Krakker 1997). Despite some sporadic attempts to conceptualize Meadowood in social and ideological terms (Loring 1985), subsequent analysis of Meadowood at a regional or macro-regional level languished or remained grounded in traditional culture-historical views (Fiedel 2001; McEachen 1996; McEachen et al. 1999; Tuck 1984). It was in this setting that Taché introduced, in 2008, a large scale, theoretically grounded approach to the Meadowood phenomenon. This work attempted to integrate a broad body of information from the larger Northeast, and sought to reconcile the archaeological patterning identified by culture-historians with recent perspectives on cultural change.

In particular, Taché's analysis took what had been an internally homogeneous spatial vision of the Meadowood, and repositioned it as developing through transformational processes from Archaic cultural systems, into Woodland cultural systems (Taché 2008, 2011b). Although the scope and scale of her analysis was new, there were elements of her work that may be influenced by Hayden (1998), as she employed a notion of directional, transformational change (Taché 2008, 2011b). While her analysis was ambitious, it (perhaps necessarily) glossed over variations in local tool production systems. It is tempting to attribute this to a particular problem of cherry-

picking *diagnostic* Meadowood stone tools, rather than interpreting complete assemblages. This methodology, flawed as it was in areas, was due to the scale of Taché's project, but was also the result of her theoretical perspective, as they powerfully affected how she conducted her work, and processed and interpreted the results.

In this chapter, I explored current conceptions of Meadowood in the Northeast, which were strongly influenced by Taché's 2008 monograph. Her work was, in many ways, the first serious attempt to theoretically address the phenomenon in the larger region. In adopting this approach, I seek to explore the most recent theoretical models that are applicable to the subject of my research, as well as situate my subject in a broader archaeological context. To do so, I first reiterated a brief outline of how the Meadowood phenomenon has been conceived of by archaeologists in the most basic sense through time. Next, I explored more recent theoretical approaches (especially that of Taché 2008, 2011a, 2011b) used to investigate Meadowood, and the interpretations that have resulted from these approaches. Throughout my critical review, I examined the theoretical underpinnings of these models, and considered alternative approaches. Finally, I reflected on what I have taken from these recent approaches to Meadowood, and considered how it has impacted the theoretical and methodological components of my thesis work.

THE MEADOWOOD PHENOMENON

The term Meadowood, as it is used in North American archaeology, is a way of describing a particular constellation of material culture traits that appear in the archaeological record of northeastern North America roughly 3000 to 2200 years ago (Blair 2004a:37; Sanger 1979:99; Taché 2011b:8). This period has been referred to in

broad taxonomies as the Early Woodland period (Blair 2004a:37). Although it was originally defined in the Great Lakes Basin, there were many archaeologists (e.g. Allen 1980; Blair 2004a; Black 2000; Bourque 1994; Fiedel 2001; McEachen 1996, 2004; McEachen et al 1999; Taché 2008, 2011a, 2011b; Tuck 1984; see Wright 1999) who argued that the Early Woodland was a distinctive period that also occurred on the Maritime Peninsula, including the Canadian Maritimes, and parts of Quebec and Maine.

On the Maritime Peninsula, as in much of the Northeast, the period between the end of the Archaic (after 4000 BP) and the end of the Early Woodland (variously between 2200 and 2000 years ago), represents a period of change from the long-standing continuity in technology (technological traditions; Willey and Phillips 1958) that characterized the preceding Archaic period (e.g., the Gulf of Maine Archaic *sensu* Robinson 2001), to a sequence of widespread but short-lived patterns (horizon styles *sensu* Willey and Phillips 1958) in tools, materials and technologies that appear to replace each other in rapid succession (Granger 1978:26). The Meadowood phenomenon is widely accepted as one of several Terminal Archaic and Early Woodland entities that appeared suddenly over a broad portion of the Northeast in this period. What this entity represents is unclear; some researchers have adopted an essentialist ontology, viewing it as representing a cultural group (McEachen 1996), an adaptation to a particular ecological setting (Granger 1978), or a linguistic or ethnic group (Fiedel 2001). Others have employed a materialist ontology to suggest that the unit itself may be a product of the research process.

This orthodox perspective on regional change is, in essence, a culture-historical view. One long-standing, internally homogeneous pattern (the Archaic) is replaced by another, the Maritime Woodland. As a result, the Maritime Woodland on the whole is expected to be relatively stable, and internal variation is viewed as minor or insignificant. On the other hand,

the intervening period of transition, from Terminal Archaic through the Early Maritime Woodland (from 3800 to 2500 BP), is depicted as one of rapid episodic change. Few researchers, however, have suggested that this pattern of "big unit" - "lots of small units" - "big unit" may be the product of the research process itself. (Blair 2004a:28)

Culture-history units such as "Orient," "Meadowood," "Middlesex" and "Adena," are examples of ambiguous entities that have been identified in this period as widespread but brief phenomena. Most of them are characterized (at least in the Maritime Peninsula) by what are broadly conceived of as "non-local" stone tool forms and reinforced in some cases with non-local¹ materials, and the use of new technologies like pottery (Blair 2004a:30; Granger 1978, 1981; Krakker 1997; Sanger 1976; Tuck 1984, Turnbull 1976). Although, as I indicate above, there is considerable debate about what these patterns represent, most situate Early Woodland phenomena like Meadowood as a part of a broader set of reorganizations or replacements of some kind, relating broadly to technology. Although there have been few broad syntheses of the Northeast prior to Taché's work, at a large temporal scale, assemblages shifted from being largely made up of ground-stone implements, to becoming dominated by lighter, portable flaked stone technology (Blair 2004a:28; Bourque 1994; Petersen 1995:221; Sanger 1987). Although some of this reorganization may have begun in the Late Archaic, during the period between 4000 and 2500 BP (typically referred to as either the Terminal or Transitional Archaic) transitional technologies broadly consisted of distinctive bifacial reduction strategies, a focus on the production of stemmed bifaces ("projectile points") and steeped edged tools ("scrapers"), and in the last third of this transitional period, the use (either through introduction or development) of low-fired pottery (Blair 2004a:28; Bourque 1971; Granger 1978; Sanger 1976). Although some have suggested that these attributes

¹ The terms "exotic" or "introduced" are also accepted terms used in this way, though I have chosen to use "non-local:" following Blair (2010).

are not easily constrained to particular entities (for example, Loring 1986 and Heckenberger et al. 1990, who suggest that Adena and Meadowood forms actually co-occur), following earlier essentialist views entrenched by Ritchie (1971) and others, Meadowood phenomenon forms included side-notched points, bifacial scrapers and Vinette I ceramics (Blair 2004a; Petersen 1995:221). While many of these analyses were constructed based on technological patterns, the way Meadowood typological forms have been used as indicators of a cohesive pattern (and perhaps a cultural or ethnic group) suggests that these technologies have continued to be defined and measured along culture-history lines (Blair 2004a:28).

At the crux of debates around the nature of Early Woodland patterning has been an inherent tension around the meaning and nature of change through time. Some have usefully distinguished between historical, materialist ontologies, and ahistorical, essentialist ontologies (Lyman et al. 1997, Ramenofsky and Steffen 1998). The essentialist approach "presumes the existence of discoverable, discrete kinds of things" (Lyman et al. 1997:4), an approach that lends itself to typological thinking, where a type (for example, a Meadowood projectile point) is a discrete kind of thing that is inherently different from other types. On the other hand, a materialist approach views the placement of boundaries around a type as contingent and arbitrary. This creates an analytical process described by Lyman et al. (1997:5):

The analyst selects attributes relevant to some problem, and it is those attributes and their combinations that result in the sorting of specimens into internally homogeneous, externally heterogeneous piles. Observation and recording of the attributes of the specimens comprises measurement. Importantly specimens that share attributes or properties – those that end up together in one of the analyst's piles – do not necessarily (and need not) have an essence... They have been grouped together because they hold attributes *selected by the analyst* in common, not because of some inherent, shared quality.

This distinction is important in distinguishing the various approaches to patterning in the Early Woodland, often subsumed under units that include Meadowood. It is clear that some analysts view the Meadowood phenomenon as being a real cultural unit that has a finite distribution in time and space, where this unit has been developed around like groupings of things. After all, an essentialist ontology supports a methodology that seeks internally cohesive limits, and then compares them (Blair 2004a:51). The debates about the presence and nature of Early Woodland manifestations such as "Meadowood," "Adena" and "Middlesex" in the Maritime Peninsula (Blair 2004a:51), as well as elsewhere in the Northeast (Loring 1985, Heckenberger et al. 1990) have often been underpinned by these ontological differences. Some have argued for the presence of these complexes as relatively discrete cultural phenomenon, while others have refuted some of these claims on the basis of typological inconsistencies (and in particular, the lack of cohesion of types and units) and thus on ontological grounds (Blair 2004a:51). Often these ontological differences confound any easy taxonomic resolutions. Within an essentialist framework, for example the debate may focus on the 'meaning' of these manifestations, and whether they represent the spread of a burial cult (Dragoo 1976), a group engaged in internally cohesive socioeconomic interaction (Granger 1981), or migrating populations (McEachen 1996, but see Blair 2004a:51). All view Meadowood as encompassing some real, meaningful pattern that occurred in the past. Further, the discussion about Meadowood has shifted to boundaries, as internal variation has been rendered ephemeral – after all, an essentialist view denies change, making change over time unsuitable as a focus of study (Lyman et al. 1997:5). In this view, groupings of artifacts that "shared essential properties" and have been subject to an essentialist mindset have been considered to be the same. Lyman et al. (1997:5) stated that this

makes change impossible as "...only the difference between different kinds, or types, can be measured." This is in contrast to the materialist ontology that suggests that archaeologists should not be debating what has "caused" Meadowood to appear in the Maritimes. Instead, the question should be whether the concept Meadowood has "any real, intrinsic value in delineating a cohesive unit or group" (Blair 2004a:52).

As indicated above, one of the hallmarks of essentialist approaches is "typological thinking" (Lyman et al. 1997:5), with the implication that culture is normative, and that material culture patterning indicates the presence of a mental template – types are "real" in as much as they represent a way of making tools that really existed in the heads of a particular group of ancient people. In other words, this "typological thinking" is revealed in the reliance on particular types as indicators for the larger unit, and as a proxy for other kinds of chronological information. Some have usefully considered this approach as analogical to the use of index fossils in palaeontology (Lyman et al. 1997:65). The concept of the index fossil was first borrowed by archaeology from geology and paleontology in the late nineteenth century (e.g., by Oscar Montelius in Europe) and in the early twentieth century (e.g., by Nels Nelson in North America). In geology and paleontology, an index fossil is a fossilized organism that is useful for relative dating of associated finds and correlating the strata in which it is found with strata found at other locations. This meant that widely distributed fossils of organisms that evolve rapidly, occurring during a narrow range in time, and regarded as characteristic of a particular geological context or formation — various species of marine shellfish are classic examples — have the greatest utility as index fossils (Lyman et al. 1997:76). This approach has worked well in geology and paleontology because formal variation among individual organisms within a species is

highly constrained by genetics (and thus, given good preservation, individuals are reasonably easy to identify and classify). Also, biological organisms evolve through time from one taxon to another by mechanisms that have been relatively well understood and that allow cladistic connections through time to be convincingly specified.

In archaeology, the concept of the index fossil was attractive at a time when chronometric dating was unavailable, and stratigraphic excavation was the main relative dating technique available. "Some types that allowed the measurement of time were ones that had rather limited temporal distributions and thus were more or less equivalent to index fossils... [or] 'time-bearer' types..." (Lyman et al. 1997:81). Thus, the concept of an index fossil was borrowed by archaeologists, with particular artifact forms (especially "diagnostic" types) being substituted for particular fossil species. These forms were treated as (and occasionally labeled) index fossil or diagnostic types, and were used to identify "archaeological cultures," and to relate individual archaeological components and sites to others in the absence of contiguous layers. In this way, an index fossil in archaeology is closely consistent with the culture-historical concept of a "horizon style," developed in the early twentieth century, and codified by Willey and Phillips in the 1950s.

The archaeological use of the concept, and increasingly the term (e.g. Wright 1999), involved analogical reasoning, although, as Lyman et al. (1997:76) indicated, the analogical fit is poor. The application of the archaeological concept of an index fossil is much more problematic than in geology, because; 1) formal variation within an artifact type is not constrained by genetics; 2) even given excellent preservation, many artifacts are variable and thus difficult to identify and classify; and 3) cladistic relationships

among types, even when they can be convincingly specified, are fraught with questionable assumptions and under-pinned by poorly understood mechanisms.

The essentialist notion of a "mental template" shared by all of the makers of a particular index fossil type served essentialist culture-historians as an explanation for formal constraint within types with variation was seen as a function of imprecision in attaining the perfection of the template. Thus, types identified by archaeologists employing an essentialist framework are inferred to also have meaning for their makers. The development of chronometric dating has freed archaeologists, to some extent, from the relative dating rationale for index fossils, but the culture-history baggage of the concept persists in conceptions like Meadowood.

The discomfort of some researchers with many Early Woodland units like Meadowood flows from a materialist critique that goes to the heart of unit construction. In the materialist view, all of the vagaries of individual and local group choice and adaptation, ancestry and descent, material variations and constraints, technological approaches, errors in observation and communication, shifts in the intents of makers, and so on, may have operated at multiple scales to contribute to variations within and among the forms. In the materialist view, archaeologists *create* artifact types, rather than *discover* artifact types.

In northeastern North America, index fossils have been used extensively to interpret broad patterns (Wright 1999), particularly when there is little other evidence that can be used to date the age of the site or component in question. There are significant challenges in the radiometric dating of Early Woodland components, largely because of the presence of a major plateau in the radiometric dating calibration curve (Fiedel 2001:123), making index fossils appealing to the interpretation of Early

Woodland phenomenon, such as Meadowood. Indeed, some of the debate surrounding Meadowood has been focused on selecting *index fossils* (Blair 2004:183, Taché 2011a, 2011b). Research has shifted away from describing relationships among artifacts, radiometrically-dated features, and sites, to "the presence and sufficiency of *diagnostic* artifacts" (Blair 2004:183; Hegmon 1992:527).

MEADOWOOD AT THE MACROREGIONAL LEVEL

The use of index fossils has skewed regional analysis in several ways. In large scale spatial units, the notion that a particular mental template could be the source of patterning becomes untenable, leading to the re-emergence of migration and diffusion narratives:

...I believe that Granger's hypothesis, where Meadowood diagnostics represent trade items in the Atlantic Coastal Plain province, best accounts for most situations. The predominance of Meadowood diagnostics in a few mortuary sites or caches that generally yielded large numbers of items could support Ritchie's explanation of the Meadowood Interaction Sphere reflecting the spread of cult concepts. (Taché 2008:160)

As discussed above, in its origins, Meadowood was conceived of as a cultural pattern localized in the Great Lakes Basin (Granger 1978; Ritchie 1965). As research began to develop in areas such as the Maritime Peninsula, especially in the period after the 1960s, the culture-history frameworks from better-known areas such as the Great Lakes offered a set of signposts for interpreting material culture patterning. Units from the Great Lakes and Midwest with a well-defined suite of index fossils, could be used through a process of placing like with like as a preliminary sorting method for establishing a regional chronology. As a consequence, archaeologists began to consider the label of Meadowood for assemblages that had particular tool forms (especially side-notched bifaces, unstemmed 'cache' bifaces, bifacial scrapers, Vinette I pottery and

various ceremonial groundstone implements like birdstones) that strongly resembled Meadowood as it had been described in the Great Lakes (Black 2000; Blair 2004a; Bourque 1995; Heckenberger et al. 1990; Loring 1985; Lowery et al. 2015; McEachen 1996; Stewart 1995). The widespread nature of this phenomenon did not sit comfortably with the previous definition of Meadowood as a culture, and efforts to explain it typically privileged the place where it had originally been identified (New York State), suggesting an emanation of the phenomenon outwards through mechanisms such as migration (Fiedel 2001).

These efforts to situate Meadowood in a context that preserved elements of its initial formulation by Ritchie did little to advance the understanding of the Early Woodland, and when Taché undertook her analysis on the Meadowood phenomenon, she correctly described it as a poorly understood "complex" (Taché 2008, 2011a, 2011b). Her work has yet to stand the test of time, but already some consider it to be a defining piece of work on the Meadowood in northeastern North America, especially considering the lack of previous research conducted in this area (Chrétien 2010). Taché's 2008 monograph, *Structure and Regional Diversity of the Meadowood Interaction Sphere*, on a broad level explores the dynamics of past human interactions (Taché 2008:317). She considers how "culture contact situations" may stimulate social development and complexity (Taché 2008:317). Taché considered the Early Woodland period in northeastern North America to be a period of change from the Archaic period, that was characterized by cultural transformation and an increase in social complexity (Taché 2008:317).

This focus on social complexity and the link to prestige drew on a broad Americanist perspective on optimization, organization of technology and evolutionary

ecology (Hayden 1998). Hayden (1998) proposed that prestige goods were predominantly used in competitive feasting, where goods were publicly displayed and gifting to others was often standard and advertised (Taché 2008:133). Drawing on these perspectives, Taché (2011a) presented a model for prestige goods within the realm of the Meadowood. Given the interest in emerging complexity, this theoretical model is fundamentally evolutionary in nature, and is firmly situated at the scale of broad transformational change. Hayden signals this interest by situating prestige goods at a major human transition. "The main point of importance is that, both ethnographically and archaeologically, prestige technologies first appear in force and flourish with the emergence of transegalitarian complex hunter-gatherers" (Hayden 1998:17). In this regard, the interest by archaeologists in "complex" hunter-gatherers, chiefdoms, and "Big Man" societies may reflect this view (Hayden 1998; Sahlins 1963). These latter two social formations were seen representing "early" or transitional forms of social ranking, wherein egalitarian hunter-gatherer groups "become" ranked societies (Hayden 1998:13). Hayden has developed sophisticated arguments around the role of persuasive individuals and big men in this process, and suggested a material manifestation of this shift in the appearance of prestige goods (Hayden 1998; Plourde 2009).

According to this view, objects of display and precious substances, whatever they may be, function in a common way, as signals, enhancing the status of those interacting with them (Plourde 2009:2). The connection between prestige goods and elevated status, and their assessment of worth is based on scarcity or the labour involved in their construction (Plourde 2009). These goods may be "exotic, finely crafted or have special properties," however they were virtually always challenging to acquire (Plourde 2009:3). A person in possession of prestige is respected and is influential to their peers (Plourde

2009:3).

Although Hayden has integrated research from many regions in his analysis, a key culture area where he developed his notions is the Northwest Coast of North America (Hayden 2000). This region is significantly different from eastern North America, and in the contact period contained a record of complexly organized groups who redistributed goods in potlatch ceremonies, had complex systems of social ranking, and supported large, permanent settlements by intensively exploiting seasonal runs of salmon (Hayden 2000).

Northeastern North America, on the other hand, represents a very different context for analysis. The contact period occurred much earlier, and both the historic and archaeological records for the region have been obscure and highly variable. In broad terms, the period between 8000 or 9000 years ago to 4000 years ago (referred to over the larger region as the Archaic) shares many commonalities, with most subregions containing many small-scale groups who appear to be subsisting on hunting and gathering (Wright 1995). Like the subsequent Woodland period, the broad patterns that have been used to characterize Archaic lifeways were underpinned by a great deal of regional variability, and many Archaic researchers have struggled to reconcile these variations (e.g. papers in Sanger and Renouf 2006). Some of this variability may have shaped differences through the transition into the Woodland period. For example, in some parts of the Northeast, there is evidence that some later groups (e.g. in the Woodland period), like those living in the Great Lakes Basin, became horticulturalists (Wright 1995).

Many who seek broad patterning in the Early Woodland attempt to ground it in the Late Archaic. For example, Taché considers "...the Late Archaic period in the

Middle Atlantic Region as a 'Formative' period, in some ways comparable to traditional formative communities from other parts of North America and Mesoamerica, forming the basis for later development of more complex societies" (Taché 2008:156). In this she attempted to establish a common base, emphasizing a regional readiness for broad transformation. This seems to be demonstrated by specializations, which were considered consequences, or "material correlates" of an increase in social complexity, which may be a possible indication of the intensification of social complexity (Taché 2008:173). This echoes Hayden's (1998) view, as he explicitly stated that prestige goods were the most important element in understanding technological and cultural change.

While Taché suggested that the Late Archaic was the foundation, and so, in a sense, represents the preconditioning state for change, the Early Woodland in general, and the Meadowood in particular, is recast as the manifestation of this transformational change. Taché presented a view of the Meadowood phenomenon as an interaction sphere, which spanned a vast "region," northeastern North America (Taché 2008:161). In this, she drew on earlier explanatory models that privileged mechanisms of intra- and inter-regional interaction (Caldwell 1964; Struever and Houart 1972).

Taché suggested that the Meadowood *interaction sphere* was an expansion and an increase in complexity of Early Woodland mortuary ceremonialism and the widespread trade of Onondaga chert cache bifaces throughout the Northeast (Taché 2008:iii). Based on Taché's research, within these mortuary sites, prestige goods dominated assemblages (Taché 2008:133). In this case, Taché, following Hayden, views prestige goods as representing an increase in social inequality and competitive displays of success (Taché 2008:133). Implicit in this view was the estimation that these prestige goods will be both widespread and disseminated by broad, shared processes (Taché

2008:133). She sees these manifestations as a homogeneous entity, explaining variability as population movement and possibly reorganizations of trade networks (Taché 2008:161). Taché accounted for the Meadowood having varying levels of structural complexity between communities by attributing variability to spatial distribution, value and seasonal availability of trade goods (Taché 2008:181). In this way, these variations become epiphenomenal; for example, Taché attributes the variability found in the Maritime Peninsula to a rise in social complexity due to the reorganization of their marine-based economy at the end of the Archaic period (Taché 2008:161).

MEADOWOOD INTERPRETATIONS

The focus on prestige goods and transformational change were at their heart materialist approaches. The Late Archaic and Early Woodland have been recast as periods of broad, transformational change, with change that was expressly ongoing and internal. Interestingly, this approach is operationalized using essentialist tools – particular culture-history units that were originally conceived of as monolithic spatial and temporal entities. In adopting an essentialist unit for material ends, Taché (2008, 2011a, 2011b) largely homogenized the Meadowood, classifying Ontario, through to the East coast, including the states of Maine and New York, as a region, influenced by interaction within itself. Further, the essentialist qualities of Meadowood extend to key types and tool forms – the index fossils of Meadowood. This was exemplified in Taché's (2008, 2011b) discussion of Meadowood cache bifaces, also known as quaternary blanks (sensu Granger 1978). Following Ritchie (1971) and Granger (1978) these were conceptualized as being almost exclusively manufactured from "easily recognizable" Onondaga chert (Taché 2008:18, 2011b:8). Sources of this material are located in

western New York State and the north shore of Lake Erie in Ontario (Taché 2008:18, 2011b:8). Consistent with Granger's analysis, these cache bifaces were highly standardized, and also served as bases or blank for other tools like side-notched projectile points or bifacial triangular scrapers (Taché 2008:18, 2011b:8). In effect, cache bifaces continue to function as index fossils, with the widespread nature of the phenomenon being explained through mechanisms of diffusion and widespread trade (Taché 2008, 2011a, 2011b), with some Meadowood groups being "strategically located" as "middlemen" between the Atlantic and Midwest (Taché 2008:iii).

Although the role of prestige goods in this model was evocative of Hayden's perspective, Taché's (2011a) analysis also explores some distinctive elements. The Meadowood itself was both broadly distributed, and variable in form. Like other widespread phenomena in the Northeast (e.g. the Hopewell Interaction Sphere, Brose 1979) these patterns of similarity and wide distribution that characterize the Meadowood phenomenon have been attributed to sociocultural interaction (Krakker 1997). As a consequence, interaction was a significant component of Taché's (2008, 2011a, 2011b) discussion of the Meadowood phenomenon as she stated, "Human communities rarely develop in complete isolation, and interactions between different groups, as social practices, impact cultural trajectories and stimulate social developments" (Taché 2011b:1; see also Hayden and Schulting 1997). In her definition of inter-societal interactions, she includes the basic exchange of goods, sharing of religious beliefs, stylistic exchange and warfare (Taché 2011b:1). Taché (2008) stated that during the Early Woodland period in North America, there was an increase in the intensity and scale of "intersocietal interactions" from the Late Archaic period, which may coincide with an increase in social complexity during this period. With this view, Taché (2011a)

links an increase in interaction (notably trade), with increases in complexity. Through these processes, she struggles to bring disparate and distinctive groups into a system of mutual, broad engagement, while on the other hand, points to common processes and states of readiness for change that allow for the broad transformations that she sees as characteristic of the larger region. Underlying these tensions were conflicts between the materialist goals of her work and the essentialist tools at her disposal.

On the other hand it was not entirely clear in these more recent analyses of Early Woodland patterning whether terms like Meadowood were being stretched and warped to fit new models, or whether they were being wholly recast in materialist terms. For example, Taché's analysis of interaction assumes that some groups were able to engage in these processes directly, at the centre (nearest the Onondaga outcrops in the Great Lakes Basin), while others were middlemen between this centre and the fringes (see above). This spatial differentiation suggests that there was a structural hierarchy to these interactions (with centers and edges), and implies that these processes were most clearly grounded in transitions that emanate from the core (Taché 2008). An essentialist conceptualization of Meadowood would imagine it as internally homogeneous and coherent, with sites and forms from one part of its range essentially the same as those in other parts. As indicated by Lyman et al. (1997) above, it was either within the type or unit or it was not. In this sense, Taché's implied notion of a core that was trading with a periphery suggested that there was a real Meadowood centre surrounded by a periphery populated by groups who aspire to be Meadowood. This notion reverts our understanding, as archaeologists and anthropologists, to an essentialist model, making a fully materialist explication of Meadowood elusive.

In an attempt to break down the essentialist units in Early Woodland regional patterning, some have critiqued this notion of centered, hierarchical networks (Blair and Wiber 2013). Drawing on the work of Escobar (2003) they suggested that top-down networks may be contrasted with bottom-up meshworks. Bottom-up processes start at a more local level without being led or planned out by a central core (Escobar 2003:351), which some (Blair and Wiber 2013) have suggested may be a better fit with the archaeological record for Early Woodland exchange systems in the Northeast. This bottom-up perspective was contrary to Taché's (2008, 2011a, 2011b) view, and allows room on a local level for agency, as well as unpacks some of the ideas around complexity and sophistication, allowing it to emerge in ways that can only be understood in local terms, rather than in reference to a larger homogenous entity (Escobar 2003:351). Further, such formulations explicitly break down the essentialist units that were typically used to define and sort patterning in the Early Woodland, and may offer a materialist basis for integrating notions of prestige more fully.

Some have pointed to variability and difference within presumed Early Woodland units as a way of further establishing a materialist basis for analysis. Blair (2004a:41) agrees with Taché (2008, 2011a, 2011b) that there was evidence of the distribution of Meadowood-like forms throughout the Northeast, but suggested that these overlie considerable variability. Further, she suggested that some of the patterning was more superficial than has been previously thought; pointing to evidence that easily identified Onondaga chert was simply not so easily identified (for example, McEachen et al.'s 1999, inability to substantiate the use of Onondaga-like materials for the Tozer cache). The misidentification of local materials as non-local Onondaga is a way of challenging an essentialist understanding of Meadowood, weakening the similarity from

multifaceted to superficial. Blair has questioned the state of Early Woodland patterning, suggesting that the sharing of particular forms and material preferences were a thin substrate over profound regional differences; similar to Taché, she evokes exchange and interaction as one mechanism for this veneer of similarity (2004a:41) describing "cultural bridges" between the Maritime Peninsula to the Meadowood centre in northern New York. Studies of interaction and exchange have tended to be linked to evolutionary models: "...precisely because it is so common and relatively easy to identify in the archaeological record, archaeologists and other researchers have overemphasized the importance of interregional interaction as a primary cause of evolutionary change" (Stein 2002:903).

More recently, Blair and others (Blair 2012, Blair and Wiber 2013) have suggested, following Escobar (2003), that interactions among far-flung groups in the Northeast between 3500 and 2000 years ago were far more complex and variable than previously imagined, and that the supposed "edges" (e.g. the Maritime Peninsula) may, in fact, lead manifestations to the presumed "core" (the Midwest and Great Lakes Basin) in ways that subvert many of the more conventional assumptions of interaction networks, and the explanations that were drawn from them.

For the purposes of my research, the notion that particular tool forms were expressions of cultural behavior that can be linked to larger units of analysis like Meadowood provides an avenue for testing these models and assumptions. Based on assumptions inherent in essentialist ontologies, Meadowood tools, wherever they are encountered over its presumed range, should be created using a shared mental template carried in the heads of their producers, and should result in consistently similar outcomes over its entire range. "Meadowood culture," in this view, is an either/or

proposition. If, however, a materialist ontology provides a better fit with Early Woodland tool production, there should be considerable variability over both the spatial and temporal range, with “Meadowood” providing a convenient set of conceptual handles for expressing these similarities in strategies; variation over space is expected as it will reflect local adaptations and expressions within some shared set of practices or behaviours.

Further, models that require the construction of Meadowood as a unit of analysis can be properly evaluated through such research. To avoid the circularity of using Meadowood tools to study Meadowood forms, I have attempted to break down the essentialist tool types by creating a multidimensional hyperspace (Figure 5) for the analysis of Early Woodland tool production. This model allows for tool forms to be explored along a series of continua that express degree of bifacialness and degree of formality. In so doing, I evaluate whether these characteristics truly aggregate around particular outcomes, or whether variability is distributed along the continua. This, in turn, will allow me to explicate a materialist alternative to dominant (essentialist) approaches to tool production. In salient ways, my approach to this draws on Granger’s (1978) trajectory; in developing this model, Granger broke down simple outcomes by reconceptualizing them as variable outcomes of a process, rather than constrained by types (Figure 6). As in the hyperspace (Figure 5), tools at various stages along the sequence become thinner; with products becoming more standardized as they move from left to right. Expanding on Granger, I use the multidimensional hyperspace to operationalize key attributes, including bifacialness, thinness, degree of finish, and standardization of form.

This approach extends the critical stance taken by some in terms of the

applicability of Meadowood over the broader Northeast (i.e. Black 2004a, Heckenberger et al. 1990, Loring 1985). For example, Blair (2004a:250) agrees that Meadowood-like tools, such as bifacial scrapers occur in the Maritime Peninsula, and they may even constitute a coherent complex for a restricted period. She proposes that Granger's (1978) reduction sequence for Meadowood bifacial scrapers was spatially restricted. Instead, Blair (2004a:40) suggested that these classes of tools may occur as superficially similar forms in distinctive local technological systems; in this view, Granger's (1978) trajectory was a "prime definition of a distinctive Meadowood technological system" that was just one of many distinctive, locally grounded systems (Blair 2004a:40). Nonetheless, some (McEachen 1996; Taché 2008, 2011a, 2011b) have regarded it as the core Meadowood system that underpins the phenomenon over the broader region, even though Granger (1978) was clear about its applicability to the subregion of the Great Lakes in modern southern Ontario and northern New York State.

As Granger (1978) envisaged it, Meadowood tools were made by logistically organized hunter-gatherers who had a highly standardized system for making tools aimed at producing uniform, distinctive forms. He stated that this technological system accounts for the production of a wide range of chert tools, which were found on *all* Meadowood habitation components (Granger 1978:296). The desired end products of his technological trajectory were quaternary blanks, uniform, highly thinned bifaces made of a high quality material that was abundant in the Great Lakes basin where Granger was working (Onondaga chert; Granger 1978:296). He thought of these blanks as being made far in excess of what was needed to make projectile points, knives or drills, as there has been a large amount of un-reworked quaternary blanks found on Meadowood sites (Granger 1978:296). He explains this by suggesting that, because this raw material was

highly sought after and high-grade, these quaternary blanks were produced in order to make the material easier to transport and introduce into exchange networks (Granger 1978:296), setting the stage for their reanalysis as prestige objects. Because Taché's (2011a) analysis has focused on this process as being a part of a prestige system that emanated from the Great Lakes, and through exchange both integrated the broad periphery, and led to broad transformational change, she has extended Meadowood production systems from Granger's locally grounded notion of a Meadowood culture, into a broader, macroregional phenomenon.

Chapter 3: Analytical Review and Methodology

In this chapter, I explore the methodological literature on lithic analysis, and the particular set of methods that I used to explore Early Woodland assemblages. In order to refine my methodological approach, I examined their efficacy through practicum research on a small sample of artifacts held at the University of New Brunswick. Based on this research I delineated a set of methods that would be appropriate for the scope and constraints of the material that I would research for my thesis project.

As in Chapter 2, I focused on extracting a chronologically controlled subset of lithic tools from within Early Woodland assemblages in the Maritime Peninsula. This subset was identified through site reports and previous analyses. Although the identification of "chronologically controlled" units was a challenging task, I followed the lead of Blair (2004a) by isolating stratigraphically and functionally segregated artifact clusters – groupings of objects that occurred within particular layers in deeply stratified sites, or within functionally recognizable features, such as reduction scatters, refuse pits, hearths, and dwelling floors. I attempted to extricate units that reflect products that can be temporally restricted to the Early Woodland, although, like Blair (2004a), I recognized that I must be mindful of the potential problems posed by feature use-life and cultural transformations (*sensu* Schiffer 1987). Where possible, I used a combination of dating techniques, including establishing associations with radiometric dates, stratigraphic analysis, and association with particular types of pottery (especially Vinette I). In the end I had no need to secure support for additional radiometric dates. To avoid circular reasoning, I did not use lithic tool forms to identify Early Woodland samples. To allow me to control for differences that may result from this sampling strategy, I used the same approach to identify a subassemblage from the Great Lakes Basin.

Once I had isolated a sample of Early Woodland lithic subassemblages, I examined retouched and utilized flakes and cores as well as more formally styled tools, following protocols described below. This allowed me to both make inferences about the larger technological system, and to compare this system with what has been found in other parts of northeastern North America, closer to the presumed Meadowood "hearth" (Blair 2004a:41; Granger 1978). Ultimately, I wanted to analyze the final tool products, but initially looked at complete assemblages in order to consistently and accurately identify all formal and informal tools, with an eye to making statistical statements about the relationship of these products to notions of what *Meadowood* assemblages might be like. Particularly, I was interested in "Meadowood-like" products in order to see how proportionally important they were within complete assemblages. Initially I set out to examine bifacial scrapers as a particular subset of Meadowood tools, but as I began to examine collections, I realized that there was little consistency around how these tools were defined in practice. To properly assess the broader technological system, and to avoid bias, I adopted methods that would not impose culture-historically mediated definitions and categories, but might allow these definitions and categories to emerge from the data itself.

THE JEMSEG CROSSING, FULTON ISLAND AND BEAVERBROOK SITES

I examined feature subassemblages that have been assigned a Meadowood affiliation and have been dated to the Early Woodland, including the Jemseg Crossing, Fulton Island and Beaverbrook sites (Blair 2004a, 2004b; McEachen 2004). Studying data from these subassemblages required a portion of my research to involve reviewing primary site data, including maps, drawings, artifact coordinates and catalogues. My

intention was to use strict criteria to narrow my selection to subassemblages that reflected temporally limited activities (and thus common technological approaches) over which I had some degree of chronological control, and as a result, many sites I had originally considered as a part of my research were eliminated from my final sample due to complications or lack of dateable material.

In order for me to add to the possibilities for future regional syntheses it was critical that I examine Early Woodland features from the Maritime Peninsula. These artifacts were chronologically controlled, complete lithic subassemblages associated with 21 features from the Jemseg Crossing and Fulton Island sites, and 29 features from the Beaverbrook site in the Great Lakes Basin (Table 1). This was essential in order to refine the understanding of lithic technology in the Early Woodland of this region, as well as compare them with Meadowood affiliated components and features from the Great Lakes Basin.

Table 1. Features/Feature Complexes and Associated Artifacts.

Site	Features/Feature Complexes	# of Pieces Per Feature	Artifact Subtotals
Jemseg Crossing Site	S2 (Feature 8)	15	Subtotal- 113
	S3 (Feature 11)	14	
	S4 (Feature 13)	3	
	S5 (Feature 14)	1	
	S8 (Feature 25)	3	
	S9 (Feature 29)	6	
	S10 (Feature 41 and 42)	56	
	S11 (Feature 43, 44, 45, 46)	9	
	S13 (Feature 48)	6	
Fulton Island Site	S18 (Feature 33, 34, 35, 36, 37, 39, 40 in 4H2)	8	Subtotal- 16
	S24 (Feature 6 in TC13)	8	

Beaverbrook Site	1	2	Subtotal-175
	2	6	
	3	6	
	4	7	
	5	6	
	6	4	
	7	4	
	8	3	
	9	8	
	10	9	
	11	8	
	12	6	
	13	4	
	14	5	
	15	5	
	16	7	
	17	8	
	18	4	
	19	13	
	20	5	
	21	15	
	22	4	
	23	7	
	24	8	
	25	6	
33	4		
34	1		
50	6		
99	4		
Grand Total-			304

The Jemseg Crossing Site

The **Jemseg Crossing Site** is located in New Brunswick along the eastern shore of the Jemseg River, which connects Grand Lake to the main body of the Lower Saint John River (see Figure 7; Blair 2004a, 2004b). This site was excavated under the

directorship of Dr. Susan Blair by a team of archaeologists from the New Brunswick Archaeological Services in the years 1996 and 1997 as a part of a mandate to salvage information from the route of a planned highway (Blair 2004a:238). This large habitation site produced a wide array of artifacts that span much of the archaeological record in the region (Blair 2004a). In her doctoral work, Blair (2004a) focused on a particular, chronologically controlled subset of this larger assemblage, and in so doing, identified a number of chronological subdivisions, three of which (Periods I through III) date to between ca. 3000 BP and ca. 2200 BP. Based on both radiometric dates and stratigraphic analysis, Period I dates to the Terminal Archaic or earliest Early Maritime Woodland period, between 3090–2800 BP (Blair 2004a). Blair dated Period II to 2740–2400 BP, the early Early Maritime Woodland period, and Period III to between 2280–2020 BP, the later Early Maritime Woodland period (Blair 2004a). Blair identified 13 features and feature complexes at the Jemseg Crossing site that were directly and securely dated; these she termed Sample Units (Blair 2004a:315). Of these, she assigned ten to the three periods of interest; three to Period I, three to Period II, and four to Period III (Blair 2004a). These features were carefully selected as representing limited-use activity areas, and as such, when combined with similarly sampled materials from Fulton Island, both inform my approach to other sites, and form the basis for my thesis research (Blair 2004a). Because she had already isolated lithic assemblages associated with these units, I was able to examine 114 utilized and retouched flakes and cores, bifaces and scrapers from features that date from Periods I to III (Blair 2004a). Overall, Jemseg Crossing provided me with a variety of artifacts that were relevant to my thesis work. These pieces are located at Archaeological Services New Brunswick (Blair 2004a).

The Fulton Island Site

Although Foulkes (1980) discussed Early Woodland components and tools, she did not affiliate the material from Fulton Island with Meadowood in her initial analysis. However, Blair (2004a) argued that some of the components from Fulton Island (including those that produced material in my feature subsamples) were co-eval with Early Maritime Woodland components and Meadowood-like artifacts from the Jemseg Crossing site. She further suggested that the Early Woodland activities at Fulton Island and Jemseg Crossing were manifestations of a settlement behaviour carried out by related groups (or possibly the same group). I follow Blair's lead in this, and consider the Fulton Island subassemblages as representing the same Early Maritime Woodland lithic reduction processes as occurred at Jemseg Crossing. Blair (2004a) also integrated chronologically controlled units from the **Fulton Island** site in her analysis. A deeply stratified site, Fulton Island was occupied through the Early Maritime Woodland period (Blair 2004a). It is located along the northern margin of the Grand Lake Meadows (see Figure 8; Blair 2004a; Foulkes 1981). The Fulton Island site was excavated as a part of an archaeological survey of the Grand Lake system, directed by Dr. S. Turnbull and Dr. E. Snow from 1971 to 1973 (Blair 2004a:201). In her dissertation research, Blair assigned features, layers and associated materials from Fulton Island to chronological subdivisions, Periods I through III included several hundred pieces, of which Blair identified 77 as formal and informal tools, of which I isolated 16 for further examination (Blair 2004a:12). As she did with the Jemseg Crossing subassemblages, she included utilized and retouched flakes and cores, as well as formally styled bifaces and scrapers in this analysis (Blair 2004a). This assemblage is currently housed at Archaeological Services New Brunswick. Like Jemseg Crossing, Fulton Island has been primarily

classed as a habitation site, although it is likely that ceremonial activities were embedded within this context (Blair 2004a:31).

The Beaverbrook Site

The **Beaverbrook** site (AfHh-386) was excavated to salvage materials threatened by the development of a property on Beaverbrook Avenue, London, Ontario (TMHC 2012; Figure 9). As a part of this mitigation project, four stages of archaeological assessment were conducted between 2008–2009 (TMHC 2012). The excavations were conducted under the directorship of Dr. Holly Martelle (TMHC 2012). In particular, Stage four of the excavations uncovered a "large Meadowood cultural occupation" (TMHC 2012). The Beaverbrook site produced a large number of artifacts and features, which made sample selection difficult. Based on the feature maps provided to me by Dr. Peter Timmins, I isolated clusters of material and features that centered on the Early Woodland AMS date of 2475 ± 20 BP, the presence of this AMS date solidified the sampling of features I chose (Wood 2015; Figure 9). These artifacts are held in London, Ontario at the TMHC (Timmins Martelle Heritage Consultants Inc.) location. Through conversation with Dr. Timmins, I was able to reach an agreement for a one-year loan of these artifacts to me personally.

THE "FOUR PHASE" APPROACH

In order to efficiently proceed with the methods described above, I took a "Four Phase" approach to collecting the data for my thesis, with each phase containing a variety of components.

- Phase one: I selected material from securely dated contexts within the Jemseg Crossing site, Fulton Island site and Beaverbrook site.
- Phase two: I sorted the assemblages into formal and informal tools.
- Phase three: I assessed the *bifacialness* of each formal tool, with an eye to developing an understanding of the technological trajectory that underpinned their production.
- Phase four: I conducted analysis of the resulting data.

I explicate the specifics of each of these four phases below in order to provide a better understanding of what they entailed.

Phase One.

Phase one consisted of selecting material from securely dated contexts within the collections I have discussed above. In this I followed the methodology employed by Blair (2004a) during her dissertation research, and used to isolate the Early Maritime Woodland material from Fulton Island and Jemseg Crossing. This method involved examining non-mortuary features (living surfaces, hearth areas and dwelling structures) and establishing contextual relationships between artifacts and these features.

Initially, I considered a number of sites and features. For example, I eliminated the Mud Lake Stream site, because at the time it seemed to have a comparably small number of associated artifacts, making this site statistically extraneous to the main sites I wanted to pursue. In some cases, this phase involve some preliminary travel to assess possible candidates for further analysis. For example, Dr. Blair and I travelled to Halifax, Nova Scotia in order to determine whether Gaspereau Lake would be an

appropriate assemblage for this research. In the end this site proved to be stratigraphically complex with little vertical differentiation between layers and features. This limited my ability to identify chronologically controlled units that fit with my criteria, making it undesirable for this analysis. Determining what site would be the most beneficial from the Great Lakes Basin was also a challenge. In the end, the Beaverbrook assemblage became the most suitable site to do comparative analysis on.

At the end of this phase, I had three feature subassemblages, consisting of 113 artifacts from the Jemseg Crossing site, 16 artifacts from the Fulton Island site and 175 artifacts from the Beaverbrook site. Through further engagement with these artifacts, I isolated 136 formal and informal tools from the three sites.

Phase Two.

Phase two involved an initial sorting of lithic artifacts into tools and non-tools, and placing tools in terms of their formal and informal characteristics. I considered "tools" to be knapped lithic artifacts that exhibit use, retouch and/or thinning. Although I attempted to conceive of formal and informal tools as occurring on a continuum, I considered formal characteristics to include the presence of carefully constructed working edges (especially steep-edged retouch), and bifacial thinning to constrain cross-section shape, with standardization of form (i.e. steep-edge retouch limited to distal ends of unifacial scrapers) increasing the degree of formality, and irregularity (i.e. incidental, partial or irregular retouch) and limited finishing (i.e. use on an otherwise unmodified flake) decreasing it.

Phase Three.

Phase three was a detailed assessment of formal tools (see Figure 10). I classified all formal tools according to measures relating to *bifacialness* (the extent to which tools were thinned and otherwise modified on two faces, see below), and the nature of functional edges — in particular, steep, scraping edges. These categories were considered critical because of the central place of bifaces, and by extension, bifacial scrapers and other bifacial tools, in the Granger (1978) model of Meadowood tool production. This allowed me to contrast artifacts in my various feature subassemblages with outcomes that might be predicted by the Granger model. During this phase, I captured good quality photographs of the artifacts exhibiting *steep-edgedness* and *bifacialness*.

Phase three was the most time consuming portion of these research phases, as this included photography and conducting descriptive analysis on each individual artifact. Photographing each individual artifact was an important part of this phase, as it provided me with an avenue to revisit particular pieces, document my research, and support my interpretations.

For the purposes of this research, the focus of the photographs was on lithic artifacts exhibiting *steep-edgedness* and *bifacialness*, though I photographed as much of the process as possible within the time constraints, adding group photographs of various classes within the assemblages, formal and informal tools and any additional patterns that appeared during the analysis. I photographed three aspects of each piece, in order to show the dorsal and ventral surfaces. The third view was of a longitudinal edge, which allowed me to record both the degree of bifacial thinning of the object, and its longitudinal cross-section. Particular care was given to consistently orienting tools for

the purpose of photography and analysis, and to this end, I oriented the tools by placing it with the working edge always facing down.

Phase Four.

During Phase four, I conducted statistical analysis on my measurements and results in order to generate a model for Early Woodland tool production in the Maritime Peninsula, and to compare this model with both the Granger (1978) model, and with an assemblage similar to one that Granger would have drawn on in the generation of his model. This, in turn, allowed me to make inferences about what was taking place in the Maritimes in relation to the Meadowood phenomenon and whether they were technologically consistent with Meadowood in the Great Lakes Basin, whether they were distinctive but similar, local expressions (i.e. Meadowood-like), or whether they were in fact completely distinctive (and therefore not Meadowood at all).

TOOL TERMINOLOGY

Flaked stone tools dominate prehistoric archaeological sites in the Maritime Peninsula, especially during the Maritime Woodland period, where on many of these sites, they have been the only preserved material culture (Blair 2004a; McEachen 1996; Taché 2008). Most overviews of assemblages describe these flaked lithic tool industries as focused on the production of projectile points, bifacial knives, and scrapers (Blair 2004a:188–189, McEachen 2004:247). Although traditionally, lithic analysis in the region has focused on these as formally constrained types, some broader studies also recognize that "expedient" flake and core tools were also likely important (Blair 2004a).

Most typological classification systems have focused on projectile points (Ritchie 1971; Taché 2008:195), and occasionally particular forms of scrapers. Despite this, there has been this analytical focus, some have attempted a more comprehensive technological classification system of these tools (Blair 2004a), which integrates these types into the following broader categories:

- 1) Bifacially-thinned tools that are typically "symmetrical" (or at least "regular"), both in outline and cross-section on thin flakes, often having formally-styled haft elements (i.e. projectile points and "unstemmed bifaces");
- 2) Flakes with steep-edge retouch that appear to be consistently shaped (i.e. scrapers);
- 3) Cores and core fragments (especially those manufactured with bipolar percussion) that have been modified by steep-edged retouch into scrapers;
- 4) Retouched flakes and cores that appear to be inconsistently shaped and sized; and
- 5) Utilized flake and core tools that appear to be inconsistently shaped and sized.

Unstemmed Bifaces

Unstemmed biface. In my graduate practicum analysis, I examined (largely unprovenanced) artifacts from the George Frederick Clarke collection, one of the research and teaching collections from New Brunswick, held by UNB. This allowed me to explore the application of categories of analysis to a collection of potentially Early Woodland tools. The category of "Unstemmed Biface" turned out to be more complicated than I had initially assumed it would be, as some artifacts that were classed in the George Frederick Clarke collection as "bifacial scrapers" showed only one or two

ventral removals, and were not fully thinned, as one would expect of a bifacial tool. This revealed to me that the basic definition of a bifacial scraper might be based on unclear distinctions between bifacial and unifacial scrapers.

I arrived at the perspective that the *bifacialness* of a stone tool required a more subtle approach than that afforded by nominal classification of steep-edged implements into discrete classes. When viewed in a more subtle way, flake tools can be placed on a continuum from unifacial to fully bifacially thinned. Based on my practicum work, I sought to operationalize the concept of biface in a way that would be straightforward. In the end, I determined that, for the purposes of Early Woodland tool production, a bifacial tool is an artifact exhibiting any bifacial thinning (Plate 1; Plate 2), while a unifacial tool exhibits not even one removal from the ventral surface (Plate 3). This would not preclude a unifacial tool from being bidirectionally retouched. This allows bifacial tools to be viewed more freely on the continua from formal to informal and bifacial to unifacial.

For the purposes of describing an unstemmed biface, as I did in my data collection and analysis, I included all portions of bifaces that did not exhibit notching or steep-edge retouch. As a consequence, my unstemmed biface category includes unstemmed biface tips, bases, medial portions, longitudinal portions and a variety of other fragments. Most unstemmed bifaces were not minimally bifacial, a possibility I had considered early in my research since my bifacial category included any tool that exhibited any amount of thinning on both surfaces.

Quaternary blanks. In 1978, Granger attempted to shift the focus of Early Woodland analysis broadly (through a detailed examination of Meadowood sites and tools) from types and end products to production sequences and technological systems.

To do so, he assessed several Early Woodland assemblages from the Great Lakes Basin. Interpreting the production of thin, well-made, triangular unstemmed bifaces, typically of Onondaga chert as having characterized Meadowood economic and ideological exchanges (Granger 1978, 1981). These unstemmed bifaces, which he called quaternary blanks were therefore a stage in a reduction process, but also a valuable way of storing and trading lithic potential (Granger 1978). Granger (1978) has described the manufacturing process as a trajectory, but in many ways it looks like the beginnings of a *chaîne opératoire* (see Edmonds 1990; Sellet 1993; Shott 2003). In this work, Granger described bifacial scraper production as beginning with either locally sourced pebbles or tabular blocks (Granger 1978:17). Granger (1978) then suggested that Meadowood flintknappers would make a fully thinned, finished unstemmed biface, what he called a quaternary blank that could be finished into any number of bifacial forms, including bifacial scrapers. For Granger (1978), the manufacture of a quaternary blank left the knapper with the decision of the final function of the tool. This system could produce small and thin bifacial scrapers with lenticular cross-sections and complete bifacial thinning (Granger 1978).

Projectile Points

For the purposes of this research, I used a very conventional definition for the term "projectile point". Consistent with broader definitions from the Northeast (Ritchie 1971), projectile points were any bifacial point that was fully, or nearly fully thinned with hafting elements, such as notches or stems (Plate 4). These did not exhibit any steep-edge retouch.

Scrapers (Unifacial and Bifacial)

While these basic technological categories seem comparatively straightforward, scraping tools defy such straightforward classification. This is because, on the Maritime Peninsula, scrapers appear to be largely defined on the basis of their steep-edges (Foulkes 1981:110). While many archaeologists (at least in the Maritime Woodland) seem to presume that small to medium-sized, unifacial endscrapers were somehow "typical" (Foulkes 1981:110), a review of the literature on Maritime Woodland lithic assemblages reveals that steep-edged scraping tools can be found on flakes with absolutely no ventral modification (true unifacial scrapers) that may have steep-edge retouch at the distal end, may have steep-edge retouch along several edges or may have steep-edge retouch along one side only and on incomplete projectile point bases ("bunts"), finely-thinned bifacial tools (either the tips of incomplete bifaces or on bifaces made expressly for that purpose), flakes with only minor bifacial modification (Blair 2004a). Further, as mentioned above, some scrapers were not even made on flakes (instead being made on bipolar core fragments). This has been compounded by the fact that a great deal of scraper variability exists within periods; interestingly as many as three bifacial scraper forms were found within the Early Maritime Woodland period and only one of them would be of the kind produced on a quaternary blade that would be produced by the Granger lithic reduction trajectory. By treating all of these types as the same, I might be missing out on understanding subtle patterns within the spatial and temporal distributions. Unifacial scrapers exhibit even more variability, and it may be useful to consider that this variability does not represent final forms, but a continuous range of outcomes on a spectrum between highly stylized, formally constrained forms to highly irregular, "less-planned" forms. Given the variability discussed below, such a

schema may more accurately reflect some of the variability in scraping tools between the Middle and Late Maritime Woodland. Those archaeologists that choose to use scrapers as index fossils rarely acknowledge these variations and in fact have treated variation as discreet and not continuous. For example, both Taché (2008, 2011a, 2011b) and McEachen (1996) use the term "bifacial scraper" as indicative of the Meadowood, but neither described what they mean by the term bifacial scraper. This variability makes straightforward technological categories as described above complicated and overly simplistic. In fact, it has made me rethink scrapers as a category entirely. Below I explored how I operationalized these terms in my research.

While scraping tools are common in many periods throughout the archaeological record of the Maritime Peninsula and beyond, they are not often subject to detailed technological or typological studies. A variety of reasons may be held accountable for this, including gender bias in analysts who are less interested in what are often viewed of as "women's tools," a perception that scrapers are not formal tools but are rather expedient tools, and irregularities in form that render them less amenable to typology than projectile points.

Nonetheless, on the Maritime Peninsula and in the broader Northeast, many analysts attempted to use some scrapers, especially unifacial endscrapers (what some have called "thumbnail scrapers") and bifacial scrapers as index fossils. For example, Bourque regards unifacial endscrapers as being characteristic of the Maritime Woodland.

The most frequently occurring stone artifact found in ceramic period sites on the central Maine coast is the snub nosed end scraper...End scrapers are common in all phases of the Ceramic period, but become much more numerous during later times. (Bourque 1971:176)

Bifacial scrapers have been considered by many to be even more chronologically restricted (and in particular, strongly linked to the Early Maritime Woodland). Taché stated:

Cache bifaces, side-notched projectile points, and bifacial scrapers are three typological markers used to identify Meadowood components in the archaeological record. Meadowood flint knappers are well known for their production of thin, subtriangular bifaces ideal for transport and future modification into functional tools such as projectile points and scrapers. (Taché 2008:51)

This suggested to me that archaeologists should consider more explicitly what they mean by these categories. Even a brief examination of the literature shows that both scraper categories, unifacial and bifacial, encompass considerable variability, and overlap other types of flake tools. Below, I summarize the standard definition of unifacial endscraper, then I construct a more complex typological conception for steep-edged flaked-stone tools.

Anatomy of a unifacial endscraper. Some have attempted to describe unifacial endscrapers as a type (Bourque 1971, Dickinson 2001). While some have suggested a fairly straightforward category involving tools "manufactured by steeply and unifacially retouching one end of a flake" (Foulkes 1981:132), others have provided more detail (Bourque 1971:176). This steep retouch is typically found on the distal end of the flake (i.e., on the end of the flake away from where the striking platform is located; Figure 11; Dickinson 2001:38). In this case, the flake was the preform on which the scraper was made. Because (at least in the ideal) retouch modification was restricted to the distal end, the striking platform of the original flake blank is frequently retained. The working edges are generally convex and exhibit varying degrees of angle, which many have assumed related to the tool's function (Dickinson 2001:38). Modification of the surface of the tool occurs on one side only, typically on the dorsal surface (Dickinson 2001:38);

and the ventral surface is typically free of any removals (Bourque 1971:176). While the ideal form appears to be manufactured on a thick flake that is longer than it is wide, many acknowledge that these tools vary in size and form, from very small to large, and near-circular to elongated (Plate 5; Bourque 1971:176).

Despite the ubiquity of the term "scraper," there has been little consensus about the function of these tools (a discussion that is somewhat peripheral to this thesis), but it is significant that some have indicated that spurs are a regular feature on many Maritime Woodland unifacial scrapers (Foulkes 1981). Foulkes (1981) described these spurs as sharp projections found on the margin of the working edge of some unifacial scrapers. These have been presumed in the literature of this region as having a function as graving spurs or perforators. According to Dickinson (2001) a "spurred scraper" is a category that is distinctive from endscrapers, in that it is a unifacial scraper that is retouched on the distal end and lateral margins and that exhibits protrusions on one or both sides of the distal working edge (Dickinson 2001:38).

Two sides of a bifacial scraper. As discussed above, bifacial scrapers have been considered by some researchers to be a formally-styled tool type that are found in northeastern North America during a fairly narrow period of time (in particular, during the Meadowood phenomenon of the Early Woodland period— between 2800 and 2400 years ago – and possibly in the period leading up to the Early Woodland, the Terminal/Transitional Archaic; Bourque 1995; Plate 6). Much of this analysis was based on Granger's (1978) work on the Meadowood phenomenon of the Great Lakes Basin. In this work, Granger described bifacial scrapers as starting from either a locally sourced pebble or tabular block (Granger 1978:17). Using percussion, primary blanks were formed and decortication occurs, producing large longitudinal flakes (Granger 1978:17).

From here, a striking platform was identified in order to note the proximal end of the flake (Granger 1978:17). Basal and lateral pressure flaking was utilized in order to create a smaller form (Granger 1978:17). When this process was complete, the knapper was left with what Granger (1978) called a quaternary blank. This is the form that the bifacial scraper was made on (Granger 1978:17). This system produces scrapers that were small and thin with lenticular cross-sections and nearly complete bifacial thinning (Figure 6). In other words, these were scrapers made on thinned bifaces that have been deliberately modified to be steep-edged tools (Granger 1978). These Meadowood-style bifacial scrapers exhibit steep dorsal flaking on the proximal end of the biface (Taché 2011a:56). In the case of bifacial scrapers, the transition from preform to finished tool brings about an inversion in standard archaeological orientation, where the proximal end of the preform (base of the biface) becomes the distal end of the scraper (the working edge), while the distal end of the preform becomes the proximal (hafted) portion of the finished tool (Blair 2004a:187). This focus is evident as there is minimal surface and edge removals towards the tip, away from the working edge (Blair 2004a:189). Granger (1978) expected that ideally, function would not enter into the process of making the biface until after the blank was completed; in other words, it would only be at this point in the reduction sequence that future function would be taken into account.

Other Formal Types

I kept these as their own category as drills and perforators/gravers have been considered index fossil types of the Meadowood (even if at times minimally; Granger 1978; Taché 2008), so I wanted them included in further analysis within their own grouping.

Drills. For Granger, Meadowood represented an integrated system concerned with the production of bifaces. Because of Granger's (1978) description and based on the drills I examined during my analysis, I considered drills to be fully thinned bifacial tools with squared bases and steeply narrowed medial and tip sections (Plate 7).

Perforators/Gravers. For the purposes of this research, I considered perforators and gravers to be a subclass of unifacial tools (though they seem to straddle informal and formal on the stone tool continuum). Distinguishing between the two was simply based on my perception of the spur's purpose (i.e., the shape of the spur and the use patterns visible on that distinctive point): perforators having more of a blunt hooked spur, and gravers having almost a miniature drill point (Plate 8).

Informal Retouched Tools

As I began to contemplate the variability in unifacial tools (which were essentially systematically retouched flake tools), I was forced to consider the intersection with other, more idiosyncratic flake tools. Simply put, I wanted to examine some patterns of use and retouch on informal tools. These tools were not bifacial in any way, nor did they have any steep-edge retouch. However, this class acknowledges the fact that varying degrees of retouch can occur on flakes, including retouch that is continuous, discontinuous, widespread, isolated, invasive, minimal, unidirectional, bidirectional and in some cases, with varying combinations of these on a single flake. While bifacial scrapers occur on a continuum of bifacialness, it occurred to me that scrapers also occur on a continuum of retouched tools.

ANALYTICAL TERMINOLOGY

Data Collection

I constructed the recording sheets based on artifact collection analysis forms Dr. Blair had created for her graduate research, influenced by Andrefsky (1998), descriptive forms Dr. Wilson fashioned for her work on a Middle Paleolithic cave site in southern France, influenced by Bordes (1967) and Bisson (2000), and combine them with my Honors lithic analysis sheets. With the completion of my practicum work, I considered a variety of possibilities in order to fix the flaws within the descriptive forms created previously. These new data collection sheets functioned to restrict the range of descriptive entries in order to maintain consistency and clarity during analysis. Though I made an effort to stay within the boundaries originally set with the data collection forms, I found that outliers and patterns I had not expected began to emerge, which made me add a few extra descriptors within a number of categories. Fortunately, I identified these issues early in the process, and was able to make the requisite modification in the first day or two of data recording. In order to demonstrate which of these descriptors I added, I bolded and italicized the additions. I described artifacts using the following categories:

- **Portion** (The completeness of the artifact): This was restricted to whole, longitudinal fragment (working edge split), distal fragment (working edge intact), proximal fragment and unknown (Figure 11). In addition I added *medial* (the tip and base missing) and *other* (this developed as I encountered objects where the base was incomplete, but the medial and tip intact were still intact) as I encountered numerous examples of these in the early stages of data recording. I included this category for descriptive purposes, but also to develop a baseline for

how further categories might apply to the artifact. For example, if the proximal portion of the artifact were missing then I would automatically infer that there could be no further analysis of the striking platform. This category also has implications for function. For example, if I could identify the nature of breakage, and determine that production stage at which it occurred, I might be able to infer possible hafting, as hafted scrapers can break if enough pressure was applied to the handle and this will usually manifest itself in the proximal portion fracturing (Blair 2004a).

- **Platform** (The completeness of the striking platform): I restricted this category to present or absent (unknown/removed; Figure 11). I integrated this class in order to identify practices around platform removal. In particular, I wanted to evaluate whether the bifacial working of scrapers might relate to platform modification for either stylistic or functional reasons. In order to determine this, it was essential to assess not only if it was present, but whether the platform was intentionally or accidentally modified.
- **Working Edge Relative to Platform** (Referring to the relative location of the platform): The options for this category included Distal (D), Proximal (P), Left (L), Right (R), Both Edges (B) and All (A; Figure 11). Quite a bit of variation emerged as I began to assign objects to this category. I ended up adding *indeterminate, all except proximal, distal and left* and *distal and right*. In some cases the working edge was on the platform, so I also made a clear category of *working edge on platform*. The categorization of the platform in relation to the working edge was very informative considering that there have been speculations

about bifacial tools and their development relating to the evolution of platform removals for hafting (Susan Blair, personal communication 2015).

- **Surface Modification/Thinning** (Removals meant for shaping and thinning on one or both surfaces of a tool): For this category, I limited the field to dorsal surface modification present (dorsal), ventral surface modification present (ventral), and both dorsal and ventral surface modification present (all; Figure 11). Surface modification is a particularly important variable within this data collection, as it appears to be the primary criteria that researchers seem to be using to distinguish between bifacial and unifacial scrapers (Blair 2004a). It is important to note that erailure scars (small flakes on the ventral surface removed due to the force of the flake fracturing from the core) are not included in ventral surface thinning as they are generally considered to be a function of the removal of the flake preform (Susan Blair, personal communication 2015).
- **Number of Bifacial Removals:** This category involved counting the number of removals visible on both the ventral and dorsal surfaces of the artifact (separate counts for each surface); if it was not bifacial "N/A" was the response to this category.
- **Proportion of Thinning:** For this category I used Mylar® with a dot grid on it, and by counting how many dots were over ventral flake removals, and how many were over the original (unmodified) ventral surface, I could calculate what proportion (with a percent value) of the ventral surface had been thinned.
- **Cross-section** (The morphology of the tool along a longitudinal axis, ventral to dorsal; Figure 11): This category was limited to biconvex - () -, plano-convex - |)

-, and concave-convex (indicated as lenticular on Recording Sheets) -) – (Figure 12). I ended up adding a class to this category called *sinuous* - ~ -, which I have described as edge morphology resembling a wave. This cross-sectional morphology was present on a number of steep-edged tools. This category was important as I considered that it might produce evidence about the nature of the original tool blank, and in particular, whether the scraper was made on a prepared flake, a specially prepared bifacial quaternary blank (sensu Granger 1978), a core, or a biface or point that was used, incomplete and recycled into a scraper. These distinctions are critical for differentiating the larger process that shaped the final tool, and reflect various views about possible production trajectories that have informed Meadowood research. My assumptions are that increasing symmetry along the cross-section indicates more complete biface production at the preform stage.

- **Medial Cross-section:** I looked at each tool from working edge to working edge in order to examine the symmetry of the artifact (Figure 11). For this category I used the terminology presented in the longitudinal cross-section portion, excluding the sinuous edge morphology (Figure 12). This was examined with the dorsal surface facing upwards and looking from the distal to proximal end.
- **Steep Edge(s)** (The placement of the *scraperized* edge on the tool): This category was limited to none, proximal, distal, end and side, all sides, and unknown/cannot determine. *Has but cannot tell side, portion of right side, proximal and distal, side, and distal and right* – were all categories I added to describe the artifacts. The presence of a steeply retouched edge is a minimal

attribute for an object being called a scraper (Andrefsky 1998). While I assume that most entries in a collection database would use this minimal criterion for assigning a tool to a scraper class, I want to test these assumptions formally by this measure. After all, if there is no steep-edge retouch evident on the artifact, then it might have been misclassified, and should be rejected from the steep-edge sample.

- **Retouch Intensity** (The depth of flake removals that make up the working edge of a tool): Shallow, Normal and Intense. These were the categories I used in order to describe the retouch exhibited on the tools in my study assemblages. This category is inspired by Dr. Lucy Wilson's (geoarchaeologist at the University of New Brunswick, Saint John; personal communication 2015) descriptive sheets used in our lithic cataloguing of a site in southern France, la Bau de l'Aubesier.
- **Steep Edge Appearance** (The appearance of the removals that make up the steep-edge of a scraper): Scales, Hinge, Sub-parallel, Parallel and Nibbling are the classes I used in order to describe steep-edge appearances (Figure 13). I found that steep-edge could also have any combination of these removals together, so I allowed for more than one of these descriptor to be used for any one working edge. This was also motivated by Dr. Wilson's (personal communication 2015) work in southern France at the site of la Bau de l'Aubesier.
- **Use** (Evidence of wear on the tool): For this category, I restricted my analysis to definitely, possibly and indeterminate. This category was not intended to serve as formal use wear analysis, but merely to record any observations that might lead

to further, more formal analysis. I recorded this evidence, if I could observe it macroscopically or using minimal magnification (i.e., 10x lenses). I assume that presence of use wear itself might be critical not only for interpreting the nature of scraper use, but at a broader, presence/absence level, whether scrapers were uniformly intended for practical use or were created expressly for other (and possibly solely ceremonial) purposes. However, scrapers functioning in a ceremonial/mortuary context would not preclude the possibility of use-wear.

- **Measurements** (The overall dimensions of the artifact): I restricted my measurements to maximum length, maximum width, and maximum thickness (all in mm) and I measured these using digital calipers, to the nearest decimal point (.0). One of the assumptions made about Meadowood tool forms is that they were highly consistent and were underpinned by uniform, coherent reduction strategies (Granger 1978). I assume that this uniformity might also apply to size, and these measurements allowed me to evaluate this. Further, basic scraper dimensions have been used by others to discern trends through time (Blair 2004a) and evaluate raw material constraints (Black 2004a). In these measurements, I seek a clear and consistent basis for comparison.
- **Mass** (This was measured in order to observe the average size of particular tools): For this particular category I weighed both complete and incomplete artifacts using a digital scale, recorded in grams. This was an important category as academics use this to make statements about trends in the sizes of various artifact types over time (Susan Blair, personal communication 2015).

Through these measures, I attempted to conduct research that was rigorous, replicable, explicit and consistent. Using this methodology, I selected feature subassemblages, reporting on the range of artifacts found within them. This included, thoughtfully describing these artifacts in order to provide clarity or another perspective on this little-investigated Meadowood phenomenon. In the following chapter, I will relay the results of the artifact analysis I conducted on formal and informal tools from the Jemseg Crossing, Fulton Island and Beaverbrook sites, in order to provide a better understanding of the Early Woodland period in the Maritimes and the Great Lakes Basin.

Chapter 3 Images

Figure 7. Jemseg Crossing site units (Blair 2004a).

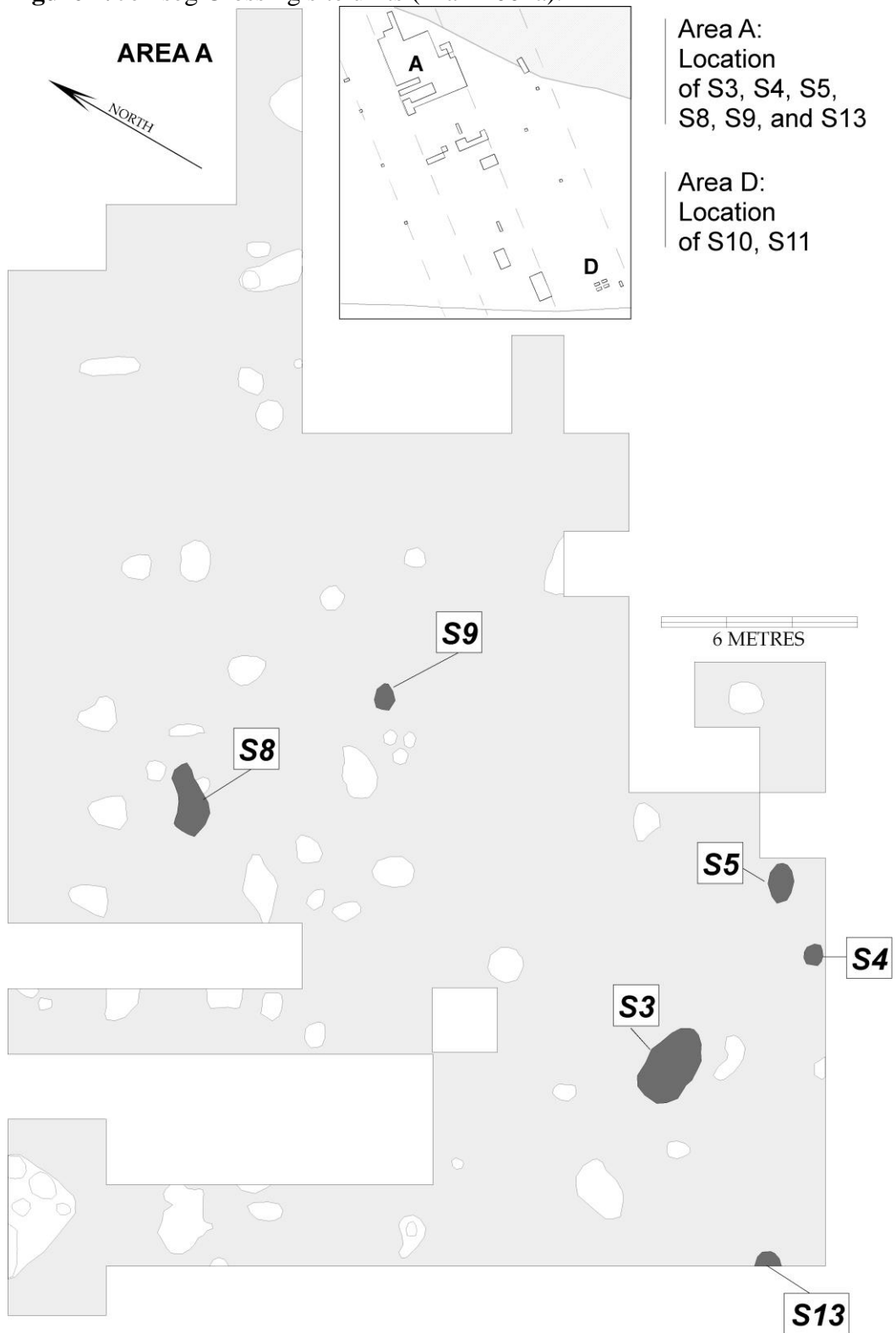


Figure 8. Fulton Island units (Blair 2004a).

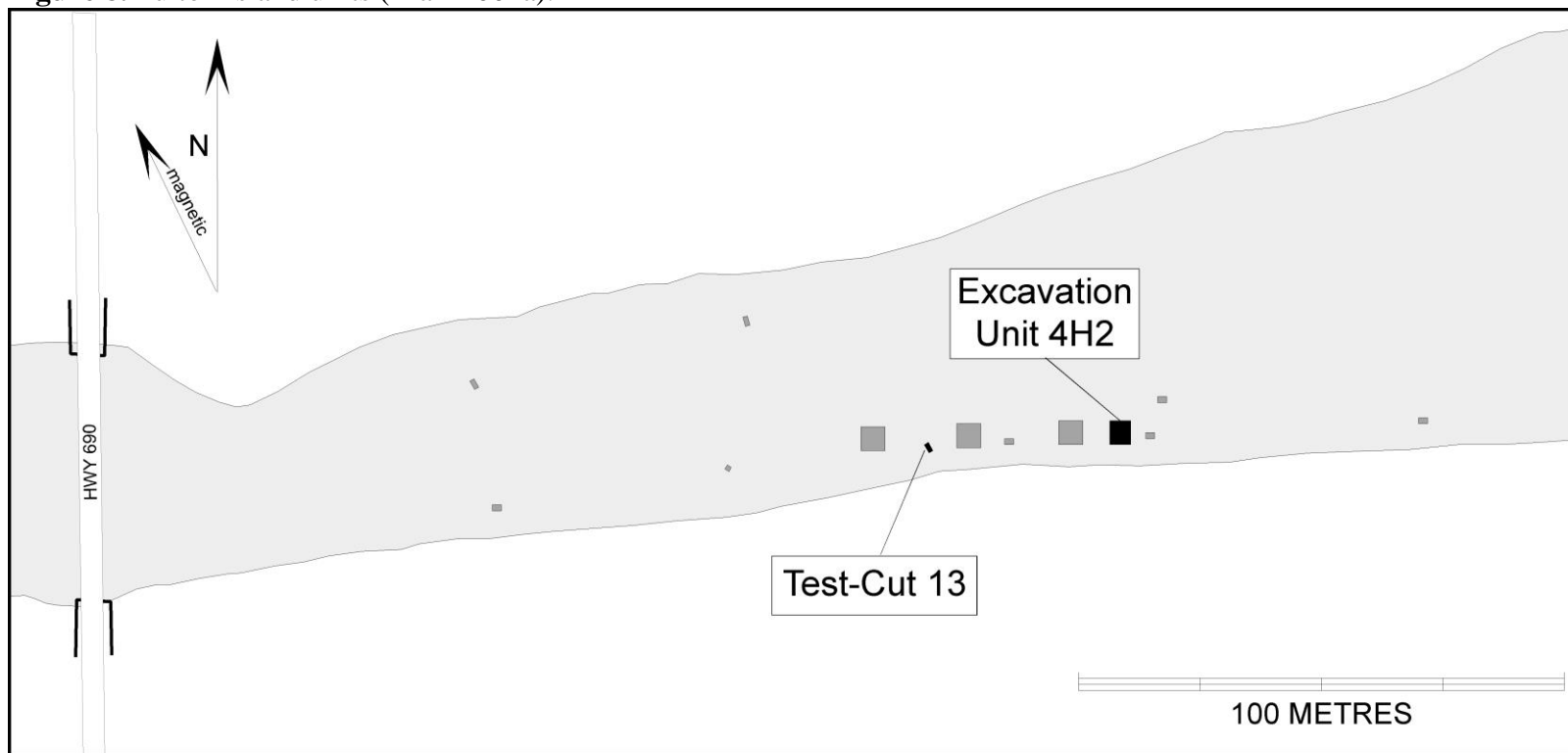


Figure 9. Image represents feature distribution at the Beaverbrook site. I isolated the circled area for analysis. These features were centered around 33, a radiocarbon dated feature to 2475±20 BP (adapted from TMHC 2012).

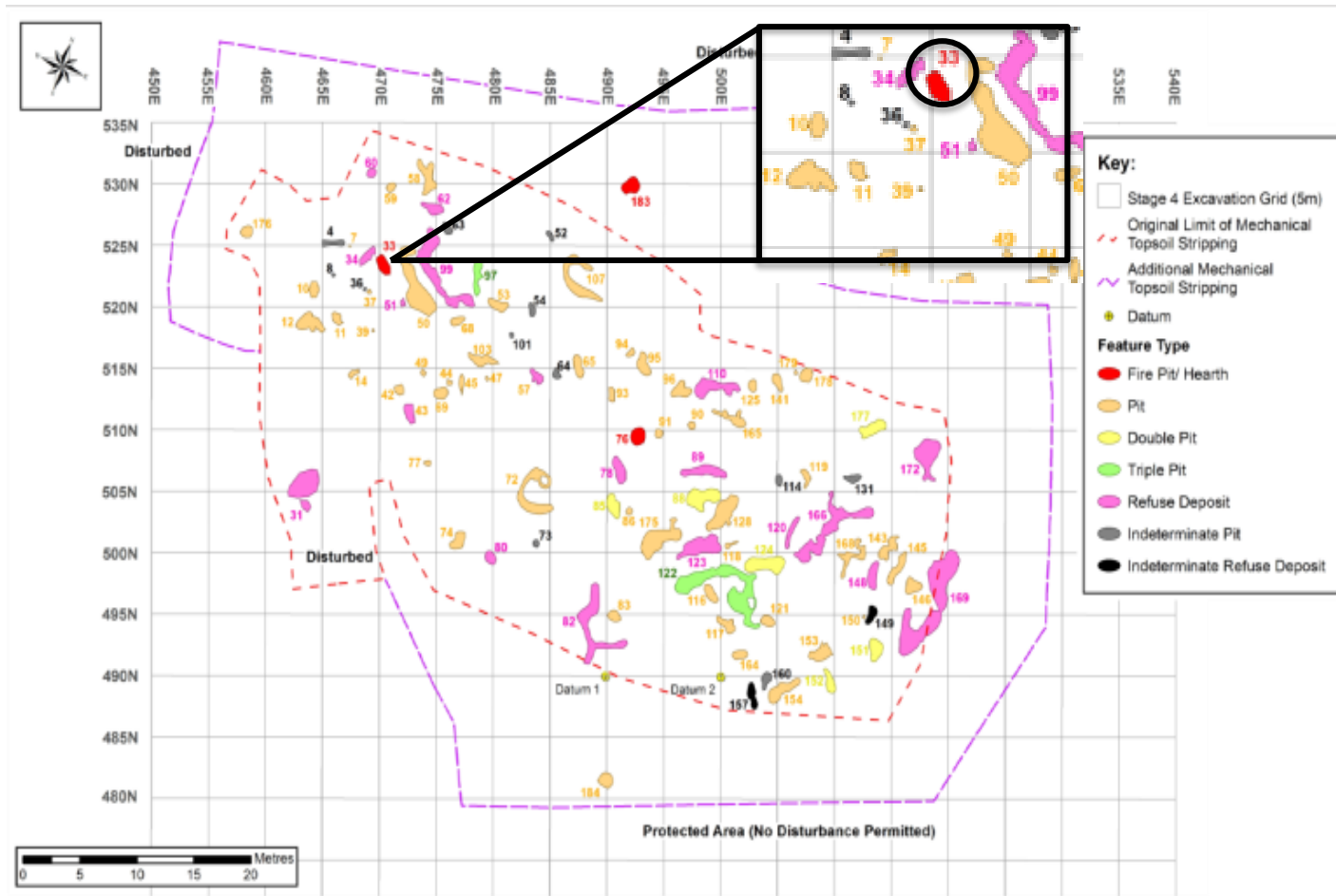


Figure 10. Example of formal tool analysis sheets; the sinuous variable was subsequently added after sheets had been printed. The bolded items are the variables, and the check box items following each variable are the potential states of the variable.

<p>Site: _____</p> <p>Artifact ID: _____</p> <p>Period: _____</p> <p>Image Code _____</p> <p>Portion:</p> <p><input type="checkbox"/> Whole</p> <p><input type="checkbox"/> Longitudinal (Working edge split)</p> <p><input type="checkbox"/> Distal (Working edge intact)</p> <p><input type="checkbox"/> Proximal</p> <p><input type="checkbox"/> Unknown</p> <p>Platform:</p> <p><input type="checkbox"/> Present</p> <p><input type="checkbox"/> Not present</p> <p>Absent Platform</p> <p><input type="checkbox"/> Removed</p> <p><input type="checkbox"/> Unknown</p> <p><input type="checkbox"/> N/A</p> <p>Platform in Relation to Working Edge:</p> <p><input type="checkbox"/> Distal</p> <p><input type="checkbox"/> Proximal</p> <p><input type="checkbox"/> Left</p> <p><input type="checkbox"/> Right</p> <p><input type="checkbox"/> Both Edges</p> <p><input type="checkbox"/> All</p> <p>Surface Modification/Thinning:</p> <p><input type="checkbox"/> Dorsal</p> <p><input type="checkbox"/> Ventral</p> <p><input type="checkbox"/> All</p> <p># of Bifacial Removals _____</p> <p>Proportion of Thinning _____</p> <p>Cross-Section (Ventral-Dorsal):</p> <p><input type="checkbox"/> Biconvex ()</p> <p><input type="checkbox"/> Plano-Convex)</p> <p><input type="checkbox"/> Concave-Convex)</p> <p>Medial Cross-Section:</p> <p><input type="checkbox"/> Biconvex ()</p> <p><input type="checkbox"/> Plano-Convex)</p> <p><input type="checkbox"/> Concave-Convex)</p> <p>Mass(g) _____</p>	<p>Steep Edge(s):</p> <p><input type="checkbox"/> None</p> <p><input type="checkbox"/> Proximal</p> <p><input type="checkbox"/> Distal</p> <p><input type="checkbox"/> End and Side</p> <p><input type="checkbox"/> All sides</p> <p><input type="checkbox"/> Cannot tell</p> <p>Perimeter of Scraper (whole/mm) _____</p> <p>Retouch Intensity:</p> <p><input type="checkbox"/> Shallow</p> <p><input type="checkbox"/> Normal</p> <p><input type="checkbox"/> Intense</p> <p>Steep Edge Appearance:</p> <p><input type="checkbox"/> Scales</p> <p><input type="checkbox"/> Hinge</p> <p><input type="checkbox"/> Sub-Parallel</p> <p><input type="checkbox"/> Parallel</p> <p><input type="checkbox"/> Nibbling</p> <p>Use:</p> <p><input type="checkbox"/> Definitely</p> <p><input type="checkbox"/> Possibly</p> <p><input type="checkbox"/> Indeterminate</p> <p>Use Wear:</p> <p><input type="checkbox"/> Battering</p> <p><input type="checkbox"/> Rounded</p> <p><input type="checkbox"/> Glossy Polish</p> <p><input type="checkbox"/> Edge Breakage</p> <p><input type="checkbox"/> Other</p> <p>Measurements (mm):</p> <p>Length (L) _____</p> <p>Width (W) _____</p> <p>Thickness (T) _____</p> <p>Flake Classes:</p> <p><input type="checkbox"/> Decortication</p> <p><input type="checkbox"/> Core Reduction</p> <p><input type="checkbox"/> Bifacial Thinning</p> <p><input type="checkbox"/> Bifacial Production</p> <p><input type="checkbox"/> Retouch</p> <p><input type="checkbox"/> Pressure</p> <p><input type="checkbox"/> Indeterminate</p>
--	--

Description: _____

Comments: _____

_____ **# of tools in assemblage**

_____ **# of formal tools in assemblage**

_____ **# of informal tools in assemblage**

Plate 1. Biface from the Beaverbrook site with some bifacial thinning (image code DSC1565 and 1566)



Plate 2. Fully thinned unstemmed biface from the Jemseg Crossing site (image code DSC0922 and DSC0923)



Plate 3. Unifacial notched flake from the Beaverbrook site (image code DSC1660 and 1662)

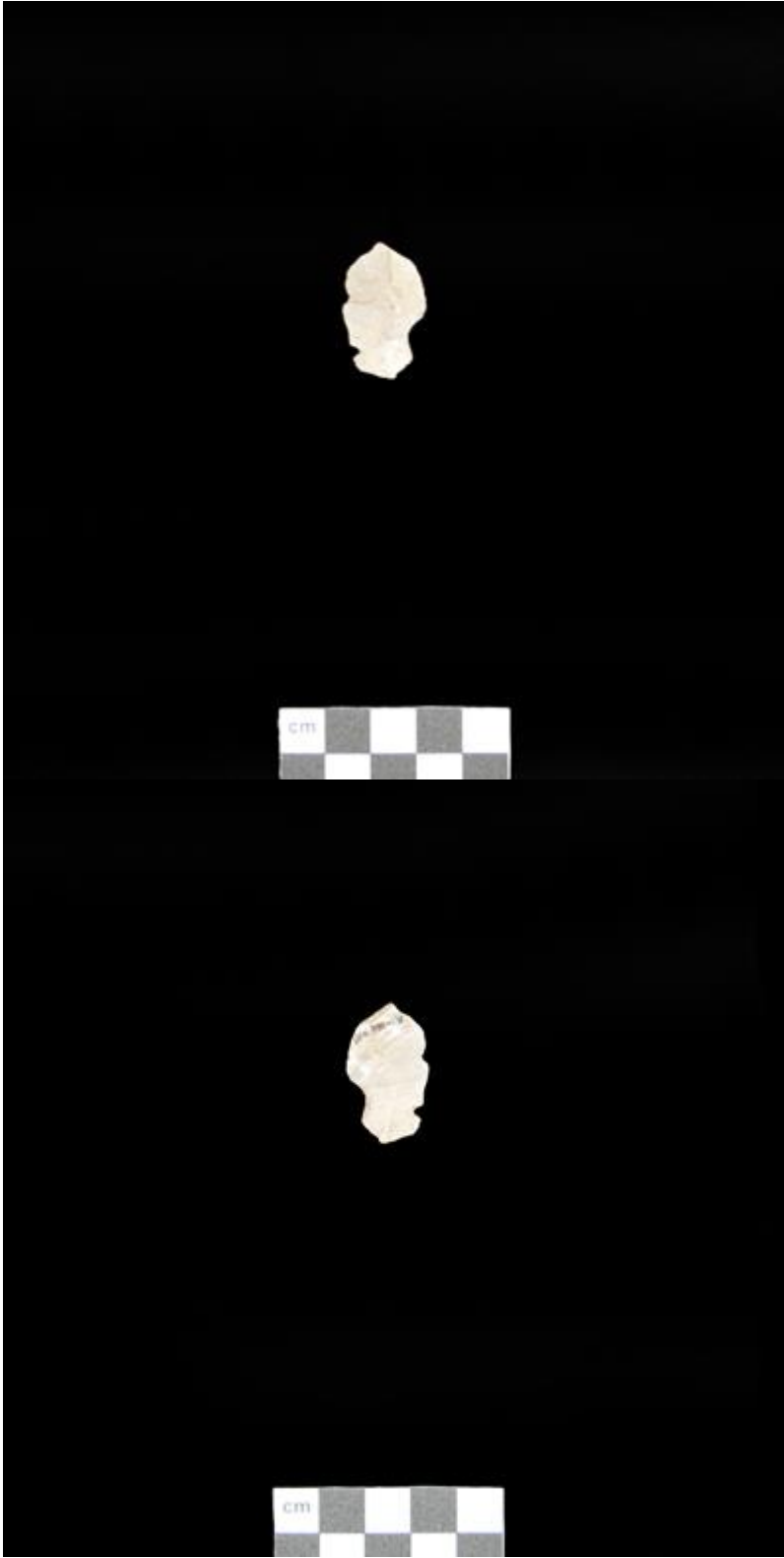


Plate 4. Complete projectile point from the Beaverbrook site (image code DSC1544)



Plate 5. Unifacial scrapers from the Beaverbrook site (image code DSC1312)



Plate 6. Conventional (above) and unconventional (below) bifacial scrapers from the Beaverbrook site (image code DSC1185 and 1169).



Plate 7. Drill from the Beaverbrook site (image code DSC1614).



Plate 8. Perforator (above) and graver (below) from the Beaverbrook site (image code DSC1630 and 1624).



Figure 11. Flake aspects (Courtesy of S. Blair).

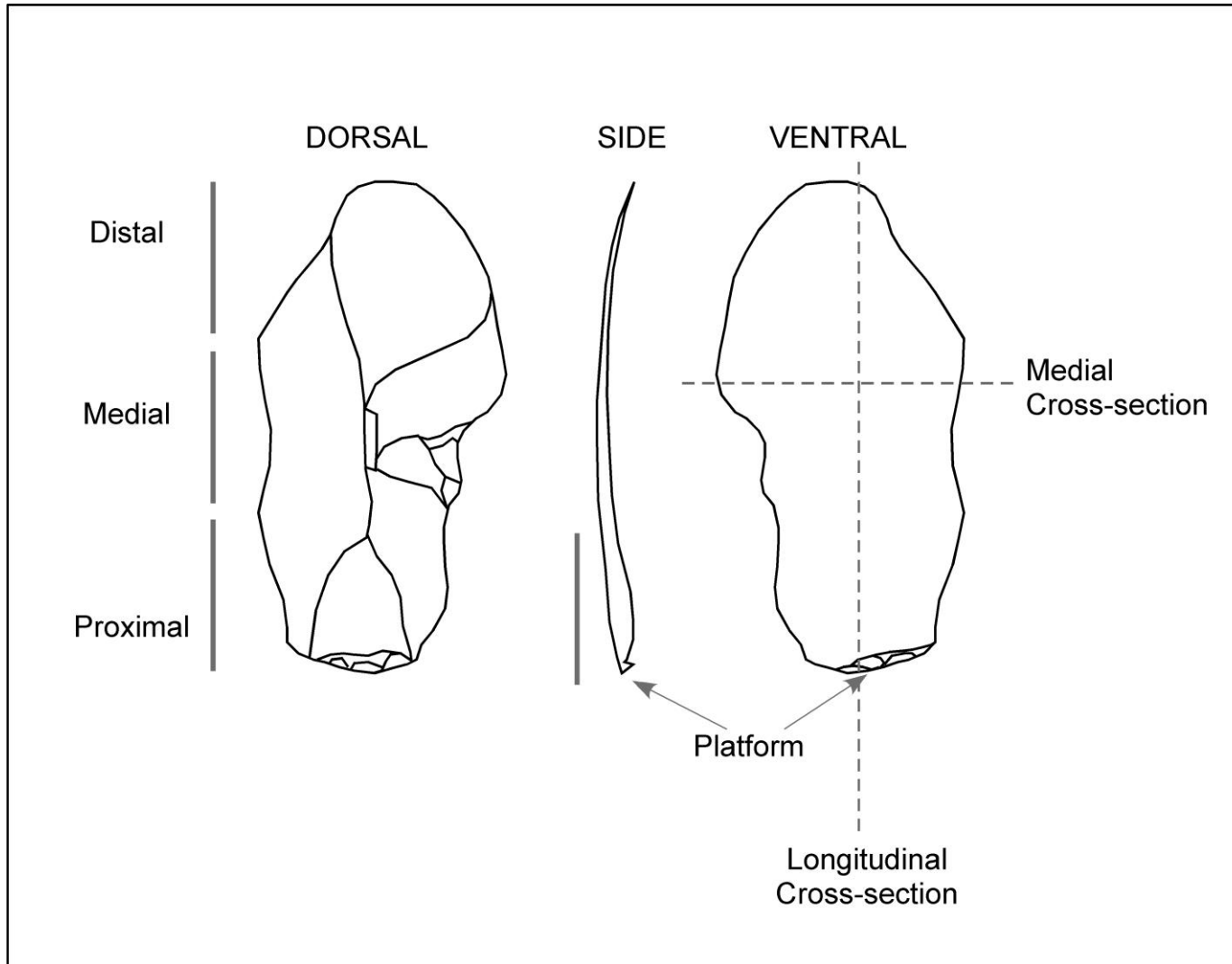
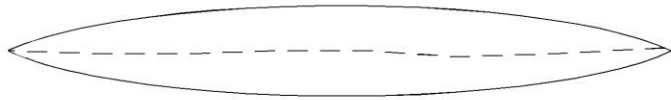
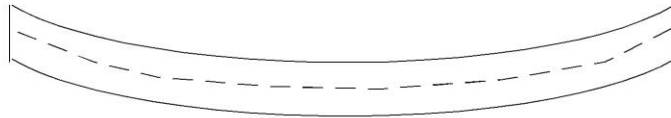


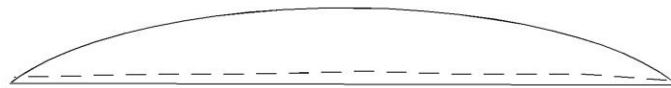
Figure 12. Cross-section shapes.



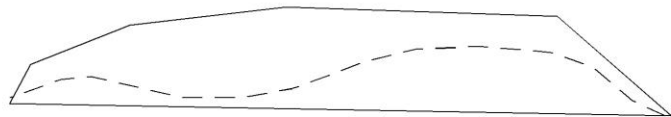
Biconvex
(Lenticular)



Concave-convex

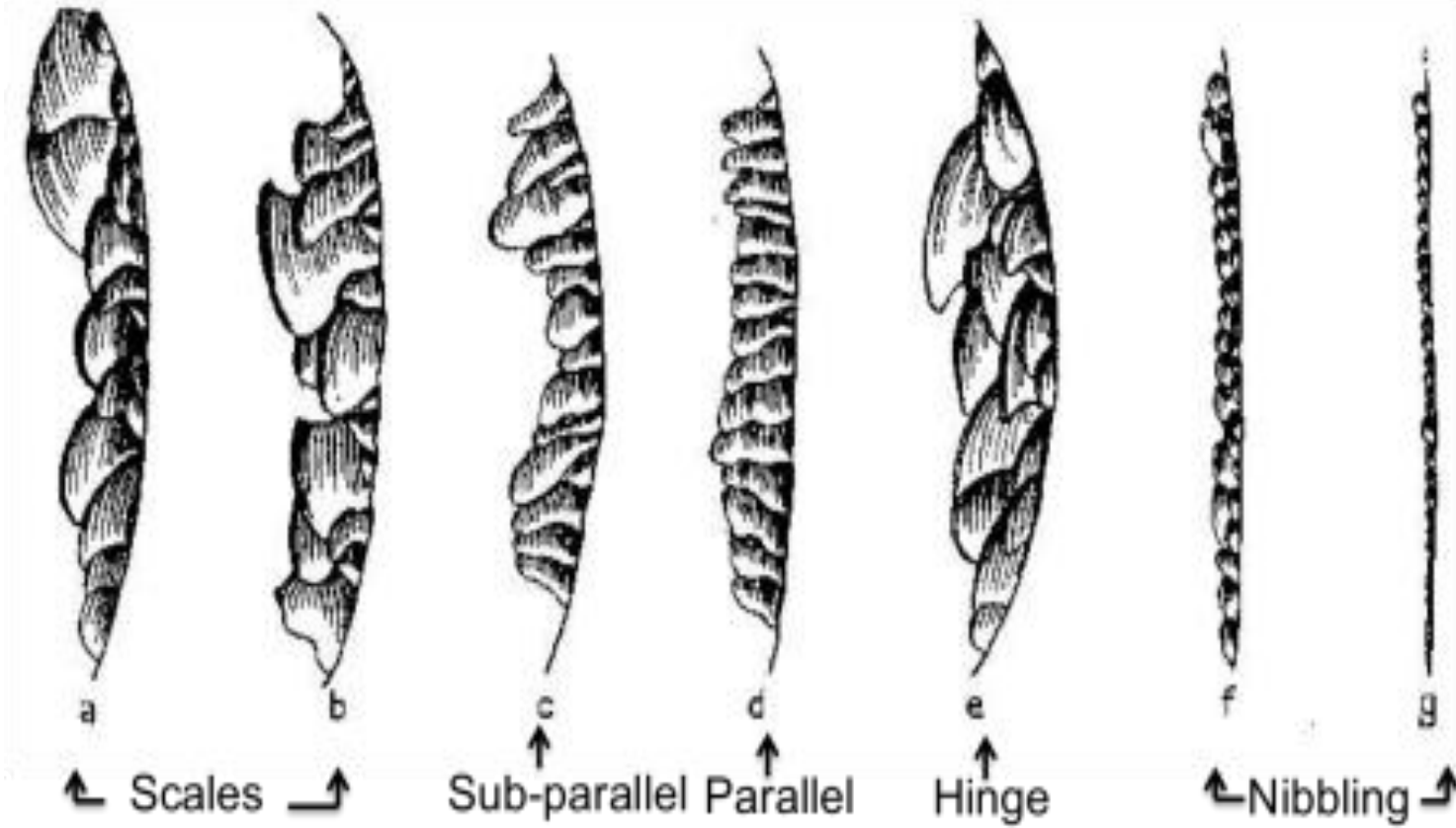


Plano-convex
with straight edge



Plano-convex with
sinuous edge

Figure 13. Steep edge appearance (adapted from Hungarian National Museum 1995).



Chapter 4: Results

Based on the methods described in the previous chapter, I was able to generate a body of data on Early Woodland lithic technology drawn from at least 49 feature samples from two widely separated regions. My main goal in conducting this particular analysis was to develop my own conclusions about lithic technology associated with the Meadowood phenomenon. In particular, I was interested in researching how Early Woodland people in the Northeast produced steep-edged and bifacial tools and why they did so in ways that were similar over broad regions, but distinctive from other periods. As a corollary, I wanted to evaluate the nature of the similarity, and determine whether actual similarity existed in dated Early Woodland assemblages, and if so, whether it came from shared approaches to technology (i.e. through the implementation of a similar *chaîne opératoire*), or whether it existed only at the outcome stage of the reduction sequence (i.e. whether Meadowood-like forms might be produced by disparate *chaînes opératoires*). At the most basic level, I needed to evaluate the concerns I had about a variety of assumptions that were made about Early Woodland trends. For this work, I had access to Early Woodland feature assemblages from the Jemseg Crossing, Fulton Island and Beaverbrook collections, from which I selected samples. In particular, I chose samples of lithic artifacts that were firmly dated to the Early Woodland period, had been associated with Meadowood or Meadowood-like attributes and were from clusters of features. This allowed for further accuracy when carbon dating was not available for every feature. To generate my thesis samples, I searched for artifacts that had been identified as **informal** and **formal tools**. By avoiding selecting for a narrow class (such as bifacial scrapers), this approach allowed me to include a range of artifacts in my samples and to explore larger trends within these sites. Within the sample of 136 lithic

artifacts that I examined from the Jemseg Crossing, Fulton Island and Beaverbrook sites, I encountered a wide range of forms, including retouched flakes, unfinished tools, unifacial scrapers, bifacially retouched flakes, bifacial scrapers, projectile points, drills, graters and a perforator. Although the artifacts were distributed among a number of feature samples, they can be grouped as New Brunswick Early Maritime Woodland tools, and Ontario Early Woodland tools. In the remainder of this chapter, I explored the pattern within the New Brunswick sample and the Ontario sample with an eye to contrasting them later in the chapter.

NEW BRUNSWICK EARLY MARITIME WOODLAND LITHICS

As discussed above, the Early Woodland artifacts that I examined from New Brunswick were drawn from a number of feature contexts from the Fulton Island and Jemseg Crossing sites. These included 32 artifacts that consisted of unstemmed bifaces (10), projectile points (2), unifacial scrapers (6), bifacial scrapers (8), and informal retouched tools (6).

Unstemmed Bifaces

Unstemmed bifaces, consisting of small flake blanks with both dorsal and ventral thinning made up a significant portion of the artifacts in the Jemseg Crossing and Fulton Island sites. These unstemmed bifaces comprised 31% (10) of the samples from New Brunswick (Figure 14). To differentiate them from bifacial scrapers, I did not include in this category any tools with any steep-edge retouch or notching of any kind. Most of them were highly thinned, with considerable lateral symmetry, that in some cases were reminiscent of Granger's (1978) quaternary blanks.

Notwithstanding the symmetry, there was considerable variation in cross-sectional asymmetry (both in longitudinal and medial cross sections); these may be indicators of function and hafting. Longitudinally, 70% (7) of the unstemmed bifaces were biconvex, 10% (1) were concave-convex and 20% (2) were plano-convex. At their medial cross section, 20% (2) of the unstemmed bifaces from New Brunswick are plano-convex, while 80% (8) of these tools were biconvex (Table 2; Table 3).

Table 2. Longitudinal Cross-Sections from the Jemseg Crossing, Fulton Island and Beaverbrook Sites.

Sites	Tool Types	Biconvex	Plano-Convex	Concave-Convex	Sinuuous Edge	Sub-total
Jemseg Crossing	Unstemmed Biface	1	2	1	0	4
	Projectile Point	0	1	0	0	1
	Unifacial Scraper	1	0	0	3	4
	Bifacial Scraper	1	4	1	2	8
Fulton Island	Unstemmed Biface	6	0	0	0	6
	Projectile Point	1	0	0	0	1
	Unifacial Scraper	0	1	0	1	2
	Bifacial Scraper	0	0	0	0	–
Beaverbrook Site	Unstemmed Biface	29	4	3	0	36
	Projectile Point	20	1	0	0	21
	Unifacial	0	4	1	13	18

	Scraper					
	Bifacial Scraper	4	2	0	6	12
	Other- Formal Tool	8	1	2	0	11
Subtotal		71	20	8	25	Grand Total - 124

Table 3. Medial Cross-Sections from the Jemseg Crossing, Fulton Island and Beaverbrook Sites.

Sites	Tool Types	Biconvex	Plano-Convex	Concave-Convex	Sub-total
Jemseg Crossing	Unstemmed Biface	3	1	0	4
	Projectile Point	1	0	0	1
	Unifacial Scraper	2	2	0	4
	Bifacial Scraper	5	3	0	8
Fulton Island	Unstemmed Biface	5	1	0	6
	Projectile Point	1	0	0	1
	Unifacial Scraper	0	2	0	2
	Bifacial Scraper	0	0	0	–
Beaverbrook Site	Unstemmed Biface	35	1	0	36
	Projectile Point	19	2	0	21
	Unifacial Scraper	0	18	0	18
	Bifacial Scraper	4	8	0	12
	Other- Formal	9	2	0	11

	Tool				
Subtotal		84	40	–	Grand Total-124

Furthermore, I calculated the average length (mm), width (mm), thickness (mm) and mass (g) of all complete lithic artifacts within these samples. The unstemmed bifaces from the New Brunswick samples had an average length of 101.67 mm, width of 37.89 mm, thickness of 10.7 mm and mass of 43.03 g. The span of the measurements in this sample of unstemmed bifaces ranged from the minimum length of 97.29 mm, width of 37.43 mm, thickness of 8.61 mm and mass of 34.99 g, while the maximum length was 106.05 mm, width was 38.34 mm, thickness was 12.79 mm and mass was 51.06 g (Table 4).

Table 4. Average Measurements of complete artifacts from the Jemseg Crossing, Fulton Island and Beaverbrook Sites. Where only one artifact was present within a category, square brackets are placed around the measurements.

Sites	Tool Types	# of Tools in Each Category	Avg. Length (mm)	Avg. Width (mm)	Avg. Thickness (mm)	Avg. Mass (g)
Jemseg Crossing	Unstemmed Biface	0	0	0	0	0
	Projectile	1	[35.02]	[23.81]	[7.02]	[5.05]

	Point					
	Unifacial Scraper	0	0	0	0	0
	Bifacial Scraper	6	40.72	28.99	10.68	13.79
Fulton Island	Unstemmed Biface	2	101.67	37.89	10.7	43.03
	Projectile Point	1	[62.91]	[23.92]	[7.69]	[10.83]
	Unifacial Scraper	0	0	0	0	0
	Bifacial Scraper	0	0	0	0	0
Beaver- brook	Unstemmed Biface	4	38.46	25.36	6.96	5.7
	Projectile Point	4	34.11	19.82	4.89	2.84
	Unifacial Scraper	7	24.12	18.94	5.54	2.68

	Bifacial Scraper	2	41.31	21.24	5.96	4.7
	Other- Formal Tool	3	32.22	20.82	5.22	2.86

The proportion of an unstemmed biface that is thinned is important to the understanding of the tool's function both stylistically and functionally. There tends to be little agreement amongst archaeologists as to what qualifies as a bifacial tool, since in some cases this can refer to a tool with partial ventral removals (as few as three or four) or the tool being fully thinned on both surfaces. For the purposes of this research I developed ratios of thinning on both surfaces separately and converted these figures to percentages to make them more easily understandable. All (100%; 10) of the unstemmed bifaces (including tips, bases, medial and longitudinal sections) from the New Brunswick assemblages were fully thinned on both the ventral and dorsal surfaces. This reinforces the notion that these are late-stage unstemmed bifaces, similar to Granger's quaternary blanks.

Projectile Points

In the sample, projectile points were represented by small bifaces that exhibited notches for hafting. These tools made up only a small portion of the overall assemblages. There were two projectile points (representing 6% of the total tools from these samples; Figure 14). It is important to note that at the Jemseg Crossing site,

Meadowood-like forms, including bifacial scrapers, side-notched “Meadowood” points and one “bunt” (a Meadowood point turned into a scraper) were found in undated contexts (Blair 2004b), they were not within my feature subsamples. Nonetheless, their presence in areas near the features and feature samples I examined suggests that they were a part of the larger technological system I am examining.

As previously mentioned, the longitudinal and medial cross-sections are key to inferring function and hafting. 50% (1) of the projectile points had a biconvex longitudinal cross-section, while 50% (1) had a plano-convex cross-section. 100% (2) of the projectile points had a biconvex medial cross-section (Table 2; Table 3).

To further the analysis of function and shape, I calculated the average length, width, thickness and mass of each complete formal tool. Projectile points from the New Brunswick samples had an average length of 48.97 mm, width of 30.85 mm, thickness of 7.36 mm and mass of 7.94 g (Table 4). As might be expected, the projectile points in the New Brunswick samples were fully thinned on both surfaces.

Unifacial Scrapers

Unifacial scrapers in these assemblages were tools manifesting thinning on either the dorsal or ventral surface (typically the dorsal) but not both, and steep-edge retouch on one or multiple edges. This steep-edge can be observed along one edge or multiple edges of a tool and can be quite delicate or deep, depending on function, use, quality of material or preservation of the tool. There were six unifacial scrapers (representing 19% of the New Brunswick lithic samples; Figure 14).

During my examination of unifacial scrapers, I noted that many exhibited a particular edge morphology that emerged during my analysis of the longitudinal cross-

section of scrapers (unifacial and bifacial), and appeared to be distinctive from those reported in other examinations of scraper morphology (Bourque 1971:76; Davis 1978; Foulkes 1981; Weedman 2002). This edge morphology is sinuous, or could be described as alternating concave–convex. 16.67% (1) of the unifacial scrapers from the New Brunswick samples had biconvex longitudinal cross-sections, 16.67% (1) had plano-convex longitudinal cross-section, while 66.67% (4) of these had sinuous edge morphologies. 33.33% (2) of these unifacial scrapers had a biconvex medial cross-section, while the other 66.67% (4) had plano-convex medial cross-sections (Table 2; Table 3).

There were no complete unifacial scrapers in the New Brunswick samples. This tends to limit the understanding of its function and use, while also being revealing when combined with use-wear analysis. It may also indicate something about the use-life of the tools, and the fact that whatever they were being used for, they were being worked to exhaustion.

Bifacial Scrapers

Bifacial scrapers, when in the production sequence, are flaked stone tools exhibiting steep-edge retouch that also have thinning on both the dorsal and ventral surfaces. Much debate has centered on when the steep retouch was established along the edge of the tools, whether the tool was meant to be a scraping tool from the beginning, or if it had a use-life before being made into a scraper, where multiple reductions were conducted (Blair 2004a; Granger 1978). In this case it is important and interesting to note that the Fulton Island site did not produce any bifacial scrapers; on the other hand, bifacial scrapers were relatively numerous in the Jemseg Crossing assemblage,

comprising 42% (8) of that sample (while comprising 25% (8) of the total New Brunswick sample; Figure 14). Six (75%) of the bifacial scrapers from this assemblage were complete, one (12.5%) had a longitudinal portion in tact and one (12.5%) was the distal portion.

In the Jemseg Crossing sample, 50% (4) of bifacial scrapers had plano-convex longitudinal cross-sections, 25% (2) had sinuous edge morphology, 12.5% (1) had biconvex and another 12.5% (1) had a concave-convex longitudinal cross-section. 62.5% (5) of Jemseg Crossing bifacial scrapers in this sample had a biconvex medial cross-section, while 37.5% (3) had a plano-convex medial cross-section (Table 2; Table 3).

The bifacial scrapers from the Jemseg Crossing assemblage have an average length of 40.72 mm, width of 28.99 mm, thickness of 10.68 mm and mass of 13.79 g. The span of these measurements in this sample of complete bifacial scrapers ranges from the minimum length of 30 mm, width of 18.1 mm, thickness of 7 mm and mass of 3.58 g, while the maximum length is 53.47 mm, width is 41.27 mm, thickness is 13.97 mm and mass is 24.89 g (Table 4).

The proportions of thinning for bifacial scrapers in the New Brunswick sample (only the Jemseg Crossing site in this case) was highly variable, with five (or 83%) of complete bifacial scrapers exhibited 100% thinning on their dorsal surface, while 17% (1) exhibited 81% thinning on their dorsal surface. Three or 50% of these complete bifacial scrapers from the Jemseg Crossing site were fully thinned (100%) on their ventral surface, while three (50%) had less than 47% thinning on their ventral.

Table 5. Proportion of Thinning on Complete Bifacial Scrapers From the Jemseg Crossing Site².

Artifact ID	Type	# of Removals	Proportion Thinned	Proportion Unthinned	Proportion Percentages
01820	Bifacial Scraper	D-7 V-5	D-30 V-17	D-7 V-19	D-81% V-47%
00827	Bifacial Scraper	D-32 V-10	D-60 V-23	D-0 V-28	D-100% V-45%
07088	Bifacial Scraper	D-18 V-5	D-66 V-19	D-0 V-41	D-100% V-32%
32250	Bifacial Scraper	35 total	S1-22 S2-25	D-0 V-0	D-100% V-100%
24396	Bifacial Scraper	28 total	D-36 V-37	D-0 V-0	D-100% V-100%
27716	Bifacial Scraper	29 total	D-17 V-15	D-0 V-0	D-100% V-100%

All (2; 100%) of the dorsal surfaces on incomplete bifacial scrapers were fully thinned, while on the other hand, all of the incomplete bifacial scrapers (2; 100%) had 50% or less of their ventral surface thinned.

Table 6. Proportion of Thinning on Broken Bifacial Scrapers from the Jemseg Crossing Site.

Artifact ID	Type	# of Removals	Proportion Thinned	Proportion Unthinned	Proportion Percentages
33589	Scraper with some bifacial	9 total	D-15 V-6	D-0 V-6	D-100% V-50%

² "D" represents the dorsal surface and "V" indicates the ventral surface. "S1" was often my best-educated prediction of what was the dorsal surface and "S2" was also based on my best estimation of what the ventral surface was. There were a series of attributes I looked for in order to indicate ventral and dorsal surfaces, sometimes I knew right away, sometimes I would have to make a judgment call, while other times I had no indication of the surface orientations. This educated assumption was often based on the feel of the longitudinal cross-section combined with the orientation of steep edge retouch on a scraping tool. While in some cases I had nothing to base a prediction off of, so "S1" and "S2" would be arbitrary in these cases. Basically, if I was not certain of a tool's orientation, I would designate sides as "S1" or "S2." There were a series of attributes I looked for in order to indicate ventral and dorsal surfaces, sometimes I knew right away, sometimes I would have to make a judgment call, while other times I had no indication of the surface orientations.

	removals				
00794	Distal portion of scraper	D-11 V-7	D-29 V-3	D-0 V-24	D-100% V-11%

Informal Retouched Tools

Informal retouched tools were those tools that did not exhibit any formal retouch, such as steep-edgedness or ventral and dorsal thinning. Only a small percentage of the New Brunswick samples were informal retouched tools at 19% (6) of the total samples (Figure 14).

Lithic Material

Although a detailed petrographic analysis of the New Brunswick sample was outside of the scope of this analysis, a superficial assignation to broad bucket categories reveals some interesting patterns. There was a wide range of material types used to manufacture stone tools in the New Brunswick assemblages. The New Brunswick samples proved to be rich in volcanic materials, comprising 43.75% (14) of the total material used to manufacture stone tools. Another 34.38% (11) of the materials were variable cherts, while 6.25% (2) of material was quartz, 6.25% (2) was quartzite and 9.38% (3) I considered to be indeterminate (possibly due to bleaching), usually ambiguous between volcanic and variegated cherts (Figure 15; Figure 16).

Formal Tool Fragmentation

Analysis of breakage patterns and fragmentation as indicated by the presence of tool portions can provide an interesting glimpse into the past of a stone tool, as, among other things, it can be used to infer aspects of tool function and hafting. To this end, I

identified a variety of portions/breakage planes. I distinguished between distal, proximal, longitudinal and medial portions. Distal portions were parts of tools that had had their proximal ends broken off, proximal portions had had their distal ends broken off, longitudinal portions were parts of tools that had had their working edge split in half (also referred to as an orthogonal fracture)– or distal to proximal breakage – and medial portions are the midsections of tools where the distal and proximal ends have both been broken off. Of the New Brunswick lithics, 50% (13) were complete, leaving 50% of the stone tools incomplete. 23.1% (6) of these artifacts had an intact distal portion, while 7.7% (2) of the lithics were incomplete longitudinally, 7.7% (2) were medial portions, 7.7% (2) were unknown portions and 3.8% (1) were proximal portions (Figure 17; Figure 18).

THE BEAVERBROOK SITE AfHh-386

As discussed above, I drew a comparable sample of Early Woodland flaked stone tools from features recorded at the Beaverbrook site, AfHh-386, in southern Ontario. These features produced 104 artifacts that consisted of unstemmed bifaces (36), projectile points (21), unifacial scrapers (18), bifacial scrapers (12), and informal retouched tools (6), as well as a number of miscellaneous formal tools (11).

Unstemmed Bifaces

Bifaces, the largest group of artifacts in this sample, are formal stone tools that have been thinned on both surfaces of the artifact in order to create a particular shape and/or thickness and often relates to the tool's function. Out of 104, 36 (or 34.6% of the Beaverbrook site sample) are unstemmed bifaces; this number includes bifacial portions

that do not indicate use as projectile points (biface tips, medial sections, and bases and longitudinal portions that do not exhibit notching; Figure 14). Critical to the interpretation of these tools are their longitudinal and medial cross-sections. 81% (29) of the unstemmed bifaces catalogued in the Beaverbrook sample had biconvex longitudinal cross-sections, 11% (4) had a plano-convex longitudinal cross-section and 8% (3) had a concave-convex longitudinal cross-section, while 97% (35) of unstemmed bifaces in this sample had biconvex medial cross-sections and 3% (1) had plano-convex medial cross-sections (Table 2; Table 3).

In order to further understand function and identify broad trends that might occur across tool type categories I took measurements of their length (mm), width (mm), thickness (mm) and mass (g); these measurements were also consistent with those I took from the Jemseg Crossing and Fulton Island sites. The sample from the Beaverbrook site had two complete unstemmed bifaces. The unstemmed bifaces in this sample had an average length of 38.46 mm, width of 25.36 mm, thickness of 6.96 mm and a mass of 5.7 g. The span of measurements in this sample of complete unstemmed bifaces ranged from the minimum length of 37.62 mm, width of 22.05 mm, thickness of 5.65 mm and mass of 4.08 g, while the maximum length was 39.29 mm, width was 28.66 mm, thickness was 8.26 mm and mass was 7.32 g (Table 4).

All complete unstemmed bifaces in the Beaverbrook sample were completely thinned on their dorsal surface, while one of four, or 25% of these complete unstemmed bifaces had less than 70% thinning on their ventral surface. The remaining three (75%) of the unstemmed bifaces from this sample were completely thinned on their ventral surface. Only two, or 6% of the incomplete unstemmed bifaces from the Beaverbrook sample were not fully thinned on their dorsal surface, while 94% (34) had fully thinned

dorsal surfaces. In contrast, all of the incomplete unstemmed bifaces had fully thinned ventral surfaces.

Projectile Points

The projectile points in the Ontario sample, like the unstemmed bifaces, were thinned on both the ventral and dorsal surfaces, but also exhibit side-notches near their bases. These are inferred to be functionally related to hafting, as knives or projectiles (spears or arrow tips). Of a total tool sample of 104, 21 (or 20.2%) were projectile points (Figure 14). As the second largest class of artifacts in this sample, projectile points make up a significant portion of the formal tool class. In the Beaverbrook sample, 95% (20) of the projectile points had a biconvex longitudinal cross-section, while 5% (1) had a plano-convex longitudinal cross-section. 90% (19) of projectile points from this sample had a biconvex medial cross-section and 10% (2) had a plano-convex medial cross-section (Table 2; Table 3).

The Beaverbrook sample had four complete projectile points. They had an average length of 34.11 mm, width of 19.82 mm, thickness of 4.89 mm and mass of 2.84 g. The span of the measurements taken from this sample of complete projectile points ranged from the minimum length of 30.6 mm, width of 17.57 mm, thickness of 3.88 mm and mass of 2.14 g, while the maximum length was 38.4 mm, width was 21.38 mm, thickness was 5.86 mm and mass was 3.44 g (Table 4). As the case with the projectile points from the New Brunswick sample, all of the complete projectile points in the Beaverbrook sample had 100% thinning on both surfaces, a pattern which also held true for incomplete projectile points in this assemblage.

Unifacial Scrapers

As described above, unlike unstemmed bifaces and projectile points, unifacial scrapers by definition have thinning on one of their two sides, usually the dorsal. In the Beaverbrook sample, 18 of 104 (17.3%) artifacts were unifacial scrapers (Figure 14). While 72% (13) of these unifacial scrapers had a sinuous longitudinal edge morphology, 22% (4) of them had a plano-convex longitudinal cross-section and 6% (1) had a concave-convex longitudinal cross-section. In contrast to the variety evident among the longitudinal cross-section, all (18) of the unifacial scrapers in the Beaverbrook sample had plano-convex medial cross-sections (Table 2; Table 3).

The sample of lithics taken from the Beaverbrook site produced seven complete unifacial scrapers. They had an average length of 24.12 mm, width of 18.94 mm, thickness of 5.54 mm and mass of 2.68 g. The measurements spanned from the minimum length of 8.11 mm, width of 12.65 mm, thickness of 3.15 mm and mass of 0.69 g, to the maximum length of 39.15 mm, width of 24.14 mm, thickness of 9.04 mm and mass of 7.7 g (Table 4).

Bifacial Scrapers

As discussed above, bifacial scrapers exhibit steep-edged retouch and thinning on both the dorsal and ventral surfaces. [12 of 104] 11.5% of lithics in the Beaverbrook sample were bifacial scrapers (Figure 14). 50% (6) of bifacial scrapers in the Beaverbrook sample had sinuous longitudinal edge morphologies, 33% (4) of bifacial scrapers had a biconvex longitudinal cross-section and 17% (2) had plano-convex longitudinal cross-sections. 67% (8) of bifacial scrapers had plano-convex medial cross-sections and 33% (4) had biconvex medial cross-sections (Table 2; Table 3).

The Beaverbrook site had two complete bifacial scrapers in this sample. These lithics had an average length of 41.31 mm, width of 21.24 mm, thickness of 5.96 mm and mass of 4.7 g. The span of the measurements taken from this sample of complete bifacial scrapers ranged from the minimum length of 34.05 mm, width of 17.11 mm, thickness of 4.31 mm and mass of 2.74 g, while the maximum length was 48.57 mm, width was 25.37 mm, thickness was 7.61 mm and mass was 6.66 g (Table 4).

The proportion of thinning among bifacial scrapers in the Beaverbrook site proved to be much more extensive than was observed in the New Brunswick samples. All (2) of the complete bifacial scrapers in the Beaverbrook sample had 100% thinning on both the dorsal and ventral surfaces. Furthermore, all of the incomplete bifacial scrapers were fully thinned on their dorsal surface, while two of 10 (or 20%) of these tools exhibited less than 75% ventral surface thinning. The remaining 80% (8) of incomplete bifacial scrapers were fully thinned on their ventral surface.

Miscellaneous Formal Tools

The Beaverbrook site had three complete artifacts that I classified as "miscellaneous formal tools," which included a drill, a graver and a perforator. Of the Beaverbrook sample, 10.6% (11) of the artifacts were miscellaneous formal tools; this included wedges, perforators, drills and graters (Figure 14). Of the miscellaneous formal tools 73% (8) had biconvex longitudinal cross-sections, 18% (2) had concave-convex longitudinal cross-sections and 9% (1) had plano-convex longitudinal cross-sections, while 82% (9) of miscellaneous formal tools had biconvex medial cross-sections and 18% (2) of these artifacts had plano-convex medial cross-sections (Table 2; Table 3).

These tools had an average length of 32.22 mm, width of 20.82 mm, thickness of 5.22 mm and mass of 2.86 g. The span of the measurements taken from this sample of complete miscellaneous formal tools ranged from the minimum length of 28.61 mm, width of 16.54 mm, thickness of 3.22 mm and mass of 1.49 g, while the maximum length was 35 mm, width was 28.82 mm, thickness was 7.33 mm and mass was 4.77 g (Table 4).

Informal Retouched Tools

Only 5.8% (6) of the Beaverbrook sample can be classified as informal retouched tools in my analysis (Figure 14). These tools did not exhibit formal traits, such as steep-edged retouch or bifacial thinning, but they did display retouch, such as a notch or barb and more often than not showed signs of wear.

Lithic Material

In marked contrast to the New Brunswick sample, the material used to manufacture stone tools at the Beaverbrook Site was quite homogenous, with 96% of artifacts being produced using the distinctive local material, Onondaga chert. I only noted two other materials in the sample, which occurred in very small proportion relative to Onondaga chert; the analysis conducted by the TMHC reinforced my conclusions that 3% of the material was Kettlepoint chert, while 1% was a volcanic of some sort (Figure 19).

Portions

20% (20) of the Ontario formal tool sample consisted of complete specimens. 34 of 98, or 35% of the sample was made up of lithic artifacts that only retained their distal portion, while 23 of 98, or 24% consisted of only the proximal portion. 10 of 98, or 10% of the stone tools were represented by medial portions of the artifacts, while three of 98 or 3% were the longitudinal portion and 1% (1) exhibited an intact proximal and medial section, meaning only the very tip was broken off. I described 1% (1) of the lithics as having an incomplete base, but an intact distal and medial section and 6% (6) of the tools were unknown portions (Figure 20). Based on these figures, it is clear that there was a considerable amount of fragmentation of formal tools throughout this assemblage.

OVERALL TOOL PATTERNING (NEW BRUNSWICK AND ONTARIO)

Within this discussion of the portions of stone tools found in the Ontario and New Brunswick samples, it is interesting to note that I observed few striking platforms within these subassemblages. The lack of platform would relate to retouch and thinning or breakage (and sometimes both). Two unstemmed bifaces, a drill and a bifacial scraper all had bifacial retouch and retained their platforms, while 13 unifacial tools retained their platforms. The Fulton Island feature samples produced one artifact that retained its platform; this stone tool was a large decortication flake exhibiting steep-edge retouch on the right lateral margin of the flake, oriented with the proximal end down (also plausibly described as a cortical spall tool). This tool seemed more expedient in nature, but I considered it to be a formal tool due to my criteria that steep-edged tools would be included in the formal tool category. Four lithics from the Jemseg Crossing feature sample retained their platforms. One of these was a bifacial tool that I classed as a

bifacial scraper, while the other three were all classed as unifacial scrapers. The Ontario feature samples had 12 artifacts with platforms still evident on them. Three of these were bifacial tools (2 unstemmed bifaces and a drill), while the remainder (all 9) were unifacial tools (7 of these being unifacial scrapers, one a graver and one a perforator).

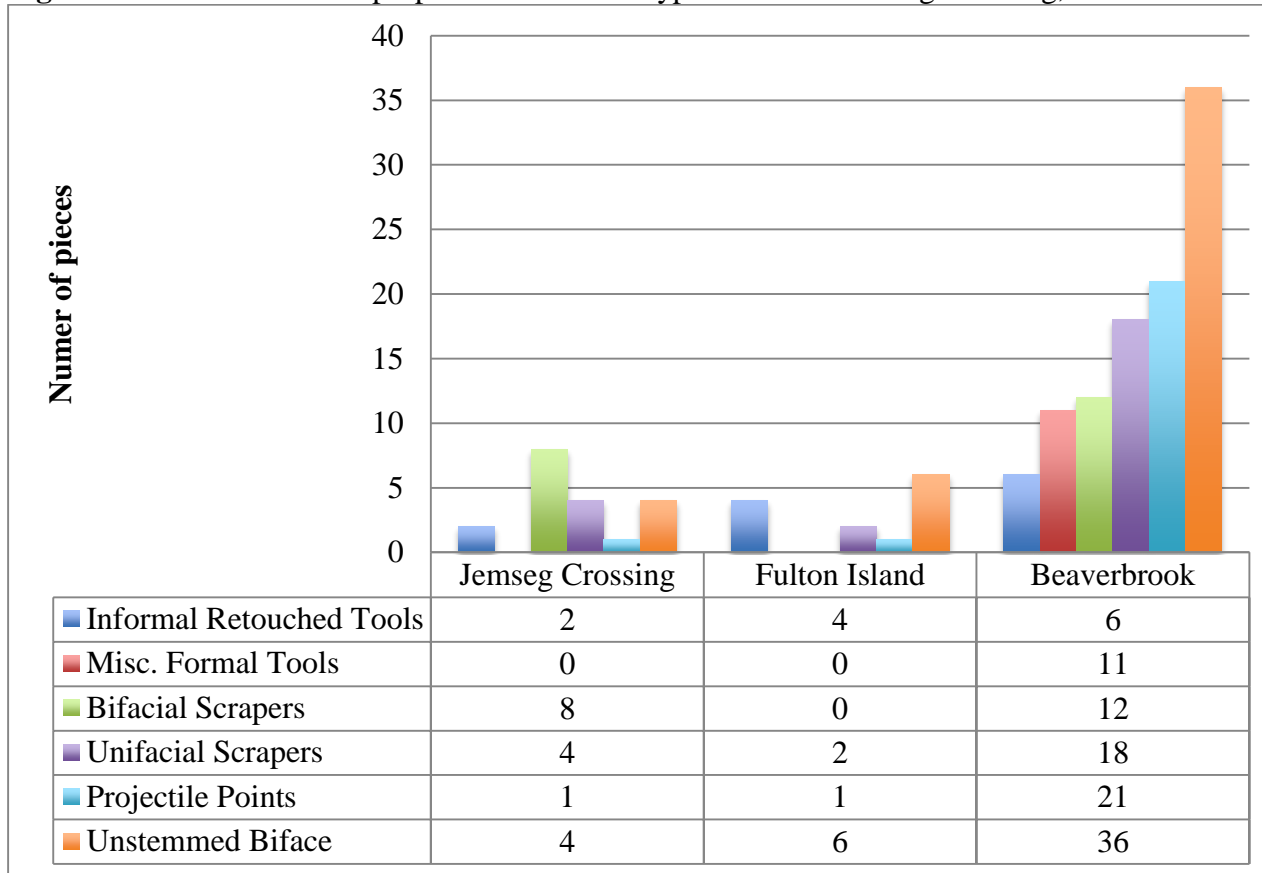
Artifact Function

For the purposes of this research, I restricted my analysis of use to macroscopic, low-resolution (10x) methods, with the goal of identifying any highly visible presence of use-wear, but not its origins, or asserting its absence, as I discuss above. I was mindful of the challenges that fine retouch, platform preparation and post-depositional damage might pose, and as a consequence, focused on evidence of abrasion, polish and crushing on tool edges. With the limitations of this approach in mind, it is clear that more detailed, function-specific and high-resolution use-wear studies are warranted for these assemblages. Variations in use evident on stone tools in the Ontario and New Brunswick samples were significant, particularly in relation to differences between the Ontario and New Brunswick samples. For example, one of three, or 33% of the unstemmed bifaces from the Fulton Island feature sample, and seven of eight, or 88% of the Beaverbrook feature sample had some evidence of use visible using the low-powered microscopy available to me. In particular, I noted patterns of use on biface tips. I particularly noted this as I considered it to be an indicator of function. 75% (3) of biface tips from the Jemseg Crossing site showed evidence of use, while the Fulton Island site had no use on biface tips. The Beaverbrook site told a different story as 100% (16) of its biface tips showed signs of use. Across the board, scrapers showed evidence of use, with 67% (8)

of scrapers in the Jemseg Crossing site indicating use, 50% (1) at Fulton Island and 60% (18) at the Beaverbrook site (Figure 21).

Chapter 4 Images

Figure 14. The number and proportion of artifact types from the Jemseg Crossing, Fulton Island and Beaverbrook sites.



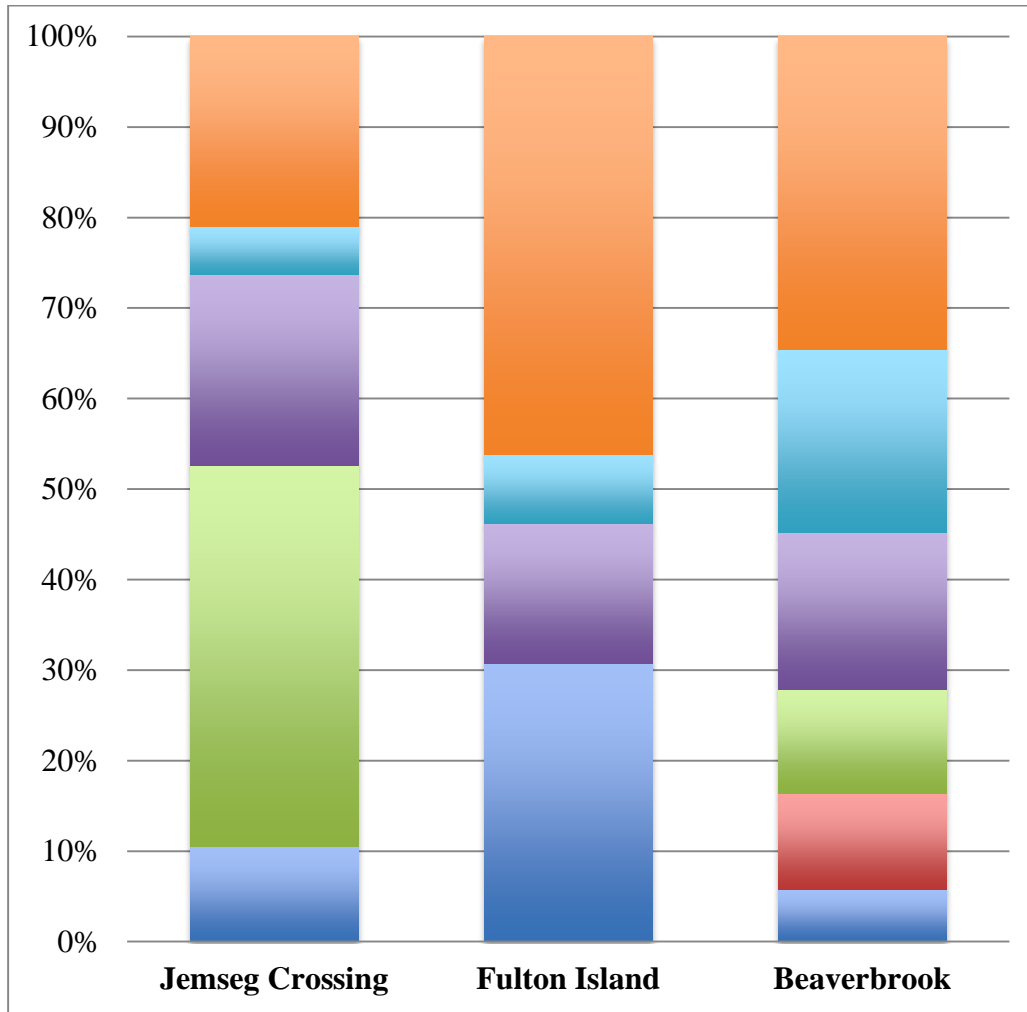


Figure 15. Lithic material percentages from the Jemseg Crossing site.

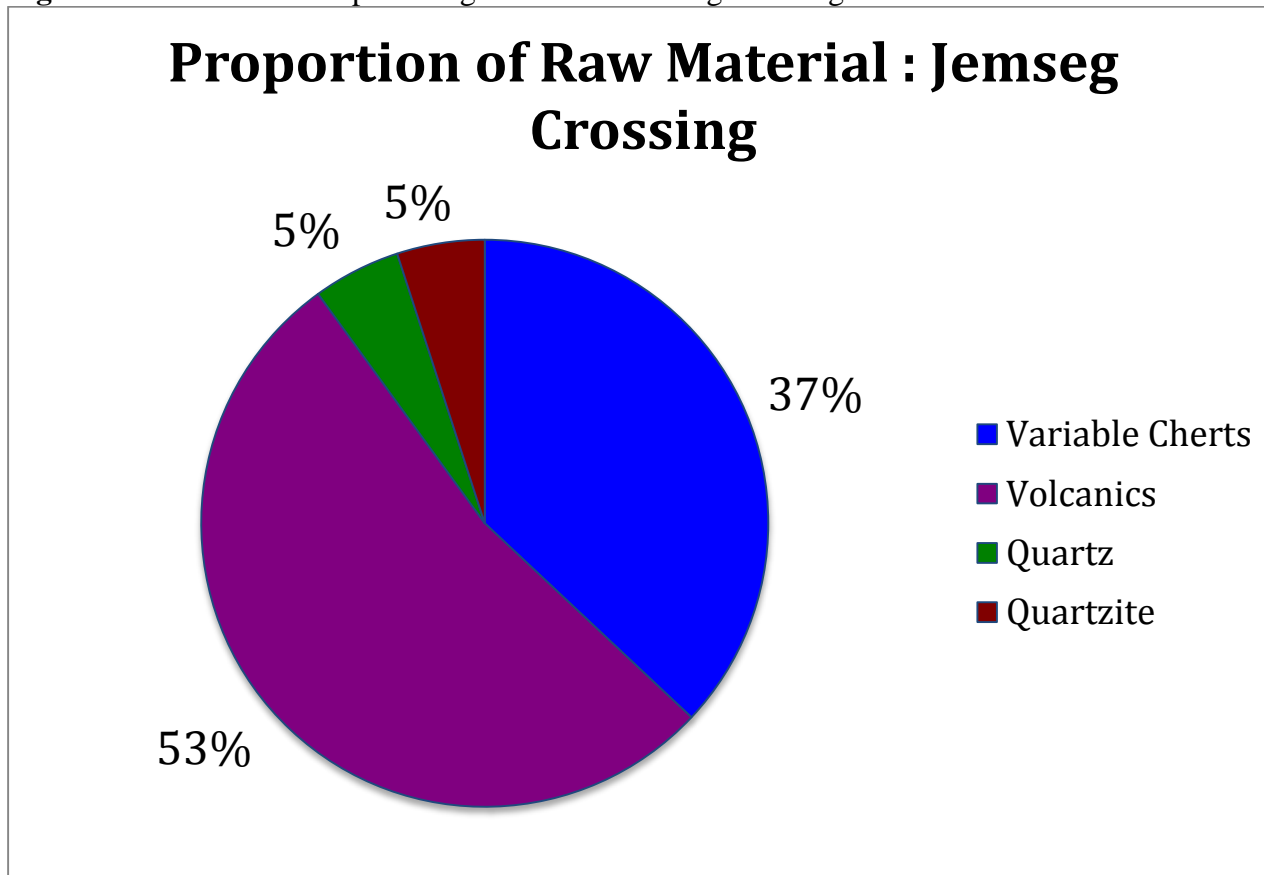


Figure 16. Lithic material percentages from the Fulton Island site.

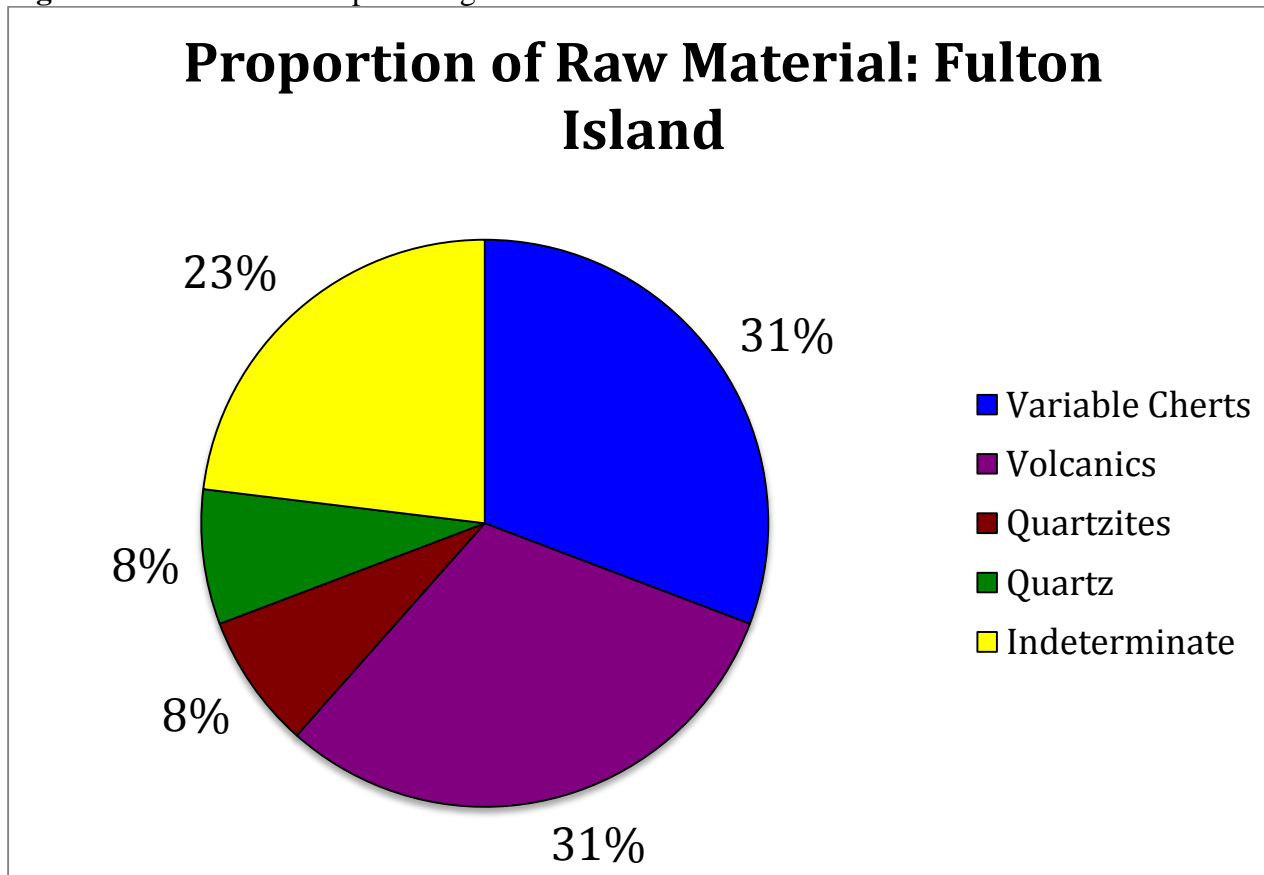


Figure 17. Stone tool portions from the Jemseg Crossing site.

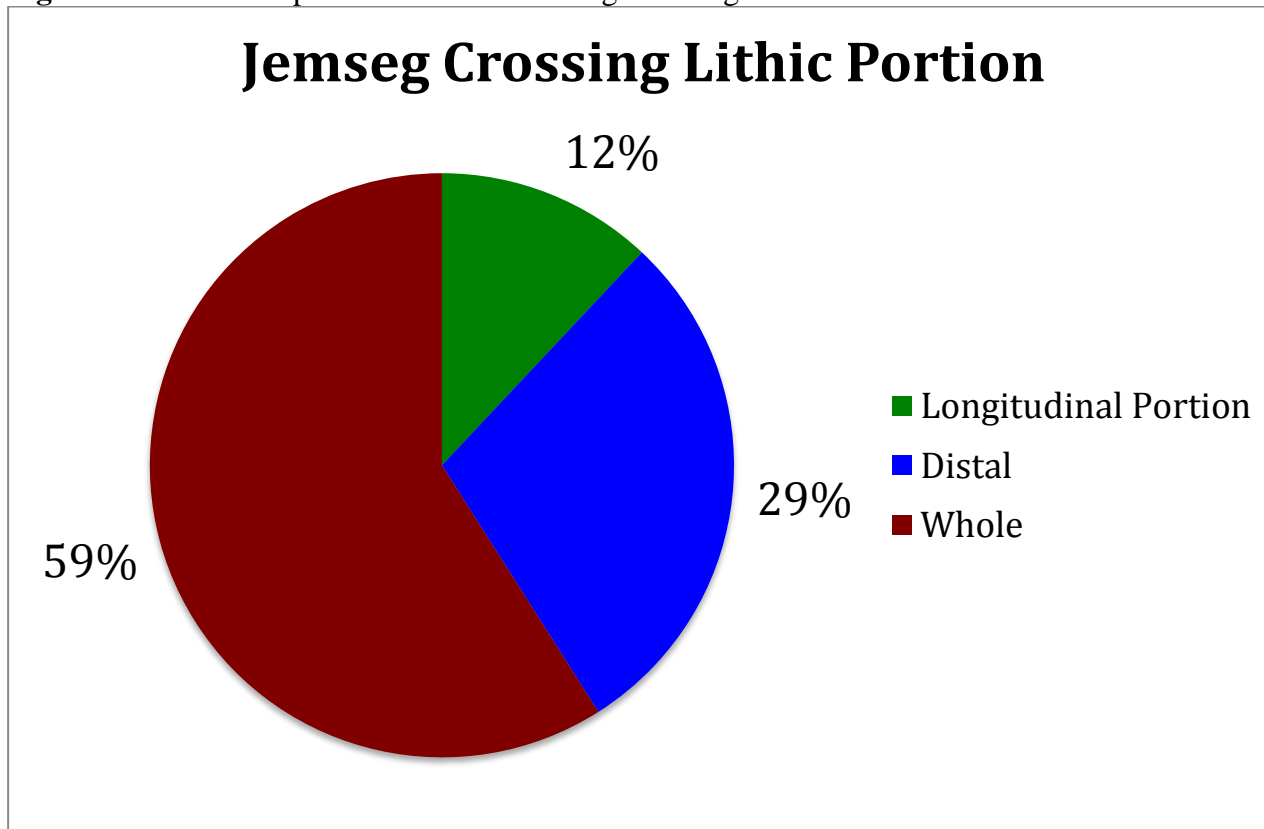


Figure 18. Stone tool portions from the Fulton Island site.

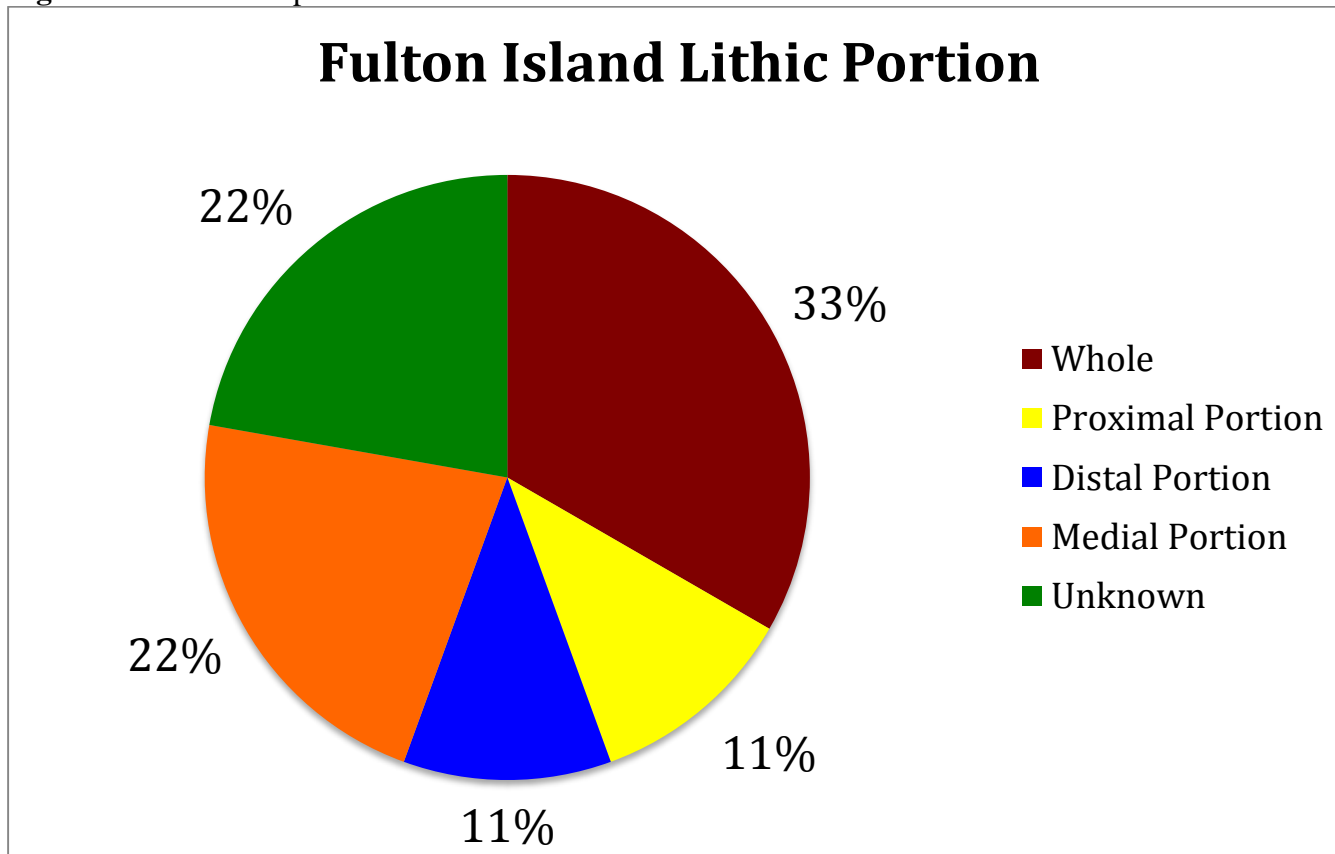


Figure 19. Lithic material percentages from the Beaverbrook site.

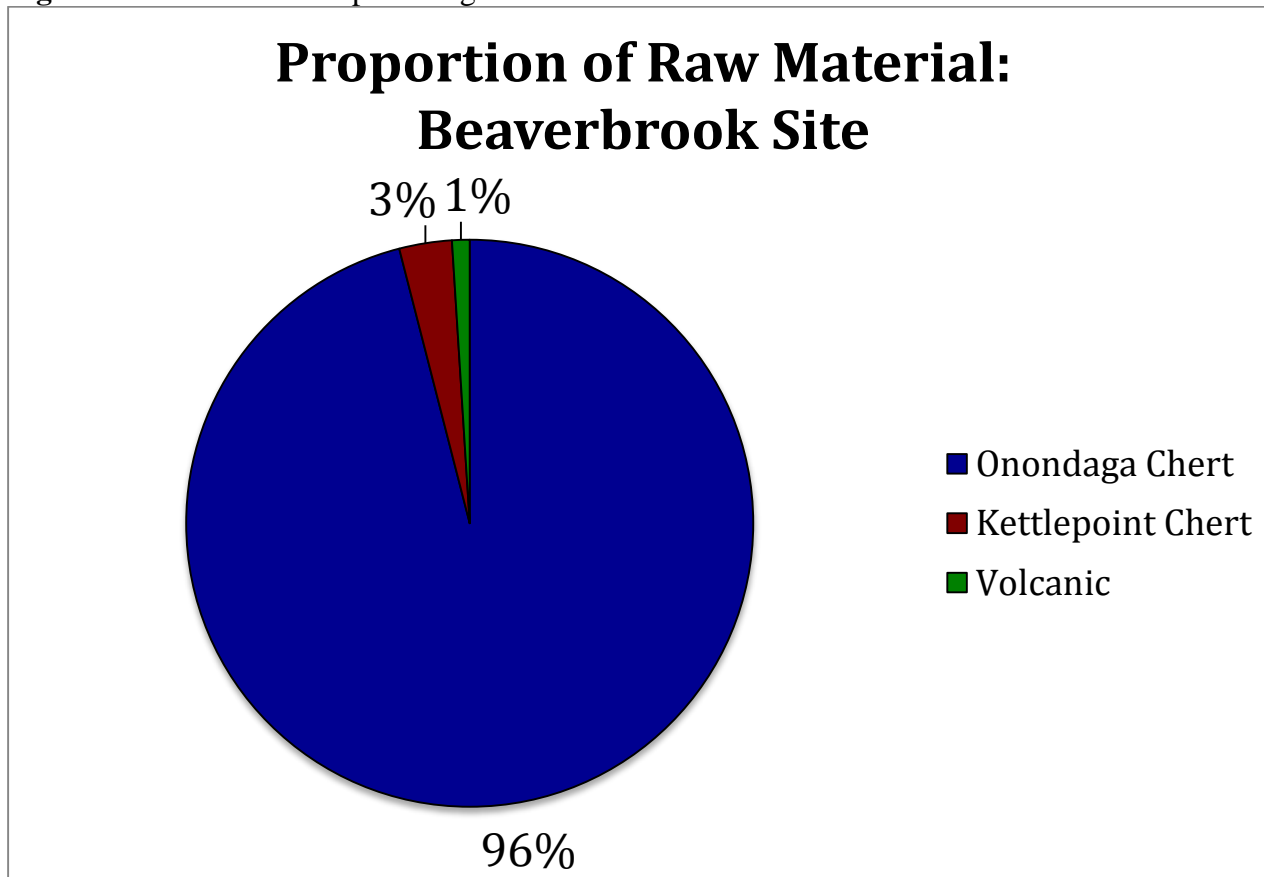


Figure 20. Stone tool portions from the Beaverbrook site.

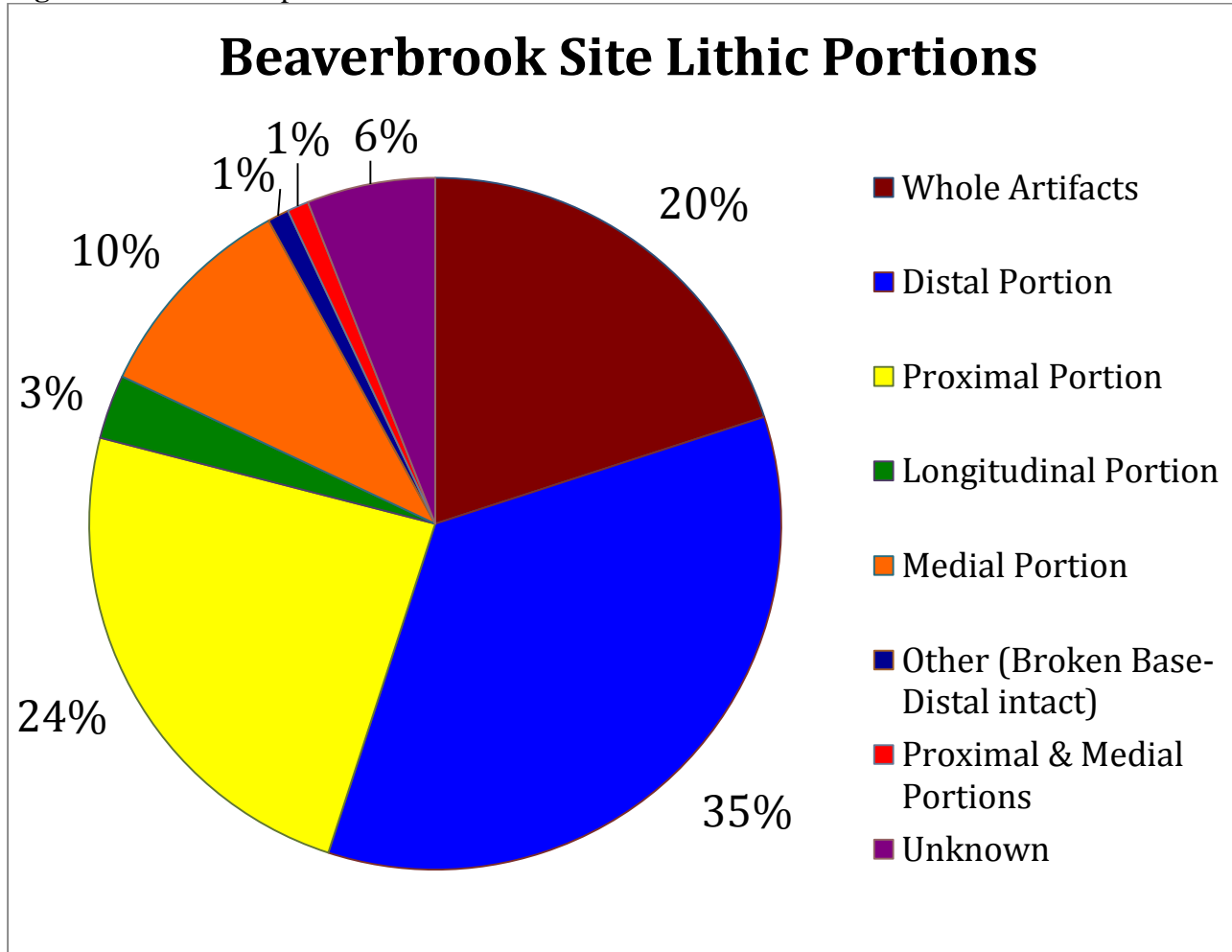
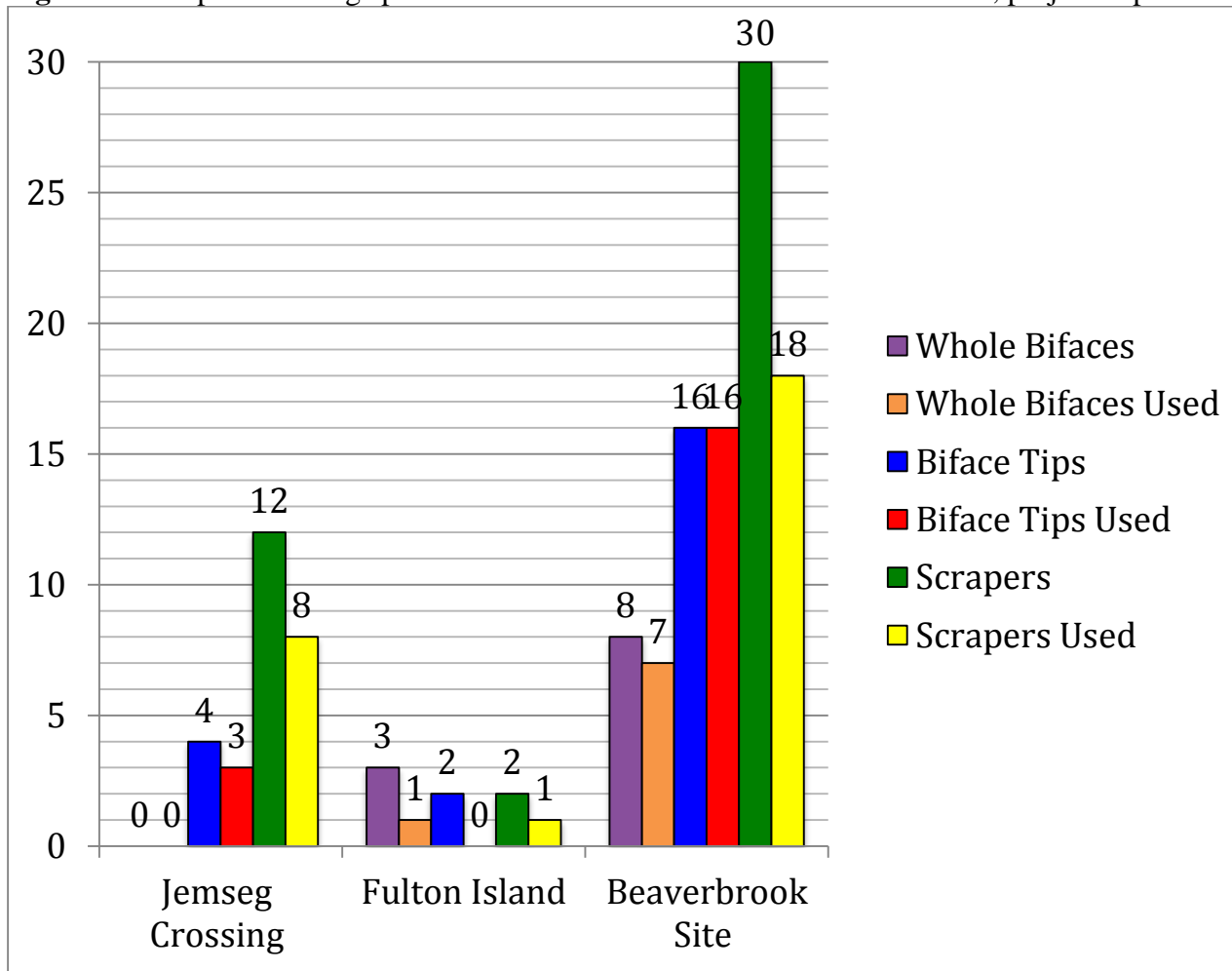


Figure 21. Graph indicating "presence of use wear" on stone tools. In this case, projectile points are added into the biface category.



Chapter 5: Analysis

Based on an extensive literature review, and the data I collected using methods I developed to explore samples from two different regions of northeastern North America, I have been able to identify some patterns related to lithic production and use, and draw some inferences about similarities and differences between these regions. Here I explored the implications of this analysis, and critically evaluated current archaeological notions about the meaning of convergence of lithic tool forms in the Early Woodland that are manifested in broadly distributed, similar end products. Some researchers have recently situated Early Woodland lithic end products (in particular, tools such as quaternary blanks, side-notched points, and bifacial scrapers) as a part of a broader shared understanding that developed in the Northeast ca. 2500 BP, that involves ideas of value, prestige, form and material (Taché 2008, 2011a, 2011b). I argued that much of the analysis on the Meadowood and the Early Woodland has generally privileged one part of the Northeast (the Great Lakes Basin), and that a fully integrated study of similarities and differences in the examination of lithic tools will further this analysis.

In my discussion below, I contrast particular aspects of Early Woodland tool production in New Brunswick and Ontario, while exploring similarities in style and form. To this end, I considered outcomes that suggest "style," manifested in particular tool forms (morphology), as being replicated in local ways, over a broad area. These similar looking end products were fundamentally superficial, and I argue that they have been the results of differing production processes, or *chaînes opératoires* (Edmonds 1990; Sellet 1993; Shott 2003). Finally, I suggest that these regional patterns must be understood before archaeologists can properly understand variability and patterning in the macroregion. This in turn allowed me to explore explanatory models that can

determine the source of widespread similarities as was characteristic of the Early Woodland in the Northeast. In the discussion below, I focused on breakage and use at a tool level, as well as at a feature sample level, explore patterning in material exploitation, and consider tool typology and morphology at a broad level.

LITHIC MATERIALS: DIFFERENCES AND SIMILARITIES

Many researchers have suggested that Onondaga chert was a key attribute in Meadowood tools (Granger 1978), and a factor that contributed to the value of these objects as prestige goods (Taché 2011b). Indeed, Onondaga chert dominated the Ontario sample (Figure 19). However, this pattern did not carry through to samples from the Maritime Peninsula. In fact, there was no consistent pattern of raw material use in any of the New Brunswick feature samples that I examined, besides the use of siliceous materials (Figure 15; Figure 16). In fact, there was no single material class, either from local or non-local (or "exotic") sources that dominated any of these assemblages. In broad terms, however, raw materials from volcanic sources dominated the samples from the Maritime Peninsula, followed by quantities of variegated chert.

This result challenges suppositions that there was a widespread use of Onondaga chert throughout the entire Northeast during the Early Woodland. Siliceous materials capable of creating conchoidal fractures were the only consistent attribute of the material found within the samples that I had examined. While some have suggested that there may have been evidence of the trade of Onondaga chert to the Maritime Peninsula (McEachen 1996), this view was not supported by the Early Maritime Woodland samples I examined.

Taché understands the Meadowood phenomenon to be an interaction sphere, which spanned a vast "region," that of northeastern North America (Taché 2011a:161). She saw the Meadowood *interaction sphere* as an expansion and an increase in complexity of Early Woodland mortuary ceremonialism; a key piece of evidence for the interconnections over this broad region has been the presumption of widespread trade of Onondaga chert unstemmed bifaces throughout the Northeast (Taché 2011a:iii). Further, she described unstemmed cache bifaces as being almost exclusively manufactured from easily recognizable Onondaga chert (Taché 2011a:7). Sources of this material are located in western New York State and the north shore of Lake Erie in Ontario (Taché 2011a:7). She stated that the production of these lithics were highly standardized, also being utilized as templates for other tools like side-notched projectile points or bifacial triangular scrapers (Taché 2011a:7). These tools and the homogeneity that Taché notes throughout the Northeast, which she related to widespread trade, was the reason why local production systems were not taken into account (Taché 2011a:7). She only acknowledges these differences as distinct regional networks, but not that they provide unique material culture, seeing some Meadowood groups as being "strategically located" as middlemen between the Atlantic and Midwest (Taché 2011a:iii). The Ontario sample supports the view that Onondaga chert was a key material in the Early Woodland within this region. However, this pattern did not hold within the samples from Early Woodland features from New Brunswick.

TOOL TYPES: DIFFERENCES AND SIMILARITIES

As discussed above, in the broader Northeast, the interpretation of Meadowood has necessarily relied on broad comparisons between shared classes of material culture,

and in particular, on comparisons between particular key tool forms that have been thought to reflect some shared understanding of form, approach to technology, or concept of value. These forms include bifacial products, including unstemmed bifaces (or cache blades), projectile points, and bifacial scrapers. As I have indicated elsewhere, the identification of these tools has generally proceeded on morphological grounds, and at the scale of frequency of types within sites and regions. In the section below, I compared these results with a technological analysis, with a consideration of variability within classes and between regions. As a means of breaking down the essentialist classification that has generally structured the analysis of tool types and forms, I considered what I have called the Multidimensional Hyperspace (see Figure 5). In so doing, I have attempted to conceptualize key attributes of Early Woodland tools as continua, rather than discrete types. The variables that lend themselves best to this analysis are bifacialness, which I measured as the number of removals on each face and overall thinness of the tool, and formality, which I evaluated on the terms of longitudinal cross-section, and symmetry. Positioning on continua could be more clearly expressed through the analysis below, and I will attempt to link particular categories and feature assemblages to the Multidimensional Hyperspace.

Unstemmed Bifaces

Unstemmed and unnotched bifaces, as indicated above, were stone tools exhibiting dorsal and ventral thinning without evidence of notches or steep-edge retouch. Tools in this class included biface tips, as well as other fragmentary pieces that lacked evidence of steep-edge modification or notches. These tools are significant in the analysis and interpretation of Meadowood in the Northeast, due both to their common

occurrence in Early Woodland, Meadowood-affiliated assemblages, and the interpretation that they represent a technological foundation for Meadowood, as indicated by Granger's analysis of Meadowood flaked stone tools.

This tool form, as broadly defined, was common in both the New Brunswick and Ontario assemblages, but was unevenly distributed between sites and within feature subassemblages (Feature 24). Unstemmed bifaces comprise the largest portions of the Fulton Island (46% or six) and Beaverbrook sites (34.6% or 36). This is in contrast to the Jemseg Crossing sample where unstemmed bifaces were the second largest category, making up 21% (4) of the total sample (Figure 14).

Interestingly, of the four unstemmed bifaces found in the Jemseg Crossing feature subassemblages there was a high proportion of bifaces with longitudinally plano-convex cross-sections. This places these unstemmed bifaces farther down on the bifacial to unifacial scale, as well as closer to the informal side of the spectrum (Figure 5). This was not what I would expect with highly homogenous unstemmed bifaces, as they would likely all be uniformly biconvex longitudinally, only 25% (1) of the unstemmed bifaces from this assemblage turned out to be biconvex on the longitudinal axis. There was more homogeneity along the medial cross-section however, where 75% of unstemmed bifaces were biconvex at the longitudinal cross-section. This heterogeneity was not encountered in Fulton Island feature subassemblages; in this subassemblage all unstemmed bifaces had biconvex longitudinal cross-sections and 83% of unstemmed bifaces had biconvex medial cross-sections. This appears to suggest that the Fulton Island subassemblage was more consistent with the morphological expectations of Meadowood (higher on the bifacial end of the spectrum and farther to the left on the formal to informal scale; Figure 5; as per Granger 1978; Taché 2008, 2011a, 2011b),

while there was diversity and divergence from the expectation in the Jemseg Crossing feature sample. Further, the homogeneity observed in the Fulton Island subsamples are more consistent with the Beaverbrook subassemblage where 81% of the unstemmed bifaces had biconvex longitudinal cross-sections and 97% of unstemmed bifaces had a biconvex medial cross-section. This homogeneity is consistent with what has been described by others who have discussed the Meadowood phenomenon (Granger 1978 and Taché 2008, 2011a, 2011b; Table 2; Table 3).

Notwithstanding this broad similarity in form, the New Brunswick and Ontario samples differ in other attributes. For example, there is a clear size difference between the complete unstemmed bifaces at the Fulton Island sample and the Beaverbrook sample (Table 4). The Fulton Island complete unstemmed bifaces are nearly twice the size of the complete unstemmed bifaces found within the Beaverbrook site. Further, although there was a shared attention to symmetry, the degree of finishing and thinning present in the New Brunswick sample was different from that observed in the Ontario sample. Although I found it difficult to quantify, in general, the unstemmed bifaces in the Fulton Island assemblage were less refined (thinned and retouched) and less completely thinned (see Table 4), while maintaining the similar unstemmed biface shape. The unstemmed bifaces seen in the Beaverbrook site were streamlined, light and homogenous in shape and size. In both cases, raw material constraints may have had a significant influence on their manufacture and use.

As with the cross-sections and average unstemmed biface sizes, the degree of thinning was another significant attribute in Granger's (1978) trajectory. The proportion of an unstemmed biface that is thinned is important to the understanding of the tool's function both stylistically and functionally, and, given that the stage of reduction of an

unstemmed biface was key to placing tools within Granger's 1978 trajectory, it was particularly important in this analysis. In this way, degree of thinning is important to determining similarities and differences in tools over the whole of the Northeast (Taché 2008). As I have discussed above, there tends to be little agreement amongst archaeologists as to what qualifies as a bifacial tool, since in some cases this can refer to one ventral removal or the tool being fully thinned on both surfaces. For the purposes of this research I developed ratios of thinning on both surfaces individually and turned these figures into percentages to make them more accessible. Based on these criteria, every unstemmed biface that I examined in the New Brunswick subsamples was fully (100%) thinned. This suggests that the diversity of form in the New Brunswick sample is underpinned by a uniform approach to thinning (relating to the formal end of the multidimensional hyperspace; Figure 5). On the other hand, a different pattern is evident in the Ontario sample. All (4) complete unstemmed bifaces in the Beaverbrook sample had 100% thinning on their dorsal surface. Of these complete unstemmed bifaces 25% (1) had less than 70% thinning on their ventral surface. The remaining 75% (3) of unstemmed bifaces from this sample had 100% thinning on their ventral surface. "S1" and "S2" refer to "side 1" and "side 2." I only used this terminology for unstemmed bifaces that had indistinguishable dorsal and ventral surfaces. "S1" was always my best-educated prediction of what was the dorsal surface and "S2" was also based on my best estimation of what the ventral surface was. Below is a table of all complete unstemmed bifaces from the Beaverbrook subsamples.

Table 7. Proportion of Thinning on Complete Unstemmed Bifaces from the Beaverbrook Site.

Artifact ID	Type	# of Removals	Proportion Thinned	Proportion Unthinned	Proportion Percentages
1652	Biface	D-15 V-13	D-36 V-36	D-0 V-0	D-100% V-100%
1654	Biface	D-8 V-8	D-12 V-12	D-0 V-0	D-100% V-100%
1653	Biface	D-16 V-10	D-27 V-18	D-0 V-9	D-100% V-67%
1667	Biface	S1:29 S2:13	S1:19 S2:19	S1:0 S2:0	S1:100% S2:100%

Of the unstemmed bifaces from the Beaverbrook sample, 6% (2) were not fully thinned on their dorsal surface, while 94% (34) of incomplete unstemmed bifaces had fully thinned dorsal surfaces. In contrast, 100% (36) of incomplete unstemmed bifaces had fully thinned ventral surfaces. These numbers still signify considerable homogeneity in thinning throughout the Beaverbrook site with 75% (3) of complete unstemmed bifaces being fully thinned on both surfaces and 94% (34) of incomplete unstemmed bifaces fully thinned on both surfaces. Below is a table of all incomplete unstemmed bifaces from the Beaverbrook site with proportions of thinning.

Table 8. Proportion of Thinning on Broken Unstemmed Bifaces from the Beaverbrook Site.

Artifact ID	Type	# of Removals	Proportion Thinned	Proportion Unthinned	Proportion Percentages
1590	Biface tip	S1:5 S2:7	S1:15 S2:15	0	S1: 100% S2: 100%
1554	Biface tip	S1:8 S2:8	S1:12 S2:10	0	S1: 100% S2: 100%
1576	Biface tip	D-16 V-11	D-4 V-5	0	D-100% V-100%
1575	Biface tip	S1:8 S2:6	S1:8 S2:5	0	S1: 100% S2: 100%
1577	Biface tip	S1:11	S1:13	0	S1: 100%

		S2:10	S2:8		S2: 100%
1587	Biface tip	D-9 V-7	D-7 V-5	0	D-100% V-100%
1591	Biface tip	D-10 V-11	D-22 V-22	0	D-100% V-100%
1594	Biface tip	S1:9 S2:9	S1:25 S2:25	0	S1: 100% S2: 100%
1642	Biface tip	D-8 V-9	D-9 V-9	0	D-100% V-100%
1651	Biface tip	S1:6 S2:5	S1:3 S2:3	0	S1: 100% S2: 100%
2041	Biface tip	S1:9 S2:5	S1:2 S2:2	0	S1: 100% S2: 100%
2065	Biface tip	S1:15 S2:8	S1:7 S2:7	0	S1: 100% S2: 100%
2467	Biface tip	S1:9 S2:8	S1:12 S2:6	0	S1: 100% S2: 100%
3072	Biface tip	S1:6 S2:3	S1:4 S2:4	0	S1: 100% S2: 100%
1600	Biface tip and midsection	S1:11 S2:13	S1:19 S2:19	0	S1: 100% S2: 100%
1574	Biface base	D-11 V-13	D-38 V-39	0	D-100% V-100%
1583	Biface base	S1:12 S2:9	S1:29 S2:29	0	S1: 100% S2: 100%
1588	Biface base	D-21 V-18	D-42 V-42	0	D-100% V-100%
1592	Biface base	S1:9 S2:10	S1:22 S2:22	0	S1: 100% S2: 100%
2043	Biface	D-13 V-14	D-11 V-17	D-8 V-0	D-58% V-100%
2396	Biface base	S1:11 S2:7	S1:10 S2:10	0	S1: 100% S2: 100%
2878	Biface base	S1:4 S2:3	S1:4 S2:4	0	S1: 100% S2: 100%
3056	Biface Base	S1:7 S2:8	S1:5 S2:5	0	S1: 100% S2: 100%
2581	Biface base	S1:7 S2:6	S1:6 S2:6	0	S1: 100% S2: 100%
1601	Biface base	S1:13 S2:12	S1:36 S2:36	0	S1: 100% S2: 100%
2685	Biface	S1:9	S1:13	0	S1: 100%

	base	S2:6	S2:12		S2: 100%
1312	Base Frag	S1:4 S2:4	S1:4 S2:4	0	S1: 100% S2: 100%
1420	Biface portion	D-14 V-10	D-12 V-11	0	D-100% V-100%
1334	Medial biface	D-12 V-5	D-14 V-12	0	D-100% V-100%
1353	Medial biface	D-7 V-7	D-12 V-12	0	D-100% V-100%
1586	Medial biface	S1:7 S2:7	S1:11 S2:10	0	S1: 100% S2: 100%
1641	Medial biface	S1:6 S2:5	S1:6 S2:6	0	S1: 100% S2: 100%
1649	Badly burnt biface mid	S1:8 S2:3	S1:12 S2:? POTLID	0	S1: 100% S2: 100%
2106	Medial biface	S1:4 S2:6	S1:4 S2:4	0	S1: 100% S2: 100%
3028	Medial biface	S1:5 S2:4	S1:3 S2:3	S1:1 S2:0	S1: 75% S2: 100%
1603	Medial biface	S1:8 S2:6	S1:10 S2:10	0	S1: 100% S2: 100%

These patterns suggest that there are underlying similarities between Early Woodland bifacial tools in the Great Lakes Basin and the Maritime Peninsula, but that they were not homogenous across the Northeast, nor does it appear that there was trade of quaternary blanks made of Onondaga chert, at least to the part of the Maritimes that I have focused on. This suggests that tool-makers in the Maritimes were in fact making copies of similar tools found in the Great Lakes Basin, but they were not made using the same process.

Projectile Points

Despite the fact that much of my analysis has focused on scraping tools, projectile points, and in particular, side-notched Meadowood points have generally

received more consideration in the literature, in part because of their easy recognizability and utility as an index fossil (Ritchie 1971). Nonetheless, there has been some ambiguity around side-notched projectile points in the Maritime Peninsula (Wright 1999), as this category in this region has been expanded to include blades with side-notches that were placed further up the sides of a square-based point. Some have called these box-based points, and have considered them to be a variant of Meadowood (McEachen 1996). Interestingly, none of the projectile points in my sample were of this "box-based" style and were more consistent with the notion of Meadowood points as discussed by Granger 1978, and Ritchie 1971. As a result I do not explore the box-based phenomenon in this thesis, because of a lack of evidence and I believe it warrants further study in this regard. Projectile points were well thinned, which could point towards the theory that thinned unstemmed bifaces were being repurposed as projectile points. This thinning places projectile points from the Maritimes Peninsula and the Great Lakes Basin on the far formal end and high bifacial ends of the spectrum (Figure 5). There was a definite presence of projectile points in the Beaverbrook sample (21 projectile points in total; Plate 9), but I observed very few (1 in each site) in both the Jemseg Crossing and Fulton Island sites.

Scrapers

The scrapers I observed in the New Brunswick and Ontario samples were surprisingly similar in form, both within unifacial and bifacial categories. However, there were also key differences. For example, the high quantity of incomplete scrapers found within the Beaverbrook sample was less evident in Fulton Island and Jemseg samples, as these sites had a more even distribution between incomplete and complete

artifacts. Further, there are a number of key differences that lead me to conclude that scraper production in the Maritimes was different from what occurred in the Great Lakes area.

Unifacial Scrapers. Interestingly, unifacial scrapers were very uniform between the sites in the Maritimes and the Great Lakes Basin (Plate 10; Plate 11). To me this uniformity in unifacial scraper production suggests a degree of formality that places these unifacial scrapers on the lowest end of the unifacial axis, but also fairly far over on the left of the formal scale since they are so obviously homogenous (Figure 5). In a straightforward sense, unifacial scrapers in these assemblages were tools manifesting thinning on either the dorsal or ventral surface (typically the dorsal) but not both, and having steep-edge retouch on one or multiple edges. This steep-edge can resemble nibbling along the edge or edges of a tool and can be quite delicate or deep, depending on function, use, quality of material or appearance after decades, centuries or even millennia of the accumulation of material on top of it. These tools made up 21% (4) of the Jemseg Crossing site lithics and 15% (2) of the stone tools found at the Fulton Island site. 17.3% (18) of the Beaverbrook sample were unifacial scrapers (Figure 14).

As discussed above, I identified a particular edge morphology for the analysis of the longitudinal cross-section of steep-edged tools (e.g. scrapers; unifacial and bifacial). This edge morphology can best be described as sinuous and, based on my research, is exclusively found along the longitudinal cross-sections of scrapers (Plate 12). Though, this does not mean that other longitudinal cross-section forms cease to emerge within steep-edged (scraper) categories. The vast majority (though less so of the Fulton Island site) of unifacial scrapers that I observed had the sinuous edge morphology longitudinally from all sites. Of these unifacial scrapers in the Jemseg Crossing site,

50% (2) had a biconvex medial cross-section, while the other 50% (2) had plano-convex medial cross-sections. In contrast 100% of unifacial scrapers in the Fulton Island (2) and Beaverbrook site (18) assemblages had plano-convex medial cross-sections (Table 2; Table 3). It may be that a sinuous longitudinal cross section would enable a hafted element to better anchor itself to the tool, while having a plano-convex medial cross-section might lend itself to a better scraping ability as that flat surface would likely be what would graze the surface that was being worked. Also, both the longitudinal and medial cross-sections speak to the different processes employed to create bifacial and unifacial tools. Unifacial tools could be considered more easily replaced as less thinning and shaping went into their manufacture, while bifacial tools had more energy and time put into them, so they would have been used, reused and reshaped in order to make the most out of the expenditure needed to make them (this can also connect to the availability of materials, as the tool maker would not want to make tools that had a shorter use-life out of hard to acquire materials).

Little comparison can be made about the average size of unifacial scrapers among the various feature subassemblages that I examined, as there were no complete unifacial scrapers in either the Jemseg Crossing or the Fulton Island samples. This tends to limit our understanding of function and use, and will require approaches, such as use-wear analysis, that were beyond the scope of this work.

Bifacial Scrapers. Bifacial scrapers are tools exhibiting steep-edge retouch that also have thinning on both the dorsal and ventral surfaces. Much debate has centered on their *chaîne opératoire*, relating to when the steep-edge retouch was established along the edge of the tools, whether the tool was meant to be a scraping tool from the beginning, or if it had a life before being transformed into a scraper where multiple

reductions were conducted along a sequence. The Fulton Island site did not produce a single bifacial scraper; on the other hand, bifacial scrapers were quite significant to the Jemseg Crossing site, comprising 42% (8) of my chosen sample, while only appearing in 11.5% (12) of the Beaverbrook sample (Figure 14).

The cross-sections I observed in bifacial scrapers were different in profile than those I observed for unifacial scrapers. Not forgetting the new sinuous edge morphology that I described on many unifacial and bifacial scrapers, the majority (4) of bifacial scrapers in the Jemseg crossing sample had plano-convex longitudinal cross-sections (placing these tools farther on the right of the informal axis of the multidimensional hyperspace; Figure 5) and (5) biconvex medial cross-section (situating these artifacts farther to the left on the formal axis; Figure 5). Inversely, 50% (6) of bifacial scrapers in the Beaverbrook sample had sinuous longitudinal edge morphologies and 67% (8) of bifacial scrapers had plano-convex medial cross-sections (both of these indicating less formality on the multidimensional hyperspace; Figure 5; Table 2; Table 3).

The average length of the bifacial scrapers from the Jemseg Crossing and the Beaverbrook assemblages were surprisingly consistent, though differing in thickness and mass, which is evident in the table provided below (Plate 13; Plate 14). To me this suggests that a higher degree of thinning occurred on bifacial scrapers in the Great Lakes Basin than in the Maritime Peninsula. Building on this, even the minimum and maximum measurements of complete bifacial scrapers from the Beaverbrook site are very similar. This observation drawn from the Ontario sample is consistent with predictions about bifacial scrapers that could be drawn from Granger's (1978) trajectory, where quaternary blanks were thinned to a high degree and then transformed into a bifacial scraper. Though, the proportions observed in the New Brunswick sample seem

to suggest that a different reduction process took place (Figure 6). On the other hand, this pattern could also reflect the overall differences in thickness and thinning of bifacial blanks discussed above; because unstemmed bifaces in the New Brunswick sample were larger in general and less refined, as a class, they would be thicker when they were made into bifacial scrapers.

The proportions of thinning for bifacial scrapers in the New Brunswick sample proved to be complex with 83% (5) of complete bifacial scrapers from the Jemseg Crossing site exhibiting 100% thinning on their dorsal surface (placing those five bifacial scrapers on the highest end of bifacialness and formality; Figure 5), while 17% (1) exhibited 81% thinning on their dorsal surface (situating this tool farther from bifacialness and closer to the informal point on the axis; Figure 5). Of these complete bifacial scrapers from the Jemseg Crossing site, 50% (3) had 100% thinning on their ventral surface (meaning fewer bifacial scrapers were highly bifacial and formal; Figure 5), while 50% (3) had below 47% thinning on their ventral. 100% (2) of the dorsal surfaces on incomplete bifacial scrapers from the Jemseg Crossing sample were fully thinned, while 100% (2) of incomplete bifacial scrapers had 50% or lower of their ventral surface thinned. The proportion of thinning among bifacial scrapers in the Ontario sample was much more consistent than that observed in the New Brunswick samples. 100% (2) of complete bifacial scrapers in the Beaverbrook sample had 100% thinning on both the dorsal and ventral surfaces.

Table 9. Proportion of Thinning on Complete Bifacial Scrapers from the Beaverbrook Site.

Artifact ID	Type	# of Removals	Proportion Thinned	Proportion Unthinned	Proportion Percentages
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1712	Bifacial Scraper	S1:18 S2:18	S1:29 S2:29	S1:0 S2:0	S1:100% S2:100%
1710	Bifacial Scraper	S1:15 S2:10	S1:16 S2:16	S1:0 S2:0	S1:100% S2:100%

100% (10) of incomplete bifacial scrapers were fully thinned on their dorsal surface, while 20% (2) of these tools exhibited less than 75% ventral surface thinning.

Table 10. Proportion of Thinning on Broken Bifacial Scrapers from the Beaverbrook Site.

Artifact ID	Type	# of Removals	Proportion Thinned	Proportion Unthinned	Proportion Percentages
2409	Bifacial endscraper	D-6 V-6	D-15 V-15	0	D-100% V-100%
1535	Bifacial scraper end	D-8 V-6	D-6 V-6	0	D-100% V-100%
1724	Bifacial scraper	D-6 V-5	D-7 V-7	0	D-100% V-100%
1267	Bifacial scraper	D-10 V-8	D-11 V-11	0	D-100% V-100%
1377	Bifacial scraper	D-9 V-8	D-13 V-13	0	D-100% V-100%
1566	Bifacial scraper	D-7 V-7	D-11 V-8	D-0 V-3	D-100% V-73%
1567	Bifacial scraper	D-11 V-9	D-11 V-11	0	D-100% V-100%
2459	Scraper	D-10 V-2	D-8 V-2	D-0 V-4	D-100% V-33%
1713	Bifacial scraper	S1:16 S2:14	S1:28 S2:28	0	S1: 100% S2: 100%
1584	Broken biface scraper	D-6 V-7	D-7 V-7	0	D-100% V-100%

The remaining 80% (8) of incomplete bifacial scrapers were fully thinned on their ventral surface. These numbers support my hypothesis that bifacial scrapers from the

Beaverbrook site have a greater amount of thinning, where those found in the Maritimes tend to be less refined.

BIFACE TIPS, BREAKS AND PRESENCE OF WEAR

An interesting trend, that I had not anticipated emerged early in my analysis, consistently presenting itself in all of the subassemblages. This observation relates to the relationship between biface tips, breakage patterns and macroscopically visible wear. Many bifaces (stemmed/notched or unstemmed) appear to have been broken predepositionally, and based on the regular patterns of breakage, it appears that force applied during use and hafting may have been the cause of these breaks. As I discussed in the previous chapter, while 75% of the biface tips from the Jemseg Crossing feature assemblage revealed macroscopically visible signs of use, the Fulton Island subassemblage showed no clear evidence of use on biface tips using the methods available. On the other hand, biface tips from the Beaverbrook subassemblages all showed visible signs of use. As a broad class, bifaces were mostly incomplete, with a high proportion represented only by the tips; this proportion is even higher when medial and base portions were included (Plate 15; Plate 16). The pattern of tip breakage may be expected as tips are generally the thinnest and structurally weakest component of a biface, particularly once it is extensively thinned to make it sharp. This, along with the appearances of two distinctive breakage patterns leads to the conclusion that they were most likely broken in use.

There were two types of breaks that I identified, which I refer to as "clean" (a vertical plane at the breakage point; Plate 17) and "sheared" (a horizontal break that does not extend the length of the tool and tapers to the breakage point; Plate 18). I suspect

that the differences in breakage patterns directly relate to hafting. One might infer that clean breaks, for example, might have resulted from a bending or snapping force (as a result of getting stepped on or getting stuck in something and being bent) applied to the tool, while sheared edges may have resulted from bending forces. These breaks could have to do with their use as bifacial scrapers, knives, projectile points or hafting techniques depending on the breakage type. Interestingly, the patterns of breakage are evident in the samples from both New Brunswick and Ontario.

Further replicative studies, as discussed below, may help with resolving this issue and identifying the particular type of use and force that might create this pattern. In the context of Meadowood research, the examination of hafting and breakage is important for two reasons. First, the breakage patterns are particularly widespread. Second, the portions of unstemmed bifaces present in the sample relates not only to the use of the tool itself, but to the use of the unstemmed biface as a preform for other tool types, as was discussed by Granger (1978) and Taché (2008, 2011b). The fact that biface tips dominate some subassemblages, such as the Jemseg Crossing feature sample, where all of the bifaces were represented solely by biface tips. On the other hand, the feature assemblages from the Fulton Island site had a much lower proportion of biface tips relative to complete unstemmed bifaces, with 33.3% of unstemmed bifaces being categorized as biface tips while 50% were complete unstemmed bifaces. Finally, these patterns both contrast with the Ontario assemblage; the Beaverbrook feature assemblage had a large portion of biface tips, with 44.4% of the unstemmed biface category being made up of tips, while only 22.2% of the unstemmed bifaces in this sample were complete (Figure 33). I have considered that the high proportion of biface tips may related to two possible factors; their use as knives in habitation contexts where people

processed food and animal parts or their use as projectile point and then turned into a scraper where it was broken due to force.

FEATURES AND TOOL FUNCTIONS

Feature function is vital to our understanding of the past, yet it can be a confounder. This, however, does not mean that it is either impossible or unrealistic to try to interpret as stone tool use indicates not only the function of the tool, but also the function of the feature or site. Stone tools are aspects of material culture that archaeologists use when they attempt to deduce a site or feature's function. The concept of the *chaîne opératoires* has effectively shifted the archaeological gaze from end products to processes, including the desire to make the tool, the manufacturing process, the purpose of the tool, how it was discarded, what it was found with all tie into site function – making stone tools an integral and fascinating aspect of the interpretive process. These processes in turn can help us understand whether the site was for activities like procurement, habitation, or ceremony. This insight is important to understanding the lifeways of those who inhabited or made use of the site. Although ceremony and domestic activities were likely complexly interwoven, I attempted to select features with primary characteristics reflective of everyday life, and in particular, various tool making and use behaviours. Indeed the presence of tools, debitage and evidence of use are all important for understanding feature function.

Use-wear on a stone tool is an important component for interpreting function of not only the tool, but of the feature and/or site. In fact, different methods of using a tool exhibit different wear patterns on the working edge of a stone tool, indicating what the tool was used for. There is a significant body of research on use-wear on stone tools

(Carr and Bradbury 2010; Swanson 1975; Davis and Price 1978). This formal analysis was beyond the scope of my research. However, the literature on Meadowood tools, and in particular, Meadowood cache blades, indicates that some of the production processes that underpin these tools were related to ceremonial functions – the identification of these tools as prestige goods seems to suggest that their basic function was less important than their ideological value. As a result, it was not clear to me that these tools would have been used in domestic tasks. To this end, I simply observed whether or not tools have macroscopically visible use. This included battering, polish, and edge damage, as well as breakage patterns as described above.

PRODUCTION TRAJECTORY

Due to the fact that many of the attributes identified by Granger (1978) were associated with diagnostic lithic classes, I have already touched on his trajectory a number of times (Figure 6). This being said, his trajectory implies that standardization of form (formality) becomes more important to tool makers as they move through the process of making Meadowood tools, which in Figure 6, reflects a movement from the left to right sides of the diagram (with tools closer to the left being more informal and those to the right being more formal). I simplified this in the multidimensional hyperspace (Figure 5). Thinness increases from left to right, and as bifacial tools become thinner they also become more formally constrained in shape. This leads to end products with greater standardization.

The material that I examined in the Beaverbrook assemblage was consistent with tool outcomes that would have been predicted by Granger's (1978) trajectory. In most cases the Beaverbrook bifacial scrapers were quite small and thin, and were consistent

with Meadowood forms described by Granger and others. Their small size was also consistent with the inference that the Meadowood approach to reduction was highly material-conservative such that some tools may have been repurposed a number of times, transforming them from unstemmed bifaces to long scrapers to resharpened and shortened scrapers. Many of the incomplete bifacial scrapers seem to fit in this trajectory as well. Due to the shape of the working edge, the breakage location and the narrowing of the edges, many of the incomplete bifacial scrapers in the Ontario sample exhibit the triangular shape associated with typical Meadowood bifacial scrapers. However, while some of the tools in the New Brunswick sample were similar to those indicated by Granger, many that I examined were less consistent. In particular, key attributes, such as the degree of thinning, were much more variable (Figure 22). Thinning and its impact on outcomes is key to my interpretation of the New Brunswick stone tool production trajectory for the Early Woodland period. As discussed above, I employed the terms “S1” and “S2” in cases where extensive thinning precluded identification of the ventral and dorsal of the original flake blank. The Beaverbrook subsample that I analyzed had 71% of the assemblage with indeterminate sides, while the New Brunswick assemblage only had 45% of the assemblage with indeterminate sides. This indicates that the New Brunswick sample had not gone through the same rigorous thinning process, where the Beaverbrook sample was thinned significantly. Furthermore, tools in the New Brunswick samples were generally larger and less uniform. Interestingly, despite these differences, the end forms were similar in both regions, suggesting that the intended shape was similar, but that it was being produced using two different notions of tool production.

On the other hand, there were also some differences in tool outcomes. In keeping with expectations from Granger (1978) and Ritchie (1971), drills were present in the Beaverbrook site, while they were absent from the New Brunswick sample. Although the New Brunswick sample was very small, it is also the case that they were absent from all of the lithic tools from the Jemseg Crossing and Fulton Island assemblages, which number over 1000 tools (Blair 2004a, 2004b).

A number of possibilities should be considered to explain the similarities and differences that are evident between the New Brunswick and Ontario samples, and in a broader sense, Early Woodland technology in the Great Lakes and Maritime Peninsula. It remains possible that functional differences between these sites might account for some of the differences in tool production. In general, the New Brunswick tools were less finished, and this might reflect the use of the Fulton Island and Jemseg Crossing features as primary production areas. Furthermore, the significant differences in raw material quality and availability might also have had a role, with the generally high quality materials in Ontario being finished more extensively. Finally, it may be that the small sample size used in this study biased my results, allowing me to see greater differences than might be evident in a larger sample.

Notwithstanding these issues, I would suggest that we should also consider real differences between the tool production strategies of the Early Woodland knappers in New Brunswick and Ontario. For example, one might consider a diffusion-based explanation: perhaps the bifaces (stemmed/notched and unstemmed) and bifacial scrapers in the Maritime Peninsula were not produced by a shared approach to technology, but were rather copies of the outcomes of some kind of Great Lakes Basin approach to technology. This interpretation rests on notions of some kind of interaction

or interregional engagement between the Great Lakes Basin and the Maritimes, but does not rely on mechanisms of direct exchange of forms, or movement of actual toolmakers.

Alternately, archaeologists can consider a kind of functional convergence, where independent processes result in the production of superficially similar forms. Interestingly, the unifacial scrapers in the samples I examined may provide some insight into these processes. In the three assemblages I analyzed, nearly half (11/24) of the unifacial scrapers had platforms and only ten of these were complete. This suggests a correlation between artifacts that do not have visible platforms and breakage, where the platform has been snapped off. Due to the fact that every incomplete unifacial scraper has definite (55%) or possible (45%) use, I suggest that these scrapers were broken in use (meaning that all of the unifacial scrapers had been used; Figure 21). This suggests that, from the outset, bifacial and unifacial scrapers represent different points in the production sequence (or as it is now more commonly conceived of, *chaînes opératoires*). The presence of platforms on unifacial scrapers indicates to me that they were initiated from a flake that may or may not have been produced during bifacial production and thinning. On the diagram exemplifying Ontario and New Brunswick stone tool production trajectories in Ontario and New Brunswick (Figure 22), the most significant salient difference is found outlined on the diagram as "bifacial scraper: steep-edged (end) scrapers with ventral modification." In the Ontario context, bifacial scrapers start being manufactured off of a tertiary blank, while their counterparts in New Brunswick were being made as early as on primary blanks. This illustrates how bifacial scrapers in Ontario were much more thinned and refined, while those in New Brunswick were being made thicker, beginning at an earlier stage. This is not to say that there were no scrapers made on tertiary bifaces in the New Brunswick samples, as there were some

that showed a high degree of thinning, similar to those found in Ontario. A significant portion of bifacial scrapers from the New Brunswick subsamples were made from earlier stage blanks, while in the Ontario subsamples, all were manufactured on tertiary blanks.

Chapter 5 Images

Plate 9. Projectile points from the Beaverbrook site (image code DSC1560).



Plate 10. Jemseg Crossing and Fulton Island unifacial scrapers (image code DSC0997).



Plate 11. Unifacial scrapers from the Beaverbrook site (image code DSC1312).



Plate 12. Unifacial scraper with a sinuous edge morphology (image code DSC1301).



Plate 13. Complete bifacial scrapers from the Jemseg Crossing site (image code DSC 1989)



Plate 14. Complete bifacial scrapers from the Beaverbrook site (image code DSC1197)



Plate 15. Biface tips from the Maritimes (image code DSC1005).



Plate 16. Biface tips from the Great Lakes Basin (image code DSC1117).



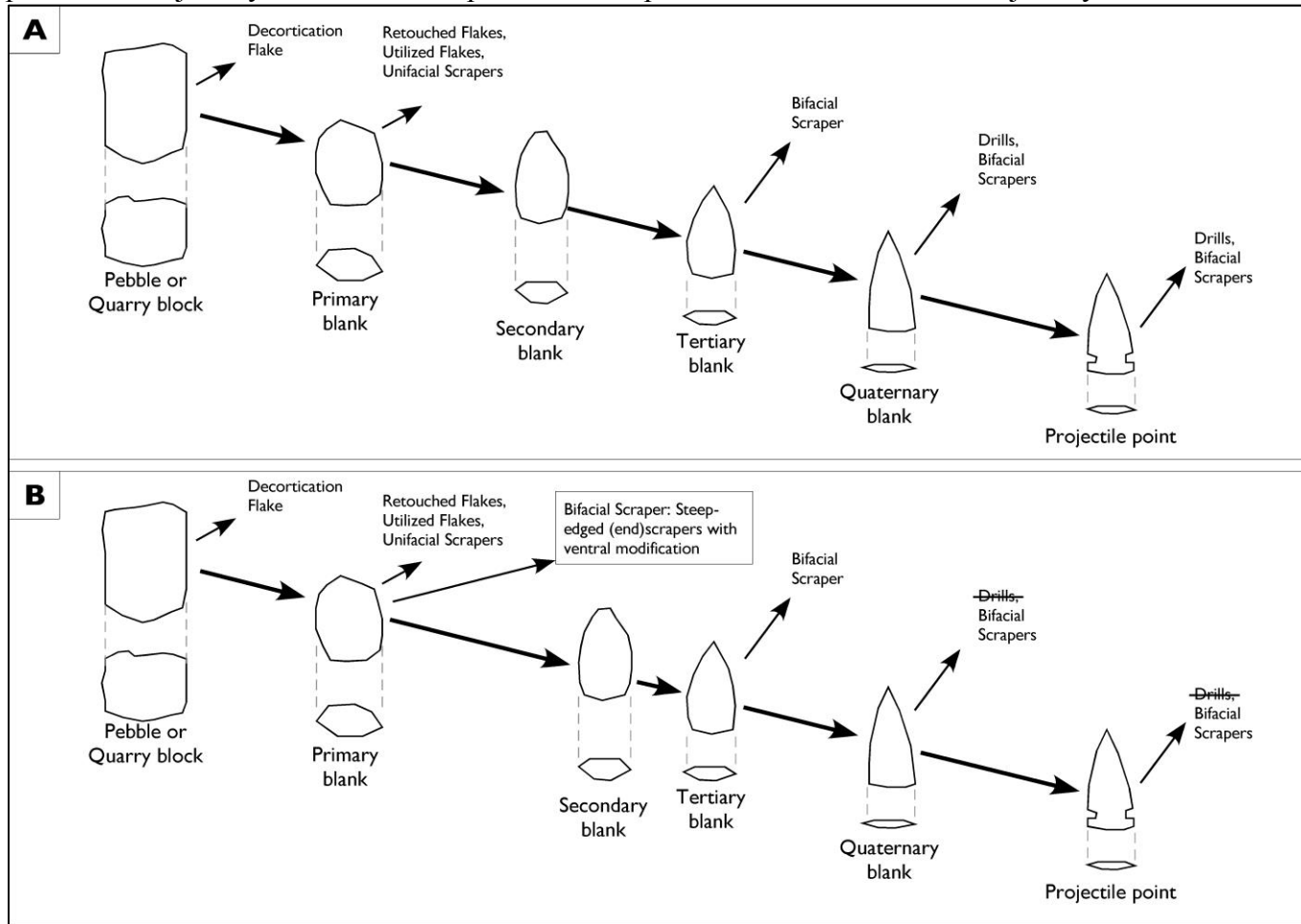
Plate 17. Image of a "clean" break on a bifacial tool from the Beaverbrook site (image code DSC0113).



Plate 18. Image of a "shear" break on a bifacial tool from the Beaverbrook site (image code DSC0100).



Figure 22. A derivation of Granger's (1978) stone tool production trajectory for the Early Woodland. Part "A" pertains to a stone tool production trajectory for Ontario and part "B" exemplifies the New Brunswick trajectory.



Chapter 6: Conclusions, Discussion and Recommendations

I concluded in the previous chapter that stylistic similarities in tool morphologies are superficial, arguing that though tool forms looked similar, the production processes were different between the Maritime Peninsula and the Great Lakes Basin. This led me to suggest that if archaeologists want to better understand macroregional variability and patterning, regional patterns must be the preliminary point of investigation. Along with these conclusions, I took note of a variety of interesting patterns relating to material exploitation, breakage and tool use.

In this thesis, I explored lithic technology in the Early Woodland period of the Northeast. Situating Early Maritime Woodland lithic technology within Early Woodland macroregional constructs required detailed examinations of assemblages in order to assess the overall structure of lithic production. One of the challenges in the study of Early Woodland lithic technology is that it is often understood through the lens of culture-historical manifestations like the Meadowood phenomenon (Blair 2004a). This has led to unresolvable debates stemming from irreconcilable conflicts between essentialist and materialist ontological positions. Each position has significant implications for the way in which overall units like Meadowood are constructed, how they are interpreted, and the methods that are brought bear in studying them. Moreover, each ontology understands variability differently – essentialist ontologies represent variability as existing between units, which are therefore reflections of real entities that existed in the past, while materialist ontologies represent variability as existing both within and between units, as units themselves are arbitrary constructions of analysis. From this perspective, understanding whether Meadowood technology over the broad scope of its presumed range is the same (or at least is underpinned by shared forms and

strategies), or whether Meadowood technology is characterized by variability, exhibiting real, consistent and measureable differences in time and space, is critical for assessing the Early Woodland as a whole.

To this end, I focused my analysis on formal and informal stone tools as a way of examining Early Maritime Woodland lithic technology in the Maritime Peninsula. Furthermore, I related these Early Maritime Woodland technologies with Early Woodland tools found in the interior, particularly the Great Lakes Basin area. I evaluated Early Woodland steep-edged and bifacial lithic production processes and assessed the extent to which these processes and end products were informed by some kind of shared understanding or intent. My intention was to add to the possibilities for future regional syntheses by developing and explicating a local view of technology, materials and form.

To achieve this goal, I analyzed lithic assemblages from the Jemseg Crossing (BkDm-14), Fulton Island (BIDn-12) and Beaverbrook sites (AfHh-386). All of these sites have Early Woodland components containing Meadowood-like artifact forms and have been attributed by various researchers to the Meadowood phenomenon (variously as a part of a phase, or more implicitly as a part of a horizon or interaction sphere) (Wood 2015, TMHC 2012, McEachen 2004, Taché 2011a, 2011b). However, rather than selecting forms that appear to be Meadowood-like, which would lead to a form of circular reasoning, I followed the lead of Blair (2004a) by seeking subassemblages from these sites that represented chronologically controlled units (ideally units that were either radiometrically dated or stratigraphically constrained), and proceeded with an analysis of whatever tools (both formal and informal) occurred in those subassemblages. With this approach, I explored the degree of similarity among tool production systems in

these subassemblages and at these sites, and their fit with the production system that is considered typical of Meadowood (Granger 1978).

After a careful examination of products and processes in lithic production, I concluded that there is considerable variation among these subassemblages; with this information, I infer that there might be much more local variation found throughout Northeastern North America than has previously been assumed. In particular, I observed that the superficial similarities in form might exist in spite of critically distinct differences in manufacturing processes and use of raw material. In particular, I have demonstrated that while tool production in Ontario is, as predicted by Granger (1978), organized around the production of cache bifaces, or quaternary blanks that can be refined into a range of forms, tool production in the Maritime Peninsula may follow a number of trajectories, with outcomes that resemble Ontario forms being produced on flake blanks, without recourse to quaternary blanks and the processes observed in the Ontario assemblage. I also challenged the notion that a key focus of lithic production in the Early Woodland was the widespread dissemination of Onondaga chert in particularly valuable Meadowood forms. These differences, in turn, may be sufficient to warrant a broader reexamination of the utility of the Meadowood concept overall.

Discussion/Speculations

Theoretical paradigms discussed in Chapter 2, reinforced by Granger (1978) and Taché (2008, 2011a, 2011b), led some researchers in the Northeast to infer that the Meadowood phenomenon represents some kind of interaction sphere centered on the Great Lakes, where Onondaga outcrops provide high-quality and desirable material for making particular goods (e.g. cache bifaces). This view would suggest that evidence of

Meadowood-like artifacts found in the Maritimes might be due to the trade of these prestigious goods from the core (the Great Lakes area) to the periphery (the Maritime Peninsula). Instead, I found substantial variability between subassemblages in the Great Lakes Basin and the Maritimes, with similarities in tool types, but important differences in production processes. Granger (1978), Ritchie (1965) and Taché (2008) were indeed correct that there is general homogeneity of bifacial tools in the Great Lakes Basin, but the consistency of material, form and process is simply not evident in the assemblages I assessed in the Maritimes. Although at some level, this research calls into question the utility of Meadowood as a unit concept, and Meadowood index fossils as a way of defining that unit, the similarity of outcomes of these disparate processes may leave room for Meadowood types to retain utility in a limited fashion. In this sense, Meadowood index fossils can be seen as dependent variables determined by the independent variables of bifacialness and formality; the index fossils retain some superficial utility, at the same time that bifacialness and formality were produced differentially by region. On the other hand, the original purpose of the index fossil approach—to identify a particular cultural or technological phenomenon that existed in particular time and place—does not hold. In other words, the utility of Meadowood-like index fossils remains only loosely valid within a materialist perspective, but cannot be seen as reflecting some underlying essentialist type.

Engaging with a materialist ontology while acknowledging these patterns and at the same time being able to avoid the view that patterning was constrained by inherent and real phenomenon that existed in the past is key. By deconstructing the essentialist/culture-historical boxes around patterns, units of analysis are liberated, which in turn will allow for new interpretations about the ancient people of the

Northeast and the processes, strategies and ideologies that they brought to bear on the production of their tools.

The implications of this research for the region, lithic analysis and for culture-historical constructs suggest that it is important to retain an understanding of technological processes that operated at the local level, and balance these with an appreciation of wider, shared patterning if archaeologists are to better understand the prehistory of northeastern North America. While research in the Northeast has benefited from a broad approach, it needs to be supplemented by a detailed local view. The Northeast is a diverse macroregional unit on a large scale, requiring us to be mindful of regional variability. At this large-scale, analysis can only fruitfully be developed by integrating a myriad of local understandings. Analysis of this region is complex and archaeologists must be wary of portraying the whole region as one particular phenomenon.

Although, as I suggested through my analysis, the end result of a particular production trajectory or *chaîne opératoire* may be particular forms and attributes similar to those produced by other trajectories, the processes involved in their manufacture are variable, and motivated by distinct needs and interests. For example, bifacial scrapers from the Maritime Peninsula appear to be manufactured by distinctive production processes that involve intentionality and consideration of final form from their initiation, while in the Great Lakes Basin the intent of knappers appears to have been focused, as suggested by Granger (1978), on the production of fully thinned unstemmed bifaces that then may be considered for further refinement into a range of products, including, in some cases, bifacial scrapers.

While I have been critical in my analysis of overtly essentialist models for tool production, and of models that weakly integrate materialist ontologies into essentialist units, my results do require a consideration of the mechanisms that may lead to the production of superficially similar tool forms using diverse and varied production systems. To this end, Taché's analysis of prestige goods, and her consideration of Meadowood as an interaction sphere that was organized around the production and circulation of these goods may offer a partial solution. Although I have challenged the notion that the Early Woodland peoples who lived in the Maritime Peninsula and those who lived in what would become Ontario were integrated into a single group, culture, or even sphere of practice, and I have rejected the idea that the Maritime Peninsula was the recipient of goods or the periphery of a Great Lakes core, it is clear that there was a connection of some kind between these regions. In this sense, it is possible that similarities in forms were being locally generated through processes of mimicry, copying or convergence. The process that may lead people to do this may well be linked with prestige, and the development of social inequality. However, my research allows for consideration of a range of alternative mechanisms, such as the mesh-like relationships proposed by Blair and Wiber (2013). In this sense, I hope to broaden the possibility for Early Woodland research, and allow for a proper situating of the Maritime Peninsula in the dynamic setting of the Early Woodland in the Northeast.

Recommendations for Future Research

Due to the scope of my thesis I was only able to scratch the surface of Early Maritime Woodland lithic technology and the various production processes or *chaînes opératoires* that developed in the Northeast in this complex period. Future research must

be conducted throughout the Northeast using a locally grounded, fully explicated perspective in order to understand tool production throughout the region. This may entail stepping away from or at least challenging traditional approaches to comparison of forms, with all of its "culture-historical" baggage. This is not only important to the understanding of stone tools, but it also relates to the understanding of the people, their intentions and the sites they inhabited – allowing an understanding of variability and local production systems to emerge, enabling reflection of broader trends over larger expanses. My research suggests that the processes underpinning regional patterning remain elusive and complex, and further research on the *chaînes opératoires* of various lithic products will be necessary in order to better understand it.

Much of this research has focused on the spatial dimension of the Meadowood phenomenon. For example, my analytical approach to tool products, which viewed bifacialness and formality as continua along which tools vary (Figure 5), expressly broke down the essentialist boxes that have been placed around particular Meadowood tool forms. However, the broad adoption of a materialist ontology requires variability to be understood on several axes, including (and perhaps most importantly, following Lyman et al. 1997:5) the temporal axis. In this regard, the Early Woodland poses significant challenges for analysis, as a major radiocarbon plateau confounds a fine-grained understanding of change through time (Fiedel 2001, Gajewski et al. 2011). Nonetheless, Meadowood forms appear over a broad period of time – perhaps as much as 1000 years (Blair 2004a), and it is critical, moving ahead, that changes in tool production are understood through this period. To extend this analysis, efforts must be made through radiometric dating, and stratigraphic analysis of multicomponent sites to distinguish

culturally meaningful units in the Early Woodland, the radiocarbon plateau notwithstanding.

I have concluded that the identification and analysis of Early Woodland assemblages needs to emerge through direct investigation of complete lithic tool subassemblages, so as to avoid privileging particular tool forms in the analysis. This requires a retreat from using index fossils to identify particular cultural phenomena, allowing variations in the archaeological record to be interpreted based on measured evidence rather than assumed similarities.

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APPENDIX A
MARITIME ARTIFACT PHOTOS

Complete Bifaces (Including Projectile Points)



Bifacial Scrapers



Unifacial Scrapers



Biface Tips



APPENDIX B
BEAVERBROOK SITE ARTIFACT PHOTOS

Projectile Point Portions



Complete Projectile Points



Biface Tips



Bifacial Scraper Portions



Complete Bifacial Scrapers



Unifacial Scraper Portions



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