A LESSON IN STONE: EXAMINING PATTERNS OF LITHIC RESOURCE USE AND CRAFT-LEARNING IN THE MINAS BASIN REGION OF NOVA SCOTIA

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A Lesson in Stone: Examining Patterns of Lithic Resource Use and Craft-learning in the Minas Basin Region of Nova Scotia

By

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Abstract

Examining the Late Woodland (1500-450 BP) quarry/workshop site of Davidson Cove, located in the Minas Basin region of Nova Scotia, a sample of debitage and a collection of stone implements appear to provide correlates of the novice and raw material production practices. Many researchers have hypothesized that lithic materials discovered at multiple sites within the region originated from the outcrop at Davidson Cove, however little information is available on lithic sourcing of the Minas Basin cherts. Considering the lack of archaeological knowledge concerning lithic procurement and production, patterns of resource use among the prehistoric indigenous populations in this region of Nova Scotia are established through the analysis of existing collections. By analysing the lithic materials quarried and initially reduced at the quarry/workshop with other contemporaneous assemblages from the region, an interpretation of craft-learning can be situated in the overall technological organization and subsistence strategy for the study area.

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I dedicate this thesis to all of you.

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction

1.1 Introduction

This thesis is an analysis of lithic materials from Late Woodland (1500-450 BP) sites in Nova Scotia. In particular, my research focuses on an outcrop of Scots Bay chert located at the quarry/workshop site of Davidson Cove on the Bay of Fundy coast. Many researchers have hypothesized that lithic materials discovered at multiple sites within the province originated from this outcrop, however little information is available on lithic sourcing of the Minas Basin cherts (Deal 1989). By incorporating the study of lithic materials at this quarry/workshop site with other sites in the region, the results can inform our understanding of prehistoric technological organization, resource use and mobility during this time period and lead to better sourcing of lithic materials.

My research focuses on three contemporaneous sites from the Late Woodland period, namely the quarry/workshop site at Davidson Cove (BhDc-2), the small camp-site at Clam Cove (BhDc-5), and the habitation site at St. Croix (BkDw-5). Not only did these sites provide a good temporal framework for a comparative study, but they were also selected for their similarity in lithic assemblages, given that a high proportion of Scots Bay chert was seen in each. Although previous fieldwork has been conducted in these areas, only a basic understanding of lithic exploitation and subsistence patterns in the Minas Basin is available, providing the groundwork for further research (Deal, Godfrey-Smith et al. 1995; Halwas 2006).

As a focus of my study, the quarry/workshop site at Davidson Cove can prove vital to the body of research concerning this type of site. Though little work has been conducted on quarry sites, it can be argued that these areas were extremely important to daily life in the prehistoric period (see Ericson 1984; Root 1992; Torrence 1986). Due to the amount of waste created through lithic reduction, a researcher can easily become overwhelmed by the amount of data in an assemblage. However, the benefits of studying such sites can no longer be ignored. Being a fixed location in the landscape, quarry sites likely held important social and cultural meaning to the groups traveling to these places on a seasonal basis. Thus, as a starting point, the characteristics of Davidson Cove shaped when and how lithic material could be procured and transported, and eventually abandoned at other sites around the region.

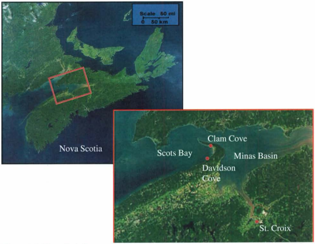

Figure 1.1 Map of study area. Note locations of Davidson Cove, Clam Cove and St. Croix sites, Nova Scotia, Canada (www.rapidfire.sci.gsfc.gov/gallery)

Given this, the primary goal of this thesis is to examine the relationship between various known settlements in the region and the ecological and geological resources. In doing so, I attempt to understand how this relationship affects a range of socio-cultural activities which relate to lithic production and procurement. By examining the lithic material culture, in particular, we can hypothesize how this resource influenced daily life in the Late Woodland period.

1.2 Objectives and Organization of Thesis

Through addressing the primary goal of this thesis, I will answer the following questions: 1) due to its location in the landscape, how did the quarry/workshop at Davidson Cove influence regional subsistence patterns?; 2) By examining the lithic material culture present, what can be said regarding societal choices concerning procurement and utilization of Scots Bay chert during this time period? With these questions in mind, this thesis has been organized into six chapters.

In this first chapter, I have introduced my primary research questions and the goals I hope to achieve through this thesis. The remainder of this chapter will provide an historical overview of research conducted at quarry and workshop sites. Chapter two examines the various theories I will be employing as part of my research, namely the theory of technological organization, and a dialogue regarding prehistoric craft-learning and the novice. In chapter two, I also review the literature on lithic analysis and describe the laboratory methods used for the analysis of flaked stone tools and the debitage produced from their reduction. Chapter three describes the geological context of the

Minas Basin with a particular focus on the Scots Bay materials. In chapter four, I discuss previous fieldwork, archaeological context and artifacts from Late Woodland sites in the Minas Basin region which are contemporaneous to Davidson Cove. I also focus on the other possible locations the may have acted as quarry sites, sites where the Scots Bay material was transported and site formation. Chapter five will present the results of laboratory analyses of lithic stone tools, identifying the types of artifacts present, presenting a detailed analysis of debitage, and discussing material types, termination points and striking platforms.

The information gleaned from the analysis of lithic materials from the Davidson Cove, St. Croix and Clam Cove sites are reiterated in chapter six, providing discussion on how these sites can offer a better understanding of resource use, site function and subsistence patterns among the prehistoric groups of the Late Woodland period of Nova Scotia. I will also discuss how the results presented in chapter six relate to fluid ideas regarding socio-cultural aspects of knowledge, learning, and ultimately, survival. Chapter six will close with some concluding thoughts regarding the primary goals of this study and future directions for lithic studies within Nova Scotia and the Maritime region as a whole.

1.3 History of Research at Quarries and Workshops

Why are quarry sites often ignored? This is a question that many lithic analysts have pondered for decades. Usually, it is the large amount of debitage present on quarry and workshop sites which has been cited as the culprit for this gap in lithic studies.

However, it would seem intuitive or logical that this initial point in the stone tool production sequence would be informative, especially given the amount of 'production-waste' present on-site. It can be further argued that the complexities and dynamics of prehistoric choices can be extrapolated by exploring the procedures of exploiting and manufacturing stone tools. The benefits of overcoming this obstacle would be quite valuable. Narrowing down and drawing on a large assemblage of artifacts can prove daunting and time-consuming, but these investigations would unarguably profit the field as a whole. Nonetheless, this aspect of archaeology is often neglected in our investigations.

Although considered to be an important aspect of prehistoric studies, research conducted on quarry and workshop sites in North America has been minimal at best. Primarily, investigations have traditionally focused on use-wear analysis and replication (Keely 1980) as well as lithic reduction sequence studies, use and discard (Callahan 1979; Hayden 1979). Until recently, few studies had focused on broader issues related to lithic sourcing and mobility (Bamforth 2006; Bryan and Gruhn 2007; Burke 2007; Evans et al. 2007; Hatch and Miller 1985; Jeske 1989; Luedtke 1979). Considering these, I will provide a brief summary of the past research conducted by Holmes (1894; 1897), in which many of these studies are grounded and continue by highlighting other examples of research in North America which have moved the analysis of quarry and workshop sites in a more comprehensive direction.

W.H. Holmes (1894) was one of the first and most influential contributors to the study of lithic quarries. The various themes that Holmes presents concerning this topic can be considered as the underpinnings of lithic analysis as they relate to the study of quarry and workshop sites. A geologist by trade, Holmes demonstrated a deep understanding of how the availability of raw materials in the landscape factored into the life ways of prehistoric cultures. His work in the eastern United States, largely in the District of Colombia, outlined many of the quarrying procedures employed, recognizing the reductive properties of stone.

Holmes (1897) notes in *Stone Implements of the Potomac-Chesapeake Tidewater Province* that manufacturing processes would have occurred in multiple stages, and separates the various processes of exploitation and production. He not only discusses the differences between these processes but also alludes to various techniques for procuring raw materials, recognizing that various strategies would be employed given the diverse environments where stone is obtainable. His early contributions to the field of archaeology, and to lithic studies as whole, have created a space for further conversations on the differences between workshop and quarry sites. More recently, the ideas presented by Holmes have led to more inclusive discussions regarding how these behaviours fit into other economic and subsistence strategies. Both Black (2004) and Burke (2007) have attempted to view the quarry as a dynamic aspect of the organization of a society, discussing the implications of such activities within a complex life-system.

Black's (2004) work in the Quoddy region of New Brunswick highlights the delicate balance that archaeologists must strike when investigating a region as a whole and the processes he refers to under the umbrella term of "human ecology". After all, as he states, prehistoric cultures and their interaction with the surrounding environment are interconnected, each choice affecting the other (Black 2004:1). In terms of quarrying, the summary provided characterizes the complexity and importance of not only utilizing the resources available in the Bliss Islands, but also demonstrated the diversity of artifacts which began to typify this group of people over time (Black 2004:141-144). Although lithic analysis was a small part of his thesis, the holistic approach toward human ecology places the importance of lithic technology in a larger context.

Like Black, Burke (2007) attempts to represent quarrying and technology in a larger socio-economic context. As discussed by Burke (2007:64), the various factors that inform our understanding of the exploitation of lithic source areas were heavily influenced by sociocultural, ideational, political, technological and environmental aspects. These variables create a complex picture of prehistoric life ways by demonstrating how raw material resources were important, and further strengthen the argument for more holistic approaches. By not only considering the initial stages of quarrying and processing, we can learn how these choices relate to settlement patterns, subsistence and the overall structure of a society.

Given the role of a quarry and/or workshop site in the landscape, our understanding of lithic production and the varying ways in which it affects a society can only increase. However, hindrances appear in the form of a lack of standardized language, an overwhelming amount of nondescript lithic materials, and a serious lack of any sort of ethnographic evidence (Purdy 1981; Flenniken 1984). Therefore, quarry and workshop sites present an interesting challenge to the archaeologist, promoting investigations which examine why these sites were chosen, why material might have been discarded and how these fixed features influenced exchange and social organization (Ericson 1984:2). It is apparent that these aspects of lithic procurement can provide researchers with a practical means to discuss lithic manufacturing and the uses of stone tools while discussing the various factors which influence these choices.

Chapter 2: Theory and Method in Lithic Procurement Practices

2.1 Introduction

"We want to understand what environment past people lived in and how they exploited and adapted to the possibilities and limits of the environment. It offered them both possibilities and limits. Human culture is, in part, the human response to those challenges" (Kooyman 2000:2).

The above quote provides a simple summary of what ecological archaeologists hope to accomplish by conducting research; that is, relating their work to a larger environmental picture. By understanding how this picture is informed by the various cultural processes that occur in a society, our view of land and resource use can be further supplemented. The use of varied mediums to create useful forms (i.e., stone tools, pottery) and the manipulation of the surrounding environment are informed by interrelated processes which influence decisions. Thus, each environment provides new and exciting possibilities for individuals to create and interact with their material world. Having the ability to explore the dynamic culture history of indigenous peoples through the use of material culture and applicable theory is the backbone of archaeological research.

2.2 Theoretical Issues

Investigation into the cognitive behaviours of past indigenous life-ways is of particular interest to archaeologists. Increased focus in this area over the past two decades has led to the creation of specific theoretical models designed to allow interpretation of these behaviours. Among them, technological organization is used to understand the complex relationship between knowledge and behaviour and how it is reflected in the various stages of the technological process. As a means of understanding these behaviours, it is also important to reflect on how past individuals came to understand where and how to exploit resources.

The following section discusses the theories of technological organization and craft-learning, examining their implications for the field of lithic studies. It is clear that the use of lithic materials not only affects subsistence, but also plays a critical role in the fabric of indigenous cultures, serving to transmit this knowledge from generation to generation.

2.3 Technological Organization

As a theoretical approach, technological organization is used to discuss the act of manufacturing and using stone tools as a response to broader social and economic variables (Leblanc 2000:23). The most popular use of technological organization has been to examine a particular aspect of lithic technology (i.e., cores, debitage) to explain overarching behavioural choices rather than taking a more holistic approach, which considers the entire life of a stone tool, thus providing a more dynamic view of technological approaches to organizational strategies (Burke 2000:297).

Many factors may affect the technological organization of a site or region, including availability of raw materials and mobility. Some researchers believe that when considering settlement patterns and subsistence strategies, availability of raw materials is a key factor for interpreting technological organization (Andrefsky 1994:23). By understanding these patterns regionally, inferences can be made about the specific kinds of resource procurement activities which took place.

The theory of technological organization is most closely linked to that of curation as proposed by Binford (1979). Although some debate exists as to whether curation is performed in response to expedience and efficiency (Binford 1979) or is the result of "time-stress" as proposed by Torrence (1983), both explore the reasons why and for this reaction. On the one hand, the concept of technological organization as first outlined by Binford was a means of understanding the act of curation as a continuation of subsistence-settlement strategies. Curation, as defined by Binford (1979), involved the conservation of materials through efficiency in highly mobile hunter-gatherer groups, highlighting the importance of what Bamforth (1986:39) refers to as "special-purpose task groups". These task groups were each responsible for the efficiency of the hunter-gatherer groups; organizing the exploitation of a multitude of available resources which would subsequently be transported back and consumed by the larger settlement. This type of group efficiency is what Binford (1979, 1980) referred to as curation, arguing that tools would be made in response to the specific tasks at hand, therefore being less formalized.

On the other hand, curation as described by Torrence (1983) relates this aspect of technological organization to what she referred to as "time-stress" and the necessity to produce lithic tools well in advance of use (Bamforth 1986:39). As such, time-stress can be best understood as a response to risk management. At its most basic level, it demonstrates the need for hunter-gatherer groups to often perform mutually exclusive tasks at the same time. This can often create a conflict within the group and as Bamforth argues (1986:39), emphasizes the reality that "no one can do everything at once."

For Bamforth (1986), technological organization as proposed by Torrence (1983) and Binford (1979), does not account for the full spectrum of activities undertaken by indigenous groups. One of the key aspects that Bamforth (1986:40) stresses is that in order to fully comprehend the concept of technological organization, the researcher must also understand the underlying environmentally deterministic factors that dictate when, where and how lithic materials are exploited. As a resource, lithics must be considered in a similar and equally important way to any other resource that was essential to survival. In this way, understanding the location and availability of lithic materials as they related to settlement patterns will enhance our understanding of curation and technological organization (Bamforth 1986:40).

In this sense, the act of procuring and manufacturing lithic tools can be viewed as one of the most important activities undertaken by some hunter-gatherer societies. Fixed geological features in the landscape strongly influenced settlement patterns; however, the situation becomes further complicated when considering other essential resources in an area. It is clear that settlement patterns ultimately could not have been determined by the lithic outcrops in the area alone, but by the distribution of a number of different resources.

Considering this, technological organization attempts to explain past modes of behaviour in relation not only to environmental conditions and constraints, but as a means to explicate the social needs of any given society. The Minas Basin, in some senses, provides an ideal environment for the Late Woodland settlements located in this region of Nova Scotia. The proximity of these settlements to outcrops and waterways, especially the Minas Basin itself, would have provided access to an abundance of resources afforded by Scots Bay. Bearing in mind the importance of mobility in the landscape, the theory of technological organization can provide a framework for considering the diverse strategies and choices made in this environment.

2.4 Lithic Analysis and the Flaked Stone Tool

Unlike some other forms of material culture, stone tools and debris are often well preserved on archaeological sites. Being able to withstand various environmental and human impacts, these artifacts represent one of the main windows into the study of prehistoric life ways (Andresky 2005:1). Throughout the history of archaeological research, the study of lithics has experienced several transformations as researchers have expanded their understanding of the importance of analysing stone. Over the past one hundred years, our knowledge of lithics has only increased to include using replication studies to understand the mechanics of production, identifying morphological changes through lithic reduction sequence studies and refitting tools/blanks or debitage to reconstruct the entire use-life of a stone artifact.

In terms of definitions, the study of flaked stone tools and the waste created from their production has lacked a uniform taxonomy. Explaining the attributes of detached pieces of lithics is one of the most challenging aspects of lithic studies. Of these, the simple term "flake" has caused much of the confusion and, as a result, has garnered a great deal of attention from lithic analysts. Most believe their analytical value has not been fully realized by most researchers (Shott 1994:70). The use of the term "flake" was likely drawn from the work of Holmes (1894), one of the first archaeologists who used the expression in an attempt to explain the processes of stone tool production.

As a researcher, Holmes' (1894) interests ranged from the quarrying process through to the final stages of production. By discussing these processes, he was able to create a sequence model diagram in which he distinguished between the methods for exploiting and procuring lithic materials while stressing the differences between percussion and pressure flaking, and documenting the resulting stone tools created by each technique (Holmes 1894:128). His understanding of morphological differences contributed a great deal to the field of lithic analysis and is still very much discussed today.

Although the work of Holmes (1894) resulted in ground-breaking research in the field of archaeology, researchers were concerned with still understanding the details of flaked stone tool production. Since a lack of relevant ethnographic evidence existed, attempting to comprehend the mechanics of stone-tool production required the development of replication studies. These studies were most notably conducted by Francois Bordes and Donald E. Crabtree during the 1950s and 1960s. Concerning their contributions, Flenniken (1984:190) argues that, "Crabtree was the first replicator of flaked stone tool technologies, and his contributions to flint-knapping were so immense it is impossible to discuss them even briefly". As a result of Crabtree's work, replication studies have been applied in numerous ways to increase our knowledge of stone tool morphologies.

The information gained from these studies has shown that the act of flintknapping can result in variation as a result of technological choice, adapting manufacturing procedures to the lithic materials selected and not as a mere stylistic choice. Although a flintknapper might have a specific design in mind, the ability to execute it effectively relies heavily on the so-called 'workability' of the stone used and the flintknappers' skill. The reductive properties of such material can present different challenges to craft-workers than other mediums, as the ability to rework the object might be limited. The result may be discarded when it is no longer possible to suitably alter the piece (Flenniken 1984:191).

Replication studies have also been useful in typological interpretation, showing slight differences between flaked stone tools as the end result of reuse and reshaping. Reshaping, in this sense, can be defined as "modifications that may occur in an artifact's form over its use-life, from its pristine state at manufacture through to eventual discard or loss" (Ellis 2004:209). What were once thought to be typologically different artifacts have the potential to be connected by including simple maintenance as part of the life history of an artifact.

Another popular approach to lithic analyses is the use of refitting. Refitting can be seen as the reconstruction of manufacturing sequences through the refitting of debitage that has not experienced any further retouch work (Sellet 1993:109). Utilizing refitting as an analytical technique can prove difficult. For example, in applying it to a collection, the act of refitting artifacts can be extremely time consuming given the large amounts of debitage that may exist on a site (Odell 1996:359). However, this strategy can lead researchers to understand which stages of production an artifact may have undergone at a particular site and the methods that may have been employed in its creation. Sellet (1993:109) suggests "refitting tools or non-retouched blanks to a core reveals the morphology of the raw material as it is introduced in the camp (blanks, cores ready for reduction or core in exploration)". Depending on the archaeological data recovered from a site and the time given to analysis of a collection, this can be a useful method.

The replication of stone tools can provide a somewhat accurate depiction of lithic production and the cognitive decisions of the flintknapper. Obviously one of the problems with reproduction is that a modern-day flintknapper does not provide any insight into the social aspects of a prehistoric culture. However, what they can provide is the important analytical information needed to identify the stages of tool production, and make inferences about skill and behaviour. One of the potential problems with these kinds of comparative studies, however, is that many types of tools are basically created in the same way. In particular, the beginning reduction stages have been shown to be similar even though the end product might be different (see Flenniken 1984).

2.5 Craft-learning and the Novice

When taking into consideration the social impacts of technological organization, logically one must consider the actors' role in these decisions. In terms of lithic procurement, exploitation, experimentation, and production, an actor's ability to conduct these tasks is based on a form of institutional knowledge passed from one generation to the next. The image of the novice attempting to learn his/her craft in the presence of experts evokes specific questions relating to how and where such learning would take place; and to what extent 'learning' would be archaeologically visible. First, when attempting to comprehend craft-learning and skill, we must be able to define it. By outlining an appropriate definition for skill, I will demonstrate how these discussions have translated into a larger, more global debate linked to stone-tool making and its influences on society (Bamforth and Finlay 2008).

As a beginner or novice, skill can be best defined in terms of knowledge production and enculturation (Bamforth and Finlay 2008; Shelley 1990). In order to ensure the health of a society, transmitting knowledge of skills and values is a necessary educational process, promoting long-term universal goals and objectives. According to Bamforth and Finlay (2008:1) skill can be defined in a variety of ways, but ultimately it relates to a form of practice. For the purposes of this study, the definition by Ingold (1993:433) is most useful; "Skill is at once a form of knowledge and a form of practice; or-if you will-it is both practical knowledge and knowledgeable practice."

As Shelley (1990:187) states, no one was ever "born" an expert in any craft. Therefore, it is safe to assume that learning skills would be a vital element of an individual's social growth, being able to contribute both in a mental and physical capacity by (1) transferring the knowledge they are gaining themselves to other members of the society, and (2) having the ability to practically apply that knowledge in a tangible form; in this case, stone tools.

In terms of lithic studies, discussions of learning have been minimal in North America, with a majority of the literature emerging from Old World studies (Milne 2005:239). The idea of a child having a significant role in such tasks has not emerged as an important research question in the former region. A common assumption in archaeology is that flintknappers are predominately adult males (Finlay 1997: 203). Until recently, this premise has led to a limited discussion of skill and the craft-learner, and a reliance on ethnographic evidence to establish parallels with past cultures. With the use of feminist theory and gender studies (see Gero and Conkey 1991) it has become possible to break down some of these barriers.

One could argue that the role of educating a craft-learner is as important to a society as the exploitation of resources. By considering the position of the child or the novice, and cultivating an ability to identify the act of learning through its archaeological signatures, we can broaden our research base. Illustrating this process through artifactual evidence will add another facet to the archaeologist's investigations of stone tool manufacture, allowing for a more holistic approach to analysing debitage and a more comprehensive view of how individuals were situated in a social landscape.

2.6 Methodological Issues

A large part of my investigations addresses the importance of flaked stone tools as a medium for cultural knowledge and learning through the phases of procurement, production and use. I will begin this section by outlining the past archaeological work conducted in the field of lithic analyses and provide an overview of the history and limited work conducted on quarry sites. Traditionally, quarry sites have been given little consideration in the archaeological record due to the large amounts of lithic debitage requiring time-consuming analysis (Ericson 1984; Purdy 1984). Additionally, other issues faced when examining quarries have included difficulties controlling the stratigraphy during excavation, thus making it difficult to accurately date the assemblage recovered (Doelman 2005:50). Although painted as being problematic, quarries can be viewed as an essential means of subsistence amongst hunter-gatherer societies and as one of the most important resources utilized by many such groups. With information on lithic sourcing and procurement practices of indigenous populations, researchers can better interpret the movement of past cultures on the landscape. As discussed in the previous chapter, many of the sites used were identified as part of the Minas Basin Archaeological Survey. In order to strengthen the argument that the act of procuring lithics was part of a larger economic structure, I will continue to focus on importance of Davidson Cove quarry/workshop site as a focal point in my investigations. Highlighting this importance will provide more substantial links between Davidson Cove and the other sites in this study.

2.7 Site Selection

Most of the sites chosen for this study were based on sites recorded as part of the Minas Basin Archaeological Survey in 1988. In addition to these, I also considered a variety of sites in the Gaspereau Lake region where preliminary work was completed, as well as the large village site of Melanson excavated by Nash and Stewart (1990). In this region of Nova Scotia, little is known about the Late Woodland period and the potential for continued archaeological work at many of these sites is a distinct possibility.

Site selection was determined by a variety of factors related to the primary research questions. Clearly, when attempting to understand settlement patterns and economic rounds as related to the quarry/workshop site of Davidson Cove and related outcrops of Scots Bay chert, it was important to select sites which exhibited similar characteristics. Although Davidson Cove is thought to be the only known area from which Scots Bay chert was quarried, identification of other outcrops, and in turn, their relationship to settlement areas were also considered.

Sites were selected based on three main criteria. These included: (1) the presence of Scots Bay materials was documented on the site or the collection was available for analysis; (2) the site was located within the Minas Basin region or in proximity to other Late Woodland sites in the region; and finally, (3) the sites were all contemporaneous during the Late Woodland period. This final criterion was essential in order to provide some consistency when analysing the data as a whole. Although it remains unclear how long Davidson Cove was utilized in this capacity, one radiocarbon date and the presence of one side-notched projectile point situate it in the Late Woodland period (AD 1000-1500). Based on this, identifying sites of the same time period would hypothetically aid in creating a clearer picture of economic subsistence patterns during this period.

2.8 Sampling

A variety of samples were used for this study, resulting from the Minas Basin Archaeological Survey and other field seasons. The samples analyzed primarily came from Davidson Cove, St.Croix, and Clam Cove. The bulk of the materials from Davidson Cove are housed at the Nova Scotia Museum, while the samples from St. Croix and Clam Cove are on loan to Memorial University of Newfoundland. All diagnostic artifacts, including hammerstones, from Davidson Cove are stored at Memorial University of Newfoundland as well. The following section will outline sampling techniques, with particular attention given to the types of artifacts sampled from each site.

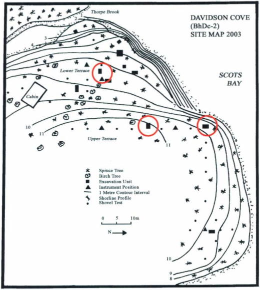

Figure 2.1 Davidson Cove site map. Units sampled circled in red (courtesy of Michael Deal)

2.8.1 Davidson Cove

At the quarry/workshop site of Davidson Cove a random sample of debitage was chosen based on excavations undertaken during the 2003 field season. Possible multiple processing areas were observed by Deal (2003) at this time. In order to build on this hypothesis, artifacts from the upper and lower terraces of the site were sampled.

The units sampled at Davidson Cove included N35 E17, S0 W2, and N6 W9 (Figure 2.1). Samples consisted of all debitage recovered during unit excavations, collected in naturally stratified layers. The debitage was then taken to the Department of Geology, Acadia University, where it was washed and preliminary identification occurred. Subsequently, the debitage was re-bagged based on excavation unit and identification (i.e., reduction flakes, pressure flakes, cores), and stored at the Nova Scotia Museum, Halifax.

Cores and other stone artifacts recovered from this site are stored at Memorial University and were also considered in this study. All such material found in the above units is discussed in the Data Presentation section, as it relates to processing on the site, based on information in the original site records of the 2003 field season.

2.8.2 St. Croix

Although previous excavations were undertaken at St. Croix by John Erskine, the materials sampled for this study were the result of the later work conducted by Deal (2003) in the area. All materials housed at Memorial University were used for this study, namely lithic artifacts. Although the materials recovered on the site were diverse, sampling focused on the array of artifacts, mainly projectile points, cores and some debitage.

2.8.3 Clam Cove

As with St. Croix, all lithic material housed at Memorial University from Clam Cove was include in the analysis. Erskine's previous investigations, although they yielded some lithic artifacts, were not included. All non-lithic artifacts contained in this collection are noted in the Data Presentation section, to further reveal how the site was utilized during the Late Woodland period.

2.9 Laboratory Analysis and Techniques

All lithic materials were washed, dried and labeled at Memorial University of Newfoundland upon return from the field. Debitage was not given individual artifact numbers. During this study, not all artifacts were available for analysis; as such, the data analyzed from various sites is the result of examining site reports and published literature. Initially, artifacts stored at Memorial University of Newfoundland were analyzed. This primarily consisted of stone tools from Davidson Cove and lithic materials from St. Croix and Clam Cove. Additionally, a random sampling of lithic debitage from Davidson Cove was analyzed at Memorial University after being obtained from the Nova Scotia Museum.

In the latter case, a random sample was used to determine the stages of stone tool reduction and production occurring on-site. This technique was utilized because a simple random sample should yield a representative selection of artifacts or activities from the population selected. It was also selected due to the size of the collection. Davidson Cove has yielded approximately one half ton of lithic materials, which is too large a collection to analyze completely in the time available. The following sections outline and discuss the methods and procedures conducted for artifact analyses.

2.9.1 Debitage Analysis

My analytical model is based on bifacial reduction, the type of stone tool manufacture believed to have occurred at the Davidson Cove and St. Croix sites. In a study conducted by Patterson (1990:550), it was shown that "bifacial-reduction processes in lithic manufacturing at an archaeological site often can be recognized by the presence of bifacial specimens in various degrees of completion". Considering this, the aim of my analysis was to recognize populations of flakes which would represent varying degrees of bifacial reduction, and determine how those patterns changed as tools made of Scots Bay chert traveled throughout the landscape.

Stone tool production of this kind is reductive, and therefore flake size should decrease as a flintknapper proceeds through the manufacturing process. Although the interpretation of bifacial reduction can be based on the analysis of flake size, this method is more useful when used with other methods of lithic analysis (Stahle and Dunn 1982:94). I chose to examine debitage for evidence of bifacial reduction through typological analysis. This method is based on examination of one or more debitage attributes, and can show that an individual flake represents the production of certain artifact types even if the artifacts themselves are not recovered on a site (Andrefsky 1999; Odell 2003).

Analysis of debitage initially followed the free-standing typology proposed by Sullivan and Rozen (1985). Although the free-standing typology has received much criticism (see Amick and Mauldin 1989) the underlying idea can be quite useful to lithic analysts (Andrefsky 128:2005). Essentially a dendrogram, the free-standing typology was used in this study as a means to separate debitage into groups which could then be further evaluated based on size, weight and the two attributes, namely flake termination and striking platform, described below. As stated by Andrefsky (127:2005), this method provides the researcher with a list of criteria that can be easily replicated, relying on objectivity to begin the initial stages of analysis.

I used the free-standing typology to categorically place debitage into four types; complete flake, broken flake, flake fragment or debris. A complete flake is denoted by intact margins, meaning there is an intact distal end which exhibits a feather, plunging or hinge termination, while a broken flake does not have intact margins (Crabtree 1972:63, Sullivan and Rozen 185:759). Flake fragments and debris represent debitage from which significant attribute data cannot be gleaned due to various complicating factors, including point of applied force and single interior surface. Once flakes were placed within these categories based on the free-standing typology method, I then quantified the complete flakes and broken flakes based on two attributes: (1) termination type (i.e., feather, hinge, step, plunging) and (2) striking platform type (i.e., flat, cortical, complex, abraded).

Based on the size of the sample, I chose these attributes as the two which would be most effective in revealing the types of stone tool production present at the various sites, particularly at Davidson Cove. Striking platform types can reveal types of manufacture, showing preparation of, or manipulation to, the objective piece involved (Andrefsky 94:2005). The striking platform not only reveals the care that the flintknapper took when creating the objective piece, but can also reveal the level of skill which the knapper possessed. Termination type can disclose similar information. Although the type of stone can influence the way in which flakes are detached from the objective piece, the flintknapper plays a significant role in this process. The decisions of the knapper can be represented through termination type by revealing the types of percussion used as well as the amount and direction of force applied.

2.9.2 Stone Tool Analysis

Analysis of stone tools can place the quarry/workshop site, outcrops, and other areas of settlement into a pattern of seasonal rounds, contributing to our understanding of how technology affects the life-ways of prehistoric peoples (Burke 2007:64). Within the collections available, types of stone tools identified included bifaces, hammerstones, bipolar cores and scrapers, as well as numerous preforms and blanks. Combined with the information gained from the debitage analysis, a clear picture of site activity has emerged, demonstrating the importance of stone and how its acquisition and reduction affected daily life.

The assignment of blanks, preforms and bifaces were based on the stages of reduction proposed by Callahan (1979). Used as a model for the Palaeoindian production of Clovis points, he suggests that there are nine stages according to which bifaces can be classified (Callahan 1979:35-37). For the purposes of this study, I used stages 1-4 (which relate to the process of bifacial tool production) when analyzing the collections of stone tools from Davidson Cove. The later stages, 5 and 6, relate to hafting modifications and were considered during the analysis of bifaces from settlement sites, like St. Croix and Clam Cove.

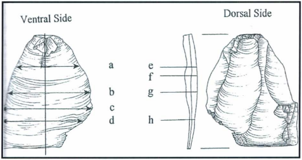

Figure 2.2 Flake width and thickness measurements (adapted from Andrefsky 2005:101)

2.9.3 Weights and Measurements

All complete artifacts were both weighed and measured. In this sense, complete refers to an intact artifact, exhibiting distal and proximal sections. A complete piece of debitage has a point of force and a feather, plunging or hinge termination. Measurements of stone tools and complete pieces of debitage were taken at two points. The stone tools were measured from the maximum proximal point to the maximum distal point and debitage was measured from the striking platform to the maximum distal point. Both stone tools and debitage were measured for width at ½ the maximum length (Figure 2.2).

2.10 Summary

Both theoretically and methodologically, my research attempts to understand the relationship between past societies and their technological behaviours. Using lithic studies to draw inferences about these behaviours can demonstrate the importance of stone material culture to indigenous peoples.

When considering lithic sourcing, environmental factors play a leading role in dictating modes of behaviour. These interactions with the environment can lead to certain decisions which will in turn affect subsistence strategies (Leblanc 2000). It is easy to assume that this knowledge related to subsistence and where resources can be acquired/exploited is acquired from other members of the society and is not inherent. From this, it can further be argued that in each society there were groups of experts, responsible for the training of novices. One can then ask how the act of knowledge transmission affected the society and its behaviours. Clearly, teaching crafts would have been essential to the survival of a culture, in part by transferring knowledge regarding fixed features and resources in the landscape that could be continually exploited.

Although the theories presented can prove controversial in the respect that they often imply that human behaviour is somewhat predictable and decisions are not easily distinguishable, drawing from these bodies of literature results in an interesting examination of prehistoric cultures through various forms of technological behaviour.

Chapter 3: Natural History of the Minas Basin Region

3.1 Introduction

The Minas Basin region of Nova Scotia has a rich geological and natural history. Situated at the eastern end of the Annapolis Valley, this area is characterized by a rolling landscape and predominately mixed forest vegetation. Historically, the Annapolis Valley was used for extensive farmlands in the nineteenth century. Similar to New England, this area had experienced extensive clear-cutting during this time period. However, the Annapolis Valley has since begun to revert to the forest growth that existed before the nineteenth century agricultural boom (Simmons 1984:2:649).

The abundance of natural resources in this diverse environment makes it obvious why prehistoric indigenous peoples would have been drawn here. Situated in the lowlands surrounding the North Mountain, the resources available in the Minas Basin and surrounding area can aid researchers in establishing the settlement and economic patterns of indigenous culture groups. It is particularly important that researchers are able to distinguish between the resources available in the Minas Basin, and those obtainable elsewhere when, establishing a framework for prehistoric activity.

This chapter highlights the importance of Scots Bay chert as a resource, providing a description of the material and discussing its distribution in the region. I also focus on this material in a larger context, discussing the broader natural and geological history of the Annapolis Valley region of Nova Scotia with particular attention to the Minas Basin and the Fundy shoreline. Finally, I provide an overview of the other regional geological resources available, their history and how they might have contributed to prehistoric lithic use in the Late Woodland period.

3.2 Ecology of the Minas Basin

The combination of rich geological resources, landscape, and the extensive waterways of the Minas Basin contributed to the popularity of this region. While lithics were clearly an important resource, the Late Woodland groups of the Minas Basin also depended greatly upon the flora and fauna present in the area. The abundance of various species made this region particularly attractive to indigenous people, drawing them to establish settlements on the shores of the Minas Basin and Scots Bay proper.

In terms of faunal species, they include but are not limited to grey seals (*Halichoerus grypus*), harbor seals (*Phoca vitulina*), American mink (*Mustela vision*), loons (*Gavis* sp.), black duck (*Anas rubripes*), eiders (*Somateria* sp.), white-tailed deer (*Odocoileus virginianus*), osprey (*Pandion haliaetus*), great blue heron (*Ardea herodias*) and red squirrel (*Tamiasciurus hudsonicus*) (Halwas 2006; Wilson 1997). These were identified primarily through a report from Isle Haute (Wilson 1997) but other species have been identified on archaeological sites around the region. Erskine (1998:90) also noted the presence of black bear (*Ursus americanus*), beaver (*Castor canadensis*), moose (*Alces alces*), woodland caribou (*Rangifer caribour*), river otter (*Lutra canadensis*), Canada goose (*Branta canadensis*), and great auk (*Pinguinus impennis*) (Halwas 2006:15).

In the mudflat and estuary areas along the shoreline of the Minas Basin and Cape Split, an abundance of saltwater resources are also present. The high amount of freshwater drainage and the presence of salt marshes compose a unique environment ideal for many shellfish species (Fuller and Trevors 1977:2). These include periwinkle (*Littorina littorea*), whelk (*Buccinum undatum*), soft-shelled clam (*Mya arenaria*), ocean quahog (*Arctica islandica*), and blue mussel (*Mytilus edulis*) (Fuller and Trevors 1997). Within the open waters of the Minas Basin, such species as flounder (*Liopsetta putnami*), monkfish (*Lophius americanus*), herring (*Clupea harengus*), Atlantic salmon (*Salmo salar*), American smelt (*Osmerus mordax*), gaspeareau (*Alosa pseudoharengus*), shad (*Alosa sapidissima*), Atlantic cod (*Gadus morhua*) and pollock (*Pollachius virens*) can also be seen (Bromley and Bleakney 1984).

Furthermore, the Minas Basin is home to variety of floral species in the predominately mixed forest vegetation that comprised the area. Tree species include various maples (*Acer* sp.), alder (*Alnus* sp.), birch (*Betula* sp.), beech (*Fagus* sp.), spruce (*Picea* sp.), popular (*Salicaceae* sp.) and aspen (*Salicaceae* sp.). Other flora species have also been identified in a prehistoric context at the site of Clam Cove (see Halwas 2006) which include raspberry/blackberry (*Rubus* sp.), strawberry (*Fragaria virginiana*), chokeberry (*Aronia* sp.), pin cherry (*Prunus virginianana*), blueberry (*Vaccinium* sp.), watercress (*Nasturtium officinale*) and common elderberry (*Sambucus canadensis*) (Halwas 2006:111-114).

Considering the variety of natural resources available in this region, it is not surprising that the Minas Basin was one of the most populace parts of the Maritime Provinces. The abundance of natural resources combined with the geological formations made this an ideal area for resource exploitation and habitation.

3.3 Description of Scots Bay Chert

The study area forms part of the Appalachians which is composed of four major geological zones; the Taconian, Acadian, Permian, and Avalonian (Grant 1987; Roberts 1996; Roland 1982). The Bay of Fundy region is in fact part of a Triassic-Jurassic basin dating to the Mesozoic era (Figure 3.1). This basin, formed during the rifting of continents, is mostly located under the Bay of Fundy; however, some of the geologic formations from this period are still visible in the Minas Basin in the North Mountain basalts and limestones observed there today (Burke 2000:26). These formations were created when rifting produced basalt flows followed by silica rich hydrothermal fluids which created the siliceous rocks such as chalcedony, jasper or chert. These cherts, jaspers and chalcedonies were an important geological resource available in the region (Burke 2000:26). The Scots Bay Formation, which overlies the North Mountain Formation, is primarily composed of limestone but also has chert-bearing units which were heavily utilized prehistorically (Burke 2000:228). The chert, which varies greatly in size, occurs in the form of nodules within the Scots Bay Formation. More specifically, Thompson (1971:144) states that Scots Bay chert "occurs in two forms; in the first case as replacement nodules in the limestone and siltstone; and secondly as…extensive bedded deposits" (Figure 3.2). In the Scots Bay region, the outcrops of limestone are extensive, but there are limited locations which would have been accessible for quarrying activities.

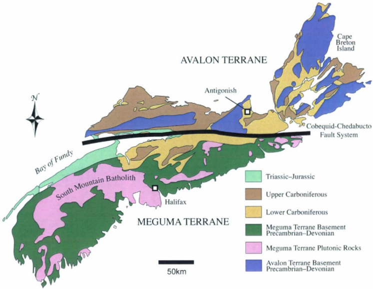

Figure 3.1 Geological formations of Nova Scotia
(Courtesy: http://earthsciences.dal.ca/people/schenk/Meguma/NovaScotia2006.jpg Accessed 23 May 2011)

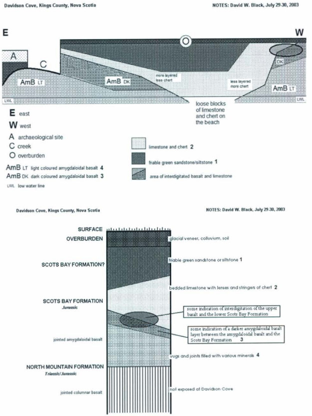

Figure 3.2 Geology at the Davidson Cove Site (courtesy David W. Black, UNB)

Figure 3.3 Scots Bay chert material from North Mountain Formation (Photo by Micheal Deal)

The word *chert* has been traditionally used as a universal term to describe sediment deposits primarily composed of cryptocrystalline silica (Thompson 1971:151). As a material, chert is distinguishable by colour, texture, internal structure and water content (Deal 1991; Crotts 1984). This internal structure of tightly composed fibrous grains of quartz, and the high silica content dictate the fracture behavior of the material. Cryptocrystalline materials fracture in a similar fashion to glass, which is also primarily composed of silica, in that fractures have a cone-like appearance, referred to as a conchoidal fracture (eg., Andrefsky 1998:23; Hellweg 1984:20-21).

As a result of extreme freeze-thaw and the tidal action of the Bay of Fundy, large cobbles of Scots Bay chert become detached and are often seen on the shores of Scots

Bay at low tide (Figure 3.3). It is possible that prehistoric peoples exploited the materials on the beach rather than extracting lithic material directly from the formation (Figure 3.3). Davidson Cove (BhDc-2) and Ross Creek (BhDc-9) seem to be the two most likely locations where this activity occurred, given their accessibility to the beach below the exposed formation. In this region, other areas which contain outcrops of Scots Bay chert may be difficult to access due to cliffs (Deal nd-a). Alternative outcrops of Scots Bay materials occur on Isle Haute, located in the Bay of Fundy, and at the Cap D'Or lighthouse (BhDe-2).

The Scots Bay materials typically range in colour from gray to reddish-brown (Burke 2000; Crotts 1984; Deal 1991; Thompson 1971). Although not common, some concentric banding can also be present. In addition, the Scots Bay formation contains some lithic sub-varieties of chalcedony, which include agate and jasper (Burke 2000, Deal 1991). The jasper from Scots Bay appears in two different geological samples. The first is an opaque dusky red along with the red-yellow slightly waxy jasper within the North Mountain basalt (Burke 2000:233). Chalcedony, a fibrous variety of quartz, is predominantly a translucent blue-gray in colour and is present as a replacement material contained within the limestone deposits of the formation (Thompson 1971: 151-152). It is also important to note that the level of impurities structurally represented within chalcedony can often alter its colour.

Figure 3.4 Exposed Scots Bay Formation (photo by Michael Deal)

There is evidence that prehistoric knappers heat-treated the Scots Bay materials, essentially making them more workable. The materials found at Scots Bay are considered of an inferior quality, due to irregularities in the stone causing cavities, known as vugs, which disrupt the direction of force a knapper applies to the objective piece. The act of heat-treating changes these flaking characteristics, producing more desirable effects when knapping stone. Successful heat-treatment can be achieved by raising the material's temperature to between 225 and 250 degrees Celsius. This makes the act of removing flakes easier in the sense that less force and pressure are needed in the process (Root 1992:26). Once heat-treated, Scots Bay chert losses its reddish-brown color, ranging between variations of white and salmon/pink (personal communication Tim Rast, Fall

2009). Other evidence of heat-treating can include the appearance of pot-lids on the surface of the heated materials and a reddened cortex.

In the past, colour and texture have been the primary form of regional identification of lithic materials by archaeologists. In recent years, advances in geo-chemical testing have been used to examine the accuracy of visual identification with the ultimate goal of better source determination (Burke 2000). The Scots Bay materials sometimes identified on archaeological sites are often difficult to distinguish from other sources in the region. Burke (2000) argues that the materials from Scots Bay, particularly the Minas Basin, are visually similar to materials from New Brunswick, most notably Washademoak cherts and Gaspe Peninsula agates and jaspers.

Burke (2000:253) conducted tests on Scots Bay materials from the Minas Basin and Washademoak materials using XRF analyses. Both appear to have few impurities, thus making them difficult to distinguish both visually and chemically. However, Black et al. (2004) contradict Burke's claim (2000:235), suggesting that it may be possible for archaeologists to distinguish between Carboniferous-associated cherts (Washademoak) and Mesozoic-associated (Minas Basin) sources. Using low-powered techniques, archaeologists may be able to distinguish the two based on three unique factors, namely the occurrence of carnelian, translucency, and strain fractures (Black et al. 2004:8). Evidence suggests that in the Woodland periods Washademoak and Scots Bay cherts were both heavily utilized, presenting the possibility that a mixture of these materials could exist on some sites. This highlights the importance that this distinction could have on archaeological investigations (Black 1997; Black et al. 2004; Burke 2000).

Although the Scots Bay materials are abundant in the area, particularly at the quarry/workshop site of Davidson Cove (BhDc-2), definitive identification of Scots Bay chert may be difficult to achieve at some sites in the region, even when chemical testing is used as an additional means of analysis. It is clear, due to the conflicting views of Burke (2000) and Black et al. (2004), that identification techniques need to be refined, for distinguishing between various chert types in the region.

3.4 Regional Lithic Resources

Interest in lithic resources in the Maritime region became a popular pastime for amateur geologists during the late nineteenth and early twentieth centuries. Of note, Abraham Gesner (1797-1864) of Nova Scotia and George F. Matthew (1837-1923) of New Brunswick contributed greatly to geological and natural history in eastern Canada (Black and Wilson 1999; Mitcham 1995).

Gesner, said to be the first provincial geologist in New Brunswick, spent much of his life identifying the lithic resources associated with Washademoak Lake (Black and Wilson 1999:83). He traversed a great deal of the New Brunswick and Nova Scotia landscapes, recording the mountains, rivers, and other things he found captivating (see Mitcham 1995). Matthew, who was also an ardent collector and observer, contributed significantly to Gesner's preliminary investigations in the region. Although Gesner was interested in the activities of aboriginal peoples, it was Matthew (1900) who took a particular interest in how native cultures transported and utilized lithic materials, both local and exotic (Black and Wilson 1999:84).

When understanding the geological resources available in any region, we must also understand what the terms 'local' and 'exotic' imply in an archeological context. For researchers, 'exotic' does not necessarily refer to the geological properties of the material, but instead is defined culturally (Black and Wilson 1999:83). A material which is 'exotic' is one which has been affected by cultural processes including transportation as part of a tool kit and/or trade/exchange. That being said, cultural processes are not limited to economic ones. The transportation and utilization of various regional materials contribute to the complexities of archaeological sites (Black and Wilson 1999:83). It was these definitions of 'local' and 'exotic' which guided analyses of early reports, such as that of Matthews noted above.

Identified lithic source areas of Late Woodland cultures include Munsungun Lake in Maine, Lake Témiscouata in Quebec, Ramah Bay in Labrador, Washademoak Lake in New Brunswick and the Minas Basin in Nova Scotia (Black et al. 2004). In Nova Scotia, Scots Bay chert and White Rock quartzite seem to be the two most highly utilized materials present in collections from prehistoric sites around the Minas Basin. In the following paragraphs, I will discuss the distribution of White Rock quartzite, given its frequent appearance with Scots Bay chert, as well as Washademoak cherts, due to its possible overlap with Scots Bay materials.

While the Scots Bay outcrops have been well documented by geologists and other rock enthusiasts, the White Rock Formation outcrops are extremely widespread throughout Yarmouth County, making identification of specific collecting locations challenging. Mainly composed of volcanic deposits, this formation dates to the

Palaeozoic Era and is characterized by quartzite interbedded with slate (Simmons et al. 1984:1:24; 2:506). This material primarily appears in the region as quartzite deposits, and is reported to be well-exposed on Cape Fourchu, south of Yarmouth County (Thompson 1974:8). Given its frequency and accessibility across the landscape, it is difficult to determine where prehistoric groups might have extracted these materials. However, the closest outcrops to late prehistoric sites in the Minas Basin occur near the town of White Rock, located along the Gaspereau River between the Melanson site and sites on Gaspereau Lake. Nash and Stewart (1990:198) note that cobbles of White Rock quartzite can even be collected in the river near the Melanson site.

Washedomoak cherts, from the Washedomoak Lake region of New Brunswick, were first identified by Gesner in 1840. His investigations offer the first description of chert after discovering the material eroding onto the beach of Washademoak Lake in the area of Belyeas Cove (Black and Wilson 1999:83). However, it was Matthew who investigated the source more fully. Black and Wilson (1999:84) argue that the study conducted by Matthew (1900) on the chert source is "the most comprehensive archaeological consideration of the source presented to date". His interpretations and interest in stone tool production have been invaluable to researchers conducting work in this area today.

Located approximately 50-60km from Saint John, this area was a well known source to indigenous peoples. In particular, there are two locations where the outcrops exist along the lake: one at Belyeas Cove and the other at MacDonald point (Black and Wilson 1999:86). These two locations afforded exposed outcrops along the shoreline and seem to be the most likely quarrying and acquisition points for prehistoric activities, although no evidence has been found to support this (Black and Wilson 1999:87).

3.5 Summary

The rich history of geological exploration in the Minas Basin region has greatly contributed to our understanding of the occurrence of lithic materials and how they relate to prehistoric procurement and production. Identification of various materials and how they are situated in the landscape can aid in the reconstruction of past economic rounds and settlement patterns. Given the frequency of Scots Bay chert, along with other materials such as Washademoak chert, this chapter also highlights the importance of refined visual and geochemical analyses for archaeological investigations.

The abundance of Scots Bay chert in the region, though limited to a few accessible outcrops, suggests the importance of this material in the Late Woodland period. It can be argued that exploration and exploitation of this particular lithic material shaped much of the prehistoric lithic economy in the region. The next chapter provides an overview of archaeological work at Late Woodland sites in the Minas Basin region and a discussion of the use of Scots Bay chert.

Chapter 4: Previous Archaeological Research

4.1 Introduction

Although archaeological exploration in the Minas Basin region of Nova Scotia has been limited, it has provided researchers a glimpse into the Late Woodland period in this region. Extending from AD 1000-1500, the Late Woodland is often characterized by the use of pottery and increased sedentism as a result of the advent of horticultural practices in Northeastern North America (Asch Sidell 1999). However, native populations in the Maritime Provinces may not have adopted horticulture (Deal 2008), but continued a pattern of seasonal mobility. Surrounded by important geological resources, the sites located around the Minas Basin demonstrate a dependence on lithic raw materials as well as other natural resources vital to a foraging economy.

This chapter describes the archaeological excavations undertaken at Late Woodland sites within the Minas Basin with a particular focus on occupation type and an overview of each artifact assemblage, situating them in both cultural and temporal contexts.

Table 4.1 Archaeological Chronology of Nova Scotia (Adapted from: http://museum.gov.ns.ca/arch/cttime.htm)

Archaeological Periods of Nova Scotia	
Period	**Date Range (years BP)**
Post-Contact Mi'kmaq	*c.400-0*
Contact Period	*c.500-400*
Woodland Period	***c.2,500-500***
Archaic Period	*c.9,000-2,500*
Paleo-Indian Period	*c.11,000-9,000*

4.1.1 Davidson Cove

The site of Davidson Cove (BhDc-2) is located in the Scots Bay area of Nova Scotia, along the Bay of Fundy, and is situated atop an exposed outcrop of North Mountain Basalt at the mouth of Thorpe Brook (Deal 2003:4). Vital to this discussion, the material of importance at Davidson Cove is the chert-bearing replacement nodules that occur within the limestone of the Scots Bay Formation. Consisting of two terraces which line the shore (Figure 4.1), Davidson Cove is often subject to extreme freeze/thaw effects in the winter months and is constantly battered by storms, undercurrents, and the dramatic tidal changes of the Bay of Fundy (Deal 2004).

Originally recorded by John Erskine, the site of Davidson Cove was later investigated as part of a large-scale survey in 1988 conducted by Dr. Michael Deal of Memorial University. The Minas Basin Archaeological survey aimed to "reconstruct prehistoric land and resource use patterns in the Minas Basin area of central Nova Scotia"

(Deal 2003). At Davidson Cove, further excavations began in 2003 after preliminary testing uncovered a wealth of lithic artifacts.

A radiocarbon date of 1540 +/- 110 B.P. on charcoal collected in 1988 indicates that this site was being visited as early as the late Middle Woodland (AD 500-1000) period. The materials collected consisted solely of lithics, almost entirely comprised of Scots Bay chert, and included debitage, preforms, and one small, side-notched (Late Woodland) projectile point. It was apparent from this assemblage that indigenous peoples were not only quarrying but also producing stone tools in this region for an extended period of time. This was further evident by discernable processing areas identified by Deal (2004). It appears that this site was used strictly for lithic procurement and processing, as no identified habitation component was present at Davidson Cove.

This assemblage makes Davidson Cove the only known lithic quarry/workshop site in the region. It is probable that indigenous people from around the region traveled to this site as part of a seasonal round. The Minas Basin contains a wealth of natural resources and hunting opportunities, making it an attractive environmental niche and therefore an important location which can enhance our understanding of prehistoric lithic economies in this area of Nova Scotia (Erskine 1998; Deal 2003; Nash et al. 1991).

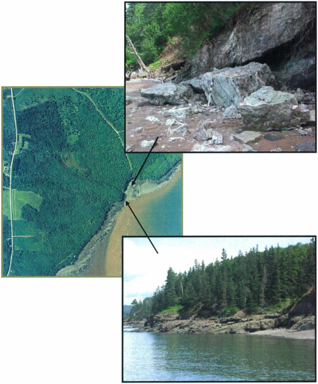

Figure 4.1 The Davidson Cove site (BhDc-2). Note the large nodules of Scots Bay chert on the beach and the site's location along the shoreline (Courtesy of Michael Deal).

4.1.2 Ross Creek

The prehistoric site of Ross Creek (BhDc-9) was also identified in 1988 as part of the Minas Basin Archaeological Survey. The site itself is located on and around cliffs of North Mountain Basalt. Evidence suggests that this location may have been a quarry site, similar to Davidson Cove (Deal 1988). Although the site area is mainly represented by large outcrops of Scots Bay chert, this area has suffered a high rate of erosion caused by the freeze-thaw effect and run-off during the spring months. A significant amount of human disturbance is also seen in this area, likely caused by geologists and amateur rock collectors (Deal 1988). Many flakes and cores of chalcedony are visible on the beach, but it is inconclusive whether or not these are the result of human activity. Further investigation could prove fruitful in establishing the extent of the Late Woodland period in the North Mountain region of Nova Scotia.

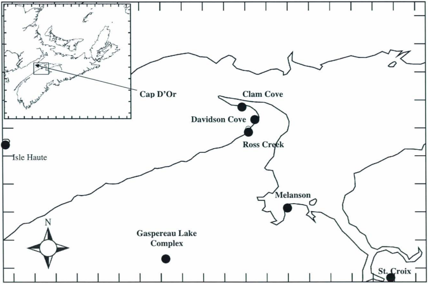

Figure 4.2 Late Woodland sites in the Minas Basin (map by Ryan Stanley)

4.1.3 Isle Haute

Isle Haute, known as Maskusetkik in Mi'kmaq, is a remote island located in the Bay of Fundy. Found 32 km south from the New Brunswick shore, Isle Haute is one of a few large islands located in this vicinity. Although the island is no longer inhabited, many find it to be an alluring location in the Bay of Fundy due to its colourful history (Conlin 2000). The focus of a mixture of legends and ghost stories, the mysterious nature of Isle Haute has made it a popular target for looting and disturbance.

Archaeologically, connections to Nova Scotian prehistory on Isle Haute were first discovered by John Erskine in 1956. He recorded various artifacts there during his employment with the Nova Scotia Museum and his records offered important information regarding a variety of resources, including an assortment of floral samples. In 1997, a full survey of the island was conducted by the Nova Scotia Museum, whose findings elaborated on the work of Erskine. Evidence from Erskine and the subsequent survey by the Nova Scotia museum suggest that this island was an important location for exploiting a variety of floral and faunal resources (Erskine 1998; Christianson and Keenlyside 1997).

Like Davidson Cove, Isle Haute exhibits outcrops of the Scots Bay formation. No evidence of mass lithic procurement is evident here and it is unlikely that Isle Haute was used for quarrying activities. Instead, it is feasible that this was a way-point during seasonal rounds, maintained by the discovery of two lithic scatters and a corner-notched projectile point recorded in 1996 (Christianson and Keenlyside 2000:9).

4.1.4 Cap D'Or

Near Parrsboro, Nova Scotia, Cap D'Or (BhDe-2) is located on the northern coast of the Bay of Fundy. This area is characterized by an outcrop of North Mountain Basalt, similar to that seen at Davidson Cove, Ross Creek and Isle Haute. Evidence suggests that this area may have been a quarry and workshop location used by native inhabitants for quite some time. Therefore, both Davidson Cove and Cap D'Or are possible locations for both lithic procurement and production in the Minas Basin, however Davidson Cove is the only verified quarry/workshop site.

David Keenlyside (1983:19) published the findings of his preliminary testing at Cap D'Or in 1978 and 1980 and his initial impressions of the area. Due to lighthouse construction on the cape, many sections of the site have experienced extensive disturbance over the past one hundred years. Excavation of undisturbed areas around the lighthouse yielded artifacts dating to the Middle to Late Woodland periods (AD 500-1100). A number of castellated and dentate impressed ceramic sherds were recorded along with an area which appears to have been utilized as a lithic workshop due to the high density of debitage (Keenlyside 1983:19). Unlike Davidson Cove, it is possible that the quarry/workshop at Cap D'Or had a habitation component associated with it, which is evident by the ceramic sherds represented in the collection.

A number of pieces of native copper were recovered from this site; a rare find in Nova Scotia and the rest of the Maritime provinces (Keenlyside 1980:16). It was previously thought that a copper source did not exist in this region. However, Leonard (1996:90) suggests that the work of early researchers share a common belief attributing native copper to sources around the Bay of Fundy (see Smith and Wintemberg 1929; Hadlock 1941). This naturally occurring resource was in all probability procured in conjunction with the available lithics as part of a seasonal round. Although easy to obtain in its natural occurring form, it is unclear in what capacity the copper may have been used, as modified pieces have yet to be recovered on nearby sites within the Minas Basin (Keenlyside 1983:19). However, some copper tools have been recovered from sites within Nova Scotia, New Brunswick and Maine which may be attributed to the copper occurring in this region (Monahan 1990; Leonard 1996).

It is important to note that, based on archaeological investigations at Cap D'Or, Keenlyside (1980:16) had hypothesized the use of Scots Bay chert at the Paleo-Indian site of Debert, located in Colchester County, Nova Scotia. Through visual identification, it is apparent that similarities between Scots Bay chert and artifacts at Debert exist; however without further chemical testing, this remains speculative. In addition, the existence of copper at Cap D'Or, previously thought to be derived from the Lake Superior region, has important implications for prehistoric Maritimes economy thatneed to be addressed with additional research (Keenlyside 1980:16).

4.1.5 Clam Cove

Like Davidson Cove, Clam Cove (BhDc-5) was revisited as part of the Minas Basin Archaeological survey in 1988. The site is located on Cape Split, Kings County, Nova Scotia and was historically the location of a lumber mill as well as a "popular recreation area in the late 1800s" (Deal 2004:18). On a larger scale, Cape Split is part of the Scots Bay formation and extends into the Bay of Fundy. Its shoreline is characterized by steep cliffs of exposed North Mountain basalts combined with the cherts and chalcedonies of the Scots Bay formation. As with Davidson Cove, this area is also strongly affected by the tidal actions of the Bay of Fundy and exhibits a high rate of erosion.

Erskine was the first to identify the site of Clam Cove in 1964. He originally recorded the area as having large shell middens which are believed to have eroded since the 1960s due to their location near the cliff's edge (Halwas 2006:21). The excavations conducted by Erskine in this area produced remains of various faunal species which included, but were not limited to, white-tailed deer, porcupine and whelk, as well as a few pottery sherds and a variety of lithics, mainly of Scots Bay chert (Halwas 2006:21).

Excavations in 1988-1989 yielded a radiocarbon date of 2170 +/- 140 BP (Beta-49257) from a deep pit feature, which dates the main portion of Clam Cove to the Middle Woodland period, similar to Davidson Cove. During these excavations, Deal (2004:13) also recovered a number of pottery sherds which were decorated in a linear dentate design, indicative of the Middle to Late Woodland periods. In 2004-2005, excavations at Clam Cove were continued by Deal and Halwas, and produced a number of stone artifacts, including corner-notched projectile points, scrapers, fishing weights or plummets, hammerstones, cores, and a large amount of lithic debitage. A second radiocarbon date of 1150 +/- 70 BP (Beta-204761), based on shell from the remnants of the shell midden reported by John Erskine, provides a chronological marker for the Late

Woodland component of the site. A number of historic artifacts were also recovered during this field season (Halwas 2006:22).

Aside from site excavation, an analysis of floral remains has also been conducted on sediment samples from Clam Cove. Conducted by Sara Halwas (2006), the samples produced a variety of edible plant species including strawberry, blueberry, elderberry, and raspberry (2006:59). Based on the artifact assemblage and the floral analysis, it can be assumed that Clam Cove was used as an indigenous camp site during the Woodland periods (Deal 2004b; Halwas 2006). It is also possible that it may have been the habitation component associated with lithic procurement at Davidson Cove.

4.1.6 St. Croix

The site of St. Croix is located in the Minas Basin proper, on the St. Croix River drainage in Hants County, Nova Scotia. On the banks of the river, this site can be described as a key location for subsistence activities related to anadromous fish-runs of salmon and gaspereau (Erskine n.d.; Deal 2007; Halwas 2006).

Although the work conducted by Erskine in this area was minimal, the material culture he recovered was clearly representative of a multi-component site. Later excavations by Deal not only corroborated this hypothesis but also yielded dates supporting continual occupation from the Early to Late Woodland periods (Deal 2007). Dating was conducted using the thermoluminescence dating technique (Godfrey-Smith et al. 1997) on samples of *in situ* pottery, as well as radiocarbon dating of charcoal samples. Charcoal and soil samples were also recovered for paleoethnobotanical analysis.

Relative to the sites described above, most of the lithic materials recovered from St. Croix are associated with the Scots Bay formation. It is believed that groups utilizing the habitation site of St. Croix would have exploited the chert outcrop located at Davidson Cove for production of various stone tools. To date, the identification of Scots Bay chert at St. Croix has been based on visual identification only (Burke 2000; Deal 2003). Considering this, a variety of projectile points was recovered from the site that can be attributed to various stages of the Woodland period. Aside from Scots Bay chert, materials included White Rock Quartzite, local Quartz, and a possible projectile point made of Mistassini chert from the northern regions of the Quebec/Labrador border. A variety of ceramic fragments were also recovered, exhibiting an assortment of different designs, which further bolstered the original interpretation that St. Croix was as a habitation site.

4.1.7 Melanson

The Melanson site, King Co., is one of the most significant sites in Nova Scotia. It stretches over 60 acres of land along the Gaspereau River drainage (Nash and Stewart 1990:187). Identified as a multi-component village site, Melanson (BgDb-7) has experienced a series of excavations revealing dates which range from the Middle to Late Woodland periods, based on various projectile point styles, ceramic styles, and radiocarbon testing. It has been suggested that Melanson's location on the banks of the river, and in close proximity to quarrying areas reflect its length of use and the large population it may have supported (Nash and Stewart 1990).

The Melanson site was originally recognized by collectors in the area, but most notably was tested by John Erskine in 1957 (Nash and Stewart 1990:1). Subsequent excavations were undertaken by George F. McDonald in 1965 and again in 1986 by Nash and Stewart. In conjunction with private collections and Erskine's initial findings, Nash and Stewart have summarized the findings at the Melanson site, considering its importance in the wider landscape.

Evidence supports the notion that Melanson was situated to take advantage of anadromous fish-runs, much like St. Croix. It is hypothesized by Nash and Stewart (1990:36) that Melanson was a seasonal camp-site, related to exploitation of smelt and gasperau. Similarities can also be seen in the lithic artifacts recovered from Melanson and St. Croix. It appears the indigenous populations at Melanson also utilized the local outcrops of White Rock quartzite and transported preforms of Scots Bay chert, from Davidson Cove, or some other quarry related to the North Mountain formation (Deal 1989; Nash and Stewart 1990).

It is also important to note, given Melanson's location, that acquiring lithic material from the quarry would have required a journey of over 51.5 kilometers by canoe from the habitation site, while by land it was only 22.4 kilometers from Melanson (Nash and Stewart 1990:198). Nash and Stewart (1990:198) state that many historic trails exist in the area, perhaps related to prehistoric travel routes, thus making land travel a very distinct possibility. Relevant to this argument are the thousands of waste flakes which were encountered during the 1986 excavations, highlighting the lithic reduction undertaken on-site (Nash and Stewart 1990:198).

4.1.8 Gaspereau Lake Complex

Gaspereau Lake is located 12km inland from the Minas Basin via the Gaspereau River. Like most parts of Nova Scotia, Gaspereau Lake has a sloping landscape covered by a mixed forest. It is widely believed that indigenous people in this region would travel the Gaspereau River to utilize the abundant resources of the Minas Basin (Laybolt 1991; Nash and Stewart 1990).

The area immediately around the lake has revealed a large number of sites within the last 50 years, garnering interest from both professional archaeologists and private collectors. To date, excavations have been conducted by George F. McDonald and John Erskine during the 1960s, while more recent surveys have been conducted in the 1980s and 1990s by various individuals, including Laybolt (1998), Nash and Stewart (1990,1991), and Deal (1988-1989).

Evidence from Gaspereau Lake suggests that occupation has been more or less continual from the Paleoindian period (11,500 to 9,000 BP) through the Woodland period (3,000 to 500 BP). Paleo-Indian projectile points occur in private collections and are documented at the Erskine Site (BfDa-5), identified by John Erskine in 1967 (Laybolt 1999:22). However, due to a lack of provenience in this region from looting activities, this time period is best understood from work conducted at the Debert site where extensive early Paleo-Indian occupation have been uncovered.

For the purposes of this thesis, I will be focusing on those multi-component or Woodland sites identified by the Minas Basin Archaeological survey. Work in this region was conducted during the 1988 field season by Deal and revealed multiple sites which included: Fishladder site (BfDd-9), Dam site (BfDd-10), Burnt Bone Beach site (BfDd-8), Cadet Beach site (BfDd-11), Cement Cross site (BfDd-12), JL-6 (BfDd-13), Landing site (BfDd-14), and Schaffer's Camp site (BfDd-7). The majority of these are located on the northern portion of the lake, near the confluence of the Gaspereau River and Gaspereau Lake.

This area can best be understood as a whole. Therefore, the following information will be summarized as the "Gaspereau Lake Complex", rather than each site being discussed. Traditionally, the term 'complex' in archaeology is used to describe a set of traits seen universally across several sites. In this sense, 'complex' will be used to define the above sites from a regional perspective, as they are all closely related, both geographically and temporally.

Interpretations regarding artifacts recovered from the Gaspereau Lake Complex are the result of a combination of collections research and survey work. Commonalities between the sites include artifacts representing multi-component occupations although, as previously mentioned, looting is a complicating factor (Laybolt 1999). The occupations range from the Early Archaic to the Late Woodland and although evidence for Paleo-Indian habitation has been seen in private collections, it has not been encountered archaeologically.

A wide range of artifacts can be attributed to this complex and are characteristic of the long-term occupation of the area. Projectile points ranging across the Archaic and Woodland periods, as well as gouges, plummets, adzes and whetstones, have been recovered. The site of Burnt Bone Beach is one of the few known protohistoric camp sites in Nova Scotia, with multiple historic artifacts such as glass trade beads and a tinkling cone (Laybolt 1999, Deal 1989).

Although there is a wealth of evidence from the region, within both public and private collections, various factors have made it difficult for researchers to truly understand the extent to which this region was utilized by prehistoric peoples (Laybolt 1999). Many of the early chronologies created for the Maritime Provinces are based on work conducted in the northeastern United States, most notably New England (Davis 1991).

Like most parts of Nova Scotia, the prehistory of the Gaspereau Lake Complex is not well understood due to a lack of archaeological investigations, which is further compounded by countless incidences of looting. Sites are often found near a main highway, like those listed above, making them extremely easy to access. Understanding the prehistory of this region is additionally complicated by, "the destruction of prehistoric sites by coastal subsidence and the alteration of the province's interior through the damming of rivers and lakes" (Laybolt 1999:2). In the Gaspereau Lake region, water levels are regularly rising and falling, revealing an abundance of artifacts scattered along the shoreline.

4.2 Summary

The landscape of the Minas Basin has been greatly altered by both natural and human forces. The extreme tidal action of the Bay of Fundy, the fluctuating water levels of Gaspereau Lake and looting have all contributed to the way the record is understood in the province. As a whole, this region requires an approach which involves working with communities to review private collections, while expanding on preliminary investigations conducted by both professional and avocational archaeologists.

Rather than reflecting on the importance of each site in the landscape individually, the act of conceptualizing the past is best suited when many sites are viewed together. From the evidence discussed above, it is clear the Minas Basin provided a wealth of resource opportunities during the Woodland period which influenced the seasonal rounds of the indigenous cultures that inhabited these sites. Thus the act of procuring lithic resources can be considered as part of a larger economic structure rather than individual, specialized trips to quarrying locations.

Chapter 5: Analysis and Comparison of Assemblages

5.1 Introduction

This chapter discusses the results of analyses of the assemblages from the Davidson Cove, Clam Cove and St. Croix sites. The data collected on debitage patterns, material distributions and artifact frequencies at each site proved to be widely divergent. However, a constant remained: Scots Bay chert was utilized at all three, and in larger quantities than all other materials.

As discussed in previous chapters, Scots Bay cherts have long been hypothesized to be important geological resources to the Late Woodland peoples of Nova Scotia and beyond. Further research suggests that Scots Bay cherts have also occur at other sites within the Maritimes, and into the state of Maine (Burke 2000; Nash and Stewart 1991). Although my analyses did not allow for such an extensive investigation of Scots Bay chert and its far-reaching utilization, it is my hope that this chapter will begin to shed light on the importance of this lithic material and how these sites might relate to other contemporaneous settlements within the area surrounding the Minas Basin.
This chapter begins with a discussion of raw material use, including the use and importance of heat treating as well as a description of artifacts recovered from each site. Finally, I present a present an analysis of the debitage, which touches on striking platforms, termination types, and flake size distributions.

Figure 5.1 Scots Bay chert, Scots Bay, Nova Scotia (photo by Catherine L. Jalbert)

I conclude this chapter by summarizing my results and providing some first impressions of the data collected. A more comprehensive interpretation is presented in the next chapter, recounting my conclusions and discussing the larger archaeological implications of the data provided here.

5.2 Raw Material Use

Examining the movement of Late Woodland cultures in Nova Scotia by tracing lithic materials through the landscape provides a wealth of information on indigenous peoples. Depending on the types of material present, information relevant to seasonal rounds, economy, or trade routes, can be generated. Regionally, little is known in this regard and such analyses are vital to better understanding of the Late Woodland time period in the Minas Basin of Nova Scotia.

This section examines how lithic materials were manufactured during this time period, exploring the process and importance of heat-treating Scots Bay chert. I also discuss the other materials in the collections, particularly from St. Croix, presenting the various quantities and varieties of lithics used on each site.

Figure 5.2 Experimentally heat-treated Scots Bay chert debitage (Courtesy of Tim Rast. Photo by Catherine L. Jalbert)

5.2.1 Heat Treating

The process of heat treating has been widely discussed by experimental archaeologists over the past 50 years. A large body of work on the topic exists, including, most notably, Purdy (1974, 1981), Crabtree and Butler (1964), and Holmes (1893, 1894, 1919). While not new, the importance of understanding the mechanics of heat-treating proves fundamental to lithic analyses. These experimental studies are extremely useful when attempting to address fracture mechanics and the lithic reduction sequences as a whole.

When discussing the use of raw materials at Late Woodland sites in Nova Scotia we must also consider the ways in which materials were altered before being knapped. The Scots Bay chert material (Figure 5.1), as discussed in Chapter 2, is a material which exhibits abundant impurities. This material would have been quite difficult to knap in its natural state as quarried from the geological formation. It is clear that in order to overcome vugs (cavities) and the general irregularities found within this material, heat treating would have played an essential role in the manufacturing process, by altering the composition of the stone and hence its knapping quality.

According to Hellweg (1984:24), in order to heat treat lithic materials, the proper application of heat is gradual, eventually achieving a temperature of approx 500-700 degrees Fahrenheit. It is thought that through heat-treating the stone experiences microscopic fractures, essentially weakening it and making it much easier to knap (Hellweg 1984:24). This can be done by placing the lithics in a pit with hot coals and burying it, allowing it to reach the desired temperature over a period of time, presumably so the stone does not shatter from too much heat being applied at once.

Once heat-treated, Scots Bay chert turns white to pinkish white, a much lighter colour than its natural state (Figure 5.2). The debitage and diagnostic artifacts made of Scots Bay chert from the Davidson Cove quarry/workshop all appear to be heat-treated chert, some exhibiting the signature pot-lid fractures, which occur as a result of expansion and contraction during the firing process (Andrefsky 2005:260). When the site of Davidson Cove was excavated during the 2003 field season, a scattering of charcoal was evident in a majority of the excavation units (personal communication, Michael Deal 2010).

During my analysis of the collections, I did not observe a single artifact or piece of debitage crafted from Scots By chert that did not appear to be heat-treated. This consistent pattern strongly suggests that in order to make this lithic material workable it needed to be altered before initial reduction. Presumably, if the majority of material was heat treated before being transported away from the quarry/workshop site it would be fairly easy to identify in other collections.

5.2.2 Davidson Cove and Scots Bay chert

Of the materials at Davidson Cove, 100% of the collection examined was of Scots Bay chert. Considering the classification of Davidson Cove as a quarry/workshop site, it would be logical that all or most of the materials in the assemblage would be derived from the source being quarried. However this evidence further suggests that no or little rejuvenation of artifacts of different lithic materials was occurring at this location. Instead, such activities may have taken place at the habitation component or camp-site of Davidson Cove. Although it has yet to be identified, it is thought to be the site of Clam Cove.

Supporting the latter inference is the overwhelming pattern of lithic selectivity in the debitage from Davidson Cove which produced only chert and no chalcedony. From this evidence it can be inferred that: 1) chalcedony was found in too few nodules to produce a large amount of waste comparable to chert reduction; 2) it was transported to another location for processing or; 3) processing occurred in a different area of the Davidson Cove site which was not investigated during the 2003 field season. Considering that this location was purported to be used for a period that could span 2000 years (Deal 2003), it would be expected that this material would be highly visible in this location alongside the chert waste from stone tool production.

Table 5.1: Material types present in the Clam Cove and St. Croix collections.

Site	*Scots Bay Cherts*	*Chalcedonies*	*White Rock Quartzite*	*Quartz*	*Unknown*	*Total*
Clam Cove	44 (77)	12 (21)	0	1 (1.8)	0	57 (99.8)
St. Croix	211(48.2)	7 (1.5)	101 (23.1)	92 (21)	27 (6.2)	438 (100)

* Davidson Cove had 100% Scots Bay materials in the collection. Only debitage is accounted for here and diagnostic artifacts are not included. They will be discussed later in the chapter.

5.2.3 Clam Cove and St. Croix

After analyzing the debitage in terms of material types from the St.Croix and Clam Cove sites (Table 5.1), the vast majority of the recovered artifacts are composed of materials from the Scots Bay formation. The Scots Bay cherts dominate the collections. However, the likely preferred chalcedonies and jaspers (Figure 5.3), which are superior in knapping characteristics, were also present.

Figure 5.3 Scots Bay Chalcedony (photo by Catherine L. Jalbert)

At Clam Cove, debitage of Scots Bay chert represented 77% of the collection while chalcedony accounted for 21% (Figure 5.3). Considering the geographical proximity to Davidson Cove, materials were probably transported to the site for processing after undergoing initial reduction at the quarry/workshop site. Although other materials, such as quartz, were rare, further archaeological investigations might reveal a greater diversity of lithics, particularly considering that ground stone plummets and an adze-like artifact were also occurred in the assemblage from the 2005 field season.

At the St. Croix site, a considerable amount of Scots Bay chert was also recovered (Table 5.1). Approximately 50% of the collection was composed of chert and chalcedony. Taking into account its distance from Scots Bay and the site of Davidson Cove itself, this is a substantial quantity. The other half of the collection was mostly composed of the more accessible White Rock quartzite, and the ubiquitous white quartz.

It is important to note that although a small percentage of materials was analyzed from St. Croix, the entire debitage assemblage consisted of about one half Scots Bay chert (3201 pieces, 44.4%), while White Rock Quartzite (2607 pieces, 36.1%) and quartz (1406 pieces, 19.5%) represented the other half (Deal 2007). These figures are based on materials collected during the 1990 field season. Finally, unidentified materials comprised 6.2% (n=18) of the St. Croix collection. This material could not be identified as coming from any of the known sources in Nova Scotia by macroscopic identification. It is likely that they were transported to the site.

From the quantities present in each collection, it is clear that Davidson Cove and Scots Bay chert were extremely important to Late Woodland cultures within the Minas Basin. The heavy utilization of the material at the site of St. Croix shows a reliance on exploiting and procuring this resource at a fair distance from the site.

Table 5.2: Artifact Frequencies (%) for Davidson Cove (BhDc-2), Clam Cove (BhDc-5) and St. Croix (BfDa-1)

Site	Debitage	Cores and Core Fragments	Hammer -stones	Informal Tools	Scrapers	Bifaces	Total
Davidson Cove	21,617(83.8)	4089(15.9)	24 (0.09)	9 (0.03)	17 (0.06)	29 (0.1)	25,758 (99.98)
Clam Cove	28 (30.4)	38 (41.3)	8 (8.7)	4 (4.3)	5 (5.4)	9 (9.8)	92 (99.9)
St. Croix	120 (41.2)	134 (46)	0 (0.0)	15 (5.2)	4 (1.4)	18 (6.2)	291 (100)

5.3 Artifact Frequencies

One of the most informative features of a site is the varieties of artifacts present. Collectively, these can provide a glimpse into the type of site, illustrating its function and importance to the inhabitants. The artifacts present can also provide a glimpse into the various technological processes in operation during the time period in question, while those that are absent are also significant.

This section examines the artifact frequencies at each site, focusing on relative abundance. A broader discussion related to the most abundant and specialized artifacts, primarily the bifaces/preforms, scrapers, and bipolar cores, will be provided after an overview of each site's artifact frequencies are discussed.

5.3.1 Davidson Cove

The artifacts examined from Davidson Cove included all tools (formal and informal) as well as a sample of debitage which constituted approximately 7% of the total collection from the 2003 field season. In this sense, formal tools refer to artifacts which were clearly made in a time-consuming manner, whereas informal tools includes items made expediently, responding to immediate need and imposed time constraints. Although the total collection of debitage and cores/core fragments was not examined, Table 5.2 presents the totals recovered from each site. It is clear, due to the sheer size of the collection from Davidson Cove, that a representative sample should prove sufficient for this study.

The hypothesis that Davidson Cove acted as a quarry/workshop site is supported by a review of the totals in Table 5.2. Having only examined four of twenty-one 1m x 1m excavation units from the 2003 field season, the debitage totals coupled with the location of the site in relation to the exposed Scots Bay chert formation and the number of hammerstones recovered suggest direct exploitation of this source.

5.3.2 Clam Cove

Of the materials analysed during the 2005 field season, the site of Clam Cove presented a smaller collection of artifacts than to Davidson Cove and St. Croix. Artifacts primarily consisted of pieces of debitage, and cores/core fragments, as well as some bifaces and scrapers. One complete projectile point was present as well as three corner-notched projectile point bases, five preforms and one hammerstone.

5.3.3 St. Croix

The St. Croix site had the second largest quantity of lithic artifacts. Debitage and cores/core fragments represent the most abundant artifacts recovered from this site, followed by formal, and finally informal tools (Table 5.2).

Concerning the lithic artifacts, bifaces differ from those recovered at Davidson Cove, both in stage of reduction and the range of material types utilized. The cores/core fragments in the St. Croix collection demonstrated that the indigenous peoples inhabiting this site likely valued Scots Bay chert (n=80), quartz (n=37) and White Rock quartzite (n=17). The presence of cores of Scots Bay chert at this site make it highly likely that travel to Davidson Cove was occurring, and this material was being returned to St. Croix for further utilization.

Understood as a habitation site, St. Croix produced a variety of ceramics, scrapers, bifaces and projectile points, supporting a range of activities during the seasonal occupations of this site during the Late Woodland period. The bifaces from St. Croix are more finished than those from Davidson Cove and many completed projectile points are present in the collection (Figure 5.4).

Figure 5.4 Corner notched point of Scots Bay chert from St. Croix
(photo by Catherine L. Jalbert)

Table 5.3 Stage 1 and 2 Bifaces/Preforms from Davidson Cove

Catalogue #	Material	Length	Width	Thickness	Mass(g)
216	Scots Bay Chert	10.0	4.9	4.2	140.0
220	Scots Bay Chert	5.2	4.4	2.5	34.0
230	Scots Bay Chert	6.9	2.9	2.1	32.0
240	Scots Bay Chert	5.1	5.5	1.9	36.0
241	Scots Bay Chert	7.2	3.2	1.4	26.0
252	Scots Bay Chert	6.9	3.6	3.3	66.0
263	Scots Bay Chert	9.0	4.0	2.4	66.0
276	Scots Bay Chert	6.0	4.9	2.6	68.0
279	Scots Bay Chert	7.5	3.7	1.7	43.5
286	Scots Bay Chert	6.4	3.1	1.7	29.2
312	Scots Bay Chert	6.1	3.4	1.7	32.0
319	Scots Bay Chert	7.9	5.2	3.4	128.2
320	Scots Bay Chert	4.3	2.7	1.2	20.7
322	Scots Bay Chert	5.4	4.0	1.4	38.7
325	Scots Bay Chert	7.1	3.7	2.5	57.9
330	Scots Bay Chert	6.2	3.1	1.3	30.0
332	Scots Bay Chert	4.9	2.4	0.8	10.7
334	Scots Bay Chert	6.3	3.5	1.8	39.4
338	Scots Bay Chert	6.4	4.1	1.6	39.9
355	Scots Bay Chert	6.9	3.2	2.1	37.6
361	Scots Bay Chert	5.2	2.5	0.9	13.9
8	Scots Bay Chert	5.3	3.6	1.6	25.5
9	Scots Bay Chert	6.6	3.4	1.9	43.7
11	Scots Bay Chert	6.0	3.1	1.6	20.0
17	Scots Bay Chert	5.2	2.6	1.1	5.6
18	Scots Bay Chert	5.6	4.5	2.4	59.9
22	Scots Bay Chert	7.1	3.7	2.5	48.8
23	Scots Bay Chert	8.5	6.9	2.6	202.8
25	Scots Bay Chert	5.6	3.5	1.6	32.3
Averages:		**6.44**	**3.77**	**1.99**	**49.25**

Note: Includes artifacts recovered in 1988 and 2003 investigations

5.4 Bifaces and Preforms

The designations of preform and biface were based during my initial analysis on the stages of reduction proposed by Callahan (1979), as discussed in Chapter 4. Stages 1-4, which primarily deal with the process of bifacial tool production, were identified and used when analyzing the collections of stone tools from Davidson Cove, Clam Cove and St. Croix. Once the bifaces and preforms were categorically placed into stages, other attributes present on the artifacts were analyzed and quantified.

This section examines the various bifaces and preforms recovered, focusing on the classification system presented by Callahan (1979), its relation to the bifacial artifacts in these assemblages, and the material types present.

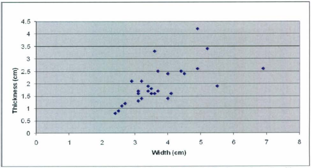

Figure 5.5 Relationship of Width to Thickness in Bifacial Preforms from Davidson Cove

5.4.1 Davidson Cove

Concerning bifacial stages, stages 1 and 2 represent the flake blank as it is first prepared and the initial trimming and edging of the biface (see Callahan 1979; Odell 2003; Morrow 1995). These preliminary stages were the most abundant in the Davidson Cove collection. Many of the bifaces exhibit a generic bifacial shape, but show very little in the way of concentrated thinning to produce a flattened appearance. The lack of further shaping contributes to the thickness seen in most of the Davidson Cove bifaces. Table 5.3 demonstrates the number of bifaces recovered during the 2003 and 1988 field seasons, all of which are within the categories of Stage 1 or Stage 2 preforms.

As evident from Table 5.3 the bifaces/preforms exhibit a rather 'chunky' quality, some being very thick through the mid-section or cross-section of the biface (Figure 5.5). According to Odell (2003:100), this is a factor that is common in Stage 1 bifacial preforms, the width to thickness ratio being approximately 2:1. Referring to Table 5.3, the majority of artifacts fall within this ratio.

The occurrence of triangular midsections can also related to Stage 1. This type of thickness, in which a 2:1 ratio or greater is observed, can be the result of the triangular shape on the face of the preform which take shape during initial reduction. This can be the result of an inability to overcome imperfections or an inability to continue reducing the object through thinning as a result of incorrect or misplaced strikes. These mistakes are typically irreversible, resulting in the discard of the artifact.

Figure 5.6 Collection of all bifaces from 2003 field season at Davidson Cove (photo by Catherine L. Jalbert)

The triangular midsections of the bifaces were often associated with a series of step-fractures, referred to as "stacked" step-fractures. As evident by their name, these step-fractures occur repeatedly within the same vicinity creating a stacked appearance. It is clear that the knapper continually tried to reduce the object with multiple unsuccessful strikes, hoping to produce a fracture which would effectively remove or reduce the triangular midsection (Shelley 1990:188).

Of note, 6 preforms showed these attributes (Figure 5.7). When quantifying the occurrence of the multiple "stacked" step-fractures, specimens which exhibited more than 5 on one or both faces were considered to fit within this category.

The other attributes observed during analysis included sinuous edging and battering. Both were common, especially in bifaces which also exhibited triangular midsections and "stacked" step fractures. For purposes of these discussions, sinuous edges can be defined as "wavy" or irregular and exist on the outer edges of the objective piece (Figure 5.8). These are caused by ineffectual removal of flakes, confined by the triangular midsection of the biface. The knapper being unable to reduce the overall thickness of the artifact, the edges become exaggerated, making them sinuous.

In addition, battering was visible on the faces, most notably around the areas which also exhibited the stacked step-fractures. Battering could be another sign of attempting to remove flakes incorrectly. By continually applying force to the face of the biface unsuccessfully, these misplaced blows would inevitably cause battering to some extent (Figure 5.8).

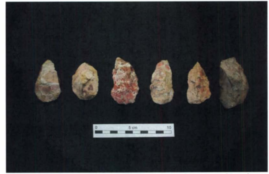

Figure 5.7 Examples of preforms/bifaces with triangular midsections (photo by Catherine L. Jalbert)

Figure 5.8 Biface from Davidson Cove (BhDc-2:22). Note the sinuous edges, stacked step fractures and triangular midsection (photo by Catherine Jalbert)

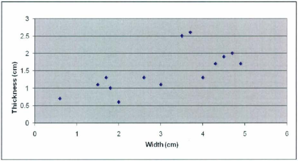

Figure 5.9 Relationship between Width and Thickness in Bifacial Preforms from St. Croix

5.4.2 St. Croix

Based on the manufacturing sequence of Callahan (1974, 1979), the bifaces from St. Croix are most indicative of Stage 5, the final thinning and shaping of the artifact. Although Callahan (1974, 1979) allows for hafting as an additional stage, the first 5 stages of the sequence are most commonly recognized as being minimal manufacturing requirements (Ahler 1992:39). When adapting Callahan's (1974, 1979) sequence to this stage of the manufacturing process, it is important to note that it was originally created for large bifacial traditions, primarily Clovis. In the case of St. Croix, a Late Woodland site, it is appropriate to discuss Ahler's (1992) classification system for bifacial arrowpoints. Although Ahler (1992) adopts a similar manufacturing sequence to Callahan's (1974, 1979), he elaborates upon it by incorporating the acts of hafting, maintenance and reuse or recycling. In this sequence, Stage 5 refers to notching, this step being considered optional to the knapper (Ahler 1992:41).

Figure 5.10 Collection of bifaces (incomplete and complete) from St. Croix (photo by Catherine L. Jalbert)

If we examine the bifacial artifacts, it is clear that most were discarded because they were broken, probably as a result of use (Figure 5.10). Only a few examples appear to be complete. A large majority of bifaces were made of White Rock quartzite and a few examples were made of Scots Bay chert (Table 5.4).

As proposed by Ahler (1992), the final stage of notching is present on some examples while others appeared to be primarily stemmed. As a means of further temporal refinement, corner notched points are considered indicative of the Late Woodland period in the Maritimes (Petersen and Sanger 1991). The two stem styles in the collection appears to be partly related to material type; points made of Scots Bay chert, were notched (either corner or side), while points made of White Rock Quartzite were stemmed. Quartz bifaces (two examples) were both notched and stemmed. This could be, in part, due to technological requirements at the time of the point's production, or perhaps the knapper's judgment of the material's strength when producing a stem or, alternatively, notches.

Also of note was one point that appears to be made of Mistasstini chert, an exotic high quality lithic which originates in northern Quebec. While the abundance of Scots Bay materials in the collection supports the hypothesis of a regional network of lithic procurement and use, the presence of the Mistasstini material expands the possibilities, highlighting the possible importance of exchange and trade networks well beyond the Maritime region. An example which best illustrates this is the Goddard site in Maine. Archaeological investigations recovered artifacts manufactured from both Mistassini and Minas Basin materials (Bourque and Cox 1981).

In terms of bifacial preforms, the sizes appear to be far more widespread than those from Davidson Cove. While the latter consistently had a width of between 2 and 4 cm, the bifacial preforms from St. Croix range between 1 and 5cm in width. Concerning the width to thickness ratio, the bifacial preforms from St. Croix mainly fall within a 2:1 or a 3:1 mean ratio. According to Odell (2003: 100), many of these bifaces would be considered Stage 1 and Stage 2.

The mix of Scots Bay chert and White Rock Quartzite may contribute to both stages being present at the site. It is apparent from Table 5.5 that a majority of bifacial preforms made of Scots Bay chert have a 3:1 width:thickness ratio, while White Rock

Quartzite is mainly 2:1 or less (Table 5.4). Being a material that is found locally, it would be logical that some production was likely occurring at the habitation site, and the White Rock quartzite transported there for reduction. Following this line of argument, the preforms produced of Scots Bay chert should show an advanced stage of production, since they were likely transported from Davidson Cove after being reduced to Stage 1 bifacial preforms.

Table 5.4 White Rock Quartzite and Unknown Material Preforms from St. Croix

Catalogue #	Material	Length	Width	Thickness	Mass (g)
48	White Rock Quartzite	7.4	3.5	2.5	62.9
1521	White Rock Quartzite	7.9	4.0	1.3	41.2
1725	White Rock Quartzite	6.6	3.7	2.6	28.7
1847	White Rock Quartzite	5.3	2.6	1.3	19.6
1787	?	4.8	1.7	1.3	7.7
1948	?	3.8	2.0	0.6	5.8
1657	White Rock Quartzite	4.2	1.8	1.0	8.6
1111	White Rock Quartzite	5.5	1.5	1.1	11.2
235	White Rock Quartzite	7.9	4.7	2.0	77.3
Averages:		**5.93**	**2.83**	**1.52**	**29.2**

Table 5.5 Scots Bay Chert Preforms from St. Croix

Catalogue #	Material	Length	Width	Thickness	Mass (g)
822	Scots Bay Chert	5.7	4.5	1.9	53.4
313	Scots Bay Chert	5.0	4.3	1.7	50.4
1127	Scots Bay Chert	4.7	3.0	1.1	14.5
1832	Scots Bay Chert	4.0	0.6	0.7	4.1
1635	Scots Bay Chert	7.8	4.9	1.7	68.2
Averages:		**5.44**	**3.28**	**1.42**	**38.1**

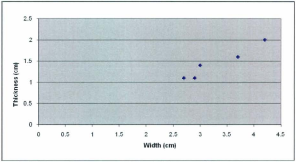

Figure 5.11 Relationship between Width and Thickness of Bifacial Preforms from Clam Cove

5.4.2 Clam Cove

A small sample of bifacial preforms was recovered from Clam Cove, along with one complete projectile point and three projectile point bases. As with the other sites considered in this report, these bifacial preforms were of Scots Bay chert. Of the projectile point bases, two were of quartz and one of Scots Bay jasper (Figure 5.12). As in the St. Croix assemblage these points are corner notched.

As mentioned in a previous report by Halwas (2006: 27-28), the complete projectile point recovered from this site has been identified as the greenish jasper present in the North Mountain formation, as it appears before heat treating. This artifact is the only example of the Scots Bay material that was utilized without heat treatment.

Unlike the bifacial preforms from Davidson Cove, these did not exhibit any of the attributes previously discussed resulting from ineffectual flake removal (i.e., stacked step fractures, sinuous edges, and triangular midsections). Similarly, they can be considered Stage 1 bifaces, exhibiting a 2:1 ratio of width to thickness.

Although a smaller number of bifacial preforms were recovered than at Davidson Cove and St. Croix, these can still yield considerable information in terms of site function. Given the lack of debitage at Clam Cove, it can be inferred that little knapping activity occurred, and bifaces were likely transported to this location already reduced to the Stage 1 form. Given its proximity to Davidson Cove, this site may have acted as one of the many way-points used during the seasonal rounds of groups inhabiting the area, as they made their way to other summer camp sites in the region, such as St. Croix and Melanson.

Figure 5.12 Complete and Incomplete Diagnostics from Clam Cove.
(Photo by Catherine L. Jalbert)

Figure 5.13 Davidson Cove scrapers (photo by Catherine L. Jalbert)

5.5 Scrapers

Among the tools found at the Davidson Cove site, scrapers were the second largest category represented, with 17 specimens (Figure 5.13). The majority appear to be thumbnail scrapers, 16 of which were made of Scots Bay chert and one example made of Scots Bay chalcedony.

Davidson Cove had by far the largest number of scrapers of the three sites. This could be due to kill processing on-site. However, the lack of any sort of camp-site or domestic component at Davidson Cove does not support this. The scrapers could also be an indication of the variety of tools that were produced here, in an expedient manner, effectively utilizing time and energy on trips to the site. What remains unclear is why so many scrapers in relatively good condition were abandoned at the quarry/workshop site. To date, no use wear analysis has been conducted on scrapers from Davidson Cove.

All five of the scrapers recovered from Clam Cove (Figure 5.14) all are thumbnail scrapers, similar to those recovered from Davidson Cove. In terms of material, two were composed of Scots Bay chert, two of Scots Bay chalcedony and one of quartz. Given the large number of scrapers present at Davidson Cove, it would be reasonable to assume that these scrapers were both produced in this location and transported to the camp-site or, alternatively, the appropriate material in the form of small cores was knapped at Clam Cove to produce these artifacts when needed. Given the varieties of material and the absence of quartz or Scots Bay chalcedony debitage at Davidson Cove, the latter option seems most plausible.

Figure 5.14 Scrapers from Clam Cove (photo by Catherine L. Jalbert)

5.6 Bipolar cores

Bipolar coring or wedging is the result of a core being struck at a 90 degree angle while the distal end is balanced on a hard surface (Odell 2003:49). It has also been referred to as hammer and anvil knapping (Shott 1989:1). This produces flaking from both the proximal and distal ends of the core as the fracture reverberates from the bottom and top of the object simultaneously. Because of the mechanics of bipolar coring, the ends of the core show crushing and no bulb of force is produced (Andrefsky 2005:27).

In total, 11 bipolar cores were recovered from Davidson Cove, all made of Scots Bay chert (Figure 5.15). Odell (2003: 49) argues that bipolar coring or bipolar flaking is a method for maximizing or "economizing" on the use of raw material. Considering the material from Davidson Cove, mainly its poor flaking quality, this is an interesting hypothesis to reflect on. First of all, the abundance of this material at the Davidson Cove quarrying site would make capitalizing on it by bipolar coring almost unnecessary. While a knapper might want to maximize the yield from a high quality stone, doing so on Scots Bay chert makes little sense.

Another factor to consider regarding bipolar coring is how it differs from conchodial flaking, the most common flake production techniques (Andrefsky 2005). While both forms can be considered uncomplicated, in terms of knapping technique conchodial flaking requires more practice in perfecting the utilization of a multi- or unidirectional core. Given the fact that both types of flaking (bipolar and conchodial) exist at this site, it is likely that this is a reflection of mixed skill and/or mixed technique.

Of the 10 bipolar cores recovered from the St. Croix site, three were of Scots Bay chert, one Scots Bay chalcedony, one Scots Bay Jasper and five of quartz. It is likely that bipolar cores were transported to St. Croix for use as wedges or transported for further utilization of the higher quality Scots Bay materials. No bipolar cores of White Rock quartzite were present.

Compared with the proportions of bipolar cores recovered from Davidson Cove, and most notably, St. Croix, only one bipolar core was found at Clam Cove. Considering the lack of chalcedony debitage present at Davidson Cove, it is interesting to note that this bipolar core was made of chalcedony. As previously stated, it could be that the high-quality chalcedonies were being transported off site for further reduction and, in this case, optimal reduction, efficiently utilizing as much of this high quality material as possible.

Figure 5.15 Collection of bipolar cores or wedges from Davidson Cove (photo by Catherine L. Jalbert)

5.7 Debitage

As stated in the Methodology chapter of this thesis, all debitage was first divided based on the free-standing typological analysis presented by Sullivan and Rozen (1985). Once the complete flakes were identified from the samples, the debitage was further characterized by attribute analysis to determine the flake terminations and striking platforms in the hope that these attributes would reveal the types of stone tool production that occurred at these sites, particularly the quarry/workshop at Davidson Cove. At the sites of Clam Cove and St. Croix, due to the minimal debitage amounts recovered, only an analysis of the flake terminations was conducted. In this vein, information concerning flake size classes was also derived from the data collected for individual complete flakes, i.e., length (cm), width (cm), and weight (g). By combining all of the above analytical methods, inferences regarding bifacial reduction and other lithic technological processes can be made.

The following section details the analysis of debitage from all three sites, highlighting the results of the analysis of striking platforms and termination points of the debitage samples. It concludes with a brief discussion of flake size and weight, providing some interpretation of the data presented and how it may be used with the other analytical methods employed here.

Table 5.6 Distal flake terminations and percentage (%) of shatter or debris

Site	Feather	Step	Hinge	Outrepassé	Shatter	Absent	Total
Davidson Cove*							
N16 E17	11 (22.4)	16 (32.6)	4 (8.2)	2 (4.1)	4 (8.2)	12 (24.5)	49 (100)
N35 E17	0 (0.0)	2 (66.6)	0 (0.0)	0 (0.0)	0 (0.0)	1 (33.3)	3 (99.9)
S0 W2	189 (21.5)	195 (22.2)	89 (10.1)	7 (0.8)	240 (27.3)	159 (18.1)	879 (100)
Clam Cove	10 (37.0)	5 (18.5)	1(3.7)	0 (0.0)	5 (18.5)	6 (22.2)	27 (99.9)
St. Croix	47 (27.3)	31 (18.0)	10 (5.8)	0 (0.0)	65 (37.8)	19 (11)	172 (99.9)

*A sample of approx. 7% of the total debitage originally identified as Reduction Flakes recovered from Davidson Cove as used for this analysis. The total population of debitage for this study is 931. Please refer back to the Methodology section for a detailed discussion of the sampling procedure for this thesis.

5.7.1 Flake terminations

In terms of stone tool production, the flake termination point is defined by the distal end of the piece, opposite the striking platform. This attribute can reveal how a flake was removed. Most importantly, it can reveal whether a flake was removed correctly or incorrectly, and if it was removed with an objective in mind (i.e., in terms of stages of reduction, or manufacture of a specific kind of tool). Terminations can be defined as *feather*, *step*, *hinge*, or *outrepassé*. This feature can also be indeterminate in the sense that it is absent because the flake is not complete, or because the piece is considered shatter or debris, displaying undefined characteristics.

A *feather termination* can be defined as a flake with a very sharp distal end. These types of terminations are very common on bifacial thinning flakes (Andrefsky 2005). A *hinge termination* is similar to a feather termination but rather than having a sharp distal end, a hinge termination is rounded. Feather and hinge termination types represent the two which are considered 'complete' during lithic debitage analysis.

A *step termination* is defined by an almost 90 degree break where the force abruptly turns into the objective piece. This type of termination causes a 'step fracture' which was discussed in the Bifaces and Preforms (5.4) section of this chapter. An *outrepassé* or plunging termination is when "the distal end of a flake turns toward the objective piece, removing the lower end of the objective piece, and creating a detached piece that has a large distal end relative to the proximal end" (Andrefsky 2005:259). This type of termination is often thought to be intentional, depending on the shape the knapper wishes the objective piece to take.

As evident in Table 5.6, Davidson Cove exhibited all types of flake terminations discussed here. The absent category in the table refers to flakes that were broken and did not exhibit a termination point. Excavation unit N16 E17 had 30.6% complete flakes (feather and hinge terminations), 32.6% incomplete (step terminations) and the remaining 32.7% indeterminate. In N35 E17, not all flake terminations were present with only 3 flakes analyzed from this unit. Although more flakes were recovered from this unit during the 2005 field season, this sample fulfilled the purposes of this study and the random sampling technique employed.

Table 5.7 Variation in material type of debitage attributes from Clam Cove

	Scots Bay Chert (N=5)	SB Chalcedony (N=11)
Step	**0**	**5 (45.4)**
Hinge/Feather	**5 (45.4)**	**6 (54.4)**

Note: Percentage in parentheses

Finally, excavation unit S0 W2 yielded the largest quantity of flakes in the sample used for this study. The indeterminate and incomplete flakes were by far the biggest group represented, composing 68.0% of the population whereas complete flakes represented only 32.0%.

In general, the Clam Cove site produced a low quantity of flakes during the 2004 field season. A relatively similar number of complete vs. indeterminate flakes were represented: 40.7% feather/hinge terminations and 40.7% indeterminate, leaving approximately 18.5% representing the step termination category (Table 5.7).

Lastly, at St. Croix, 33.0% of the flakes analyzed had a feather or hinge termination while 18.0% exhibited a step termination. Similar to the samples of debitage

Table 5.8 Variation in material types of debitage attributes from St. Croix site

	Scots Bay Chert	Scots Bay Chalcedony	White Rock Quartzite	Quartz	Unknown
Hinge/Feather	16 (51.6)	0 (0.00)	14 (58.3)	7 (70)	2 (22.2)
Step	15 (48.3)	1 (100)	10 (41.6)	3 (30)	7 (77.7)
Total:	**31(99.9)**	**1 (100)**	**24(99.9)**	**10 (100)**	**9 (99.9)**

Note: Percentage in parentheses

from Davidson Cove and Clam Cove, a high percentage of indeterminate flakes were present (49.0%) (Table 5.8).

When considering debitage attributes, it is also important to consider the types of material that are present. As previously stated, the site of Davidson Cove consisted solely of Scots Bay chert. Although only a small number of flakes were recovered, the same can be said for Clam Cove in that the debitage represented in the sample from this site consisted of a mixture of Scots Bay chert and chalcedony. As evident in Table 5.7, a larger number of complete flakes were recovered, regardless of material type.

At the St. Croix site, the majority of flakes were of White Rock Quartzite and Scots Bay chert. An almost even number of feather terminations and hinge/step terminations were recovered of Scots Bay chert, while a slightly higher percentage of hinge/step terminations were recovered of White Rock Quartzite material. Given the distance from Davidson Cove, it is likely that further reduction occurred at St. Croix once the preforms were transported there.

Table 5.9 Frequencies (%) of striking platforms at Davidson Cove

Cortical	Flat	Complex (Multifaceted)	Abraded	Indeterminate	Total
89 (9.6)	212 (22.7)	114 (12.2)	10 (1.1)	506 (54.4)	931 (100.0)

5.7.2 Striking Platforms

The striking platform is the area in which force was directed to the objective piece to remove a flake. This debitage attribute can reveal information regarding the types of percussion used, the type of reduction occurring and can direct researchers to make inferences regarding the amount of time invested in the preparation of the objective piece.

The striking platforms that are most prevalent are cortical, flat, complex and abraded. The simplest of these are 1) cortical, which represents pieces of debitage that have cortex making up the striking platform and 2) flat, which does not exhibit any alteration. As reduction continues the striking platform may become more complex, in that it can become multifaceted. This represents a platform from which multiple flakes have been removed, and often represents an advanced stage in the manufacturing process. An abraded striking platform shows that the surface where the flake was removed was prepared, thus indicating that more care was taken with the objective piece.

At Davidson Cove it is clear that a substantial portion (50%) of the materials did not have a discernable striking platform (Table 5.9).These pieces were either incomplete or broken pieces of debitage or shatter. This high percentage of shatter can result from testing of chert blocks at the quarry/workshop site. Aside from these, almost 23% of the collection is comprised of pieces with a flat striking platform, and 12% of pieces with a complex or multifaceted platform. Finally, 10% represents cortical striking platforms, and only 1% could be identified as abraded.

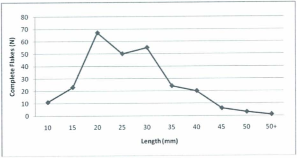

Figure 5.16 Size distribution for flakes sampled from Davidson Cove

5.7.3 Flake Size and Weight

While lithic analysts rely on many different attributes to inform their interpretations of reduction stages, one of the most reliable and replicable of these is weight (Andrefsky 2005:98). Supported by a large body of work of experimental archaeology (see Lyons 1994; Magne and Pokotylo 1981; Shott 1994), researchers find that weight will often inform other flake attributes. Combining information about weight with flake sizes (length and width) will hypothetically provide a very accurate picture of reduction stages at any site. As Root (1992:67) argues, in examining the waste-debris from the manufacture of flaked stone tools, size, although one of the most basic forms of data in lithic analysis, can greatly inform our knowledge regarding a range of reduction technologies and aid in making important inferences concerning such practices. Given the size of the collection analyzed from the Davidson Cove site, information concerning flake size could easily be obtained.

For this thesis, flake size classes were derived by dividing the maximum length of the flake by the weight, as thickness was not recorded for complete flakes in this analysis. It is hoped that this would allow flakes to be placed into size classes more readily (Andrefesky 2005:102). Given the field sampling methods employed at Davidson Cove size classes smaller than 5mm in length are not considered in this analysis. By characterizing the size grades in this manner, and comparing the results with width, the various size grades present within the assemblage are determined.

Usually, experiments related to lithic analysis are able to separate debitage based on many different reduction events. In the case of these collections, results may be skewed as many different types of lithic manufacture may have occurred at the same site (Patterson 1990:550). Although excluded through the free-standing typology, broken flakes and shatter will also be discussed in conjunction with the results produced from the analysis of the complete flakes.

According to Patterson (1990:551), flake sizes fall along an exponential curve when bifacial reduction is was practiced. This curve appears to be unique to bifacial reduction, which produces a majority of smaller flakes. When applying this hypothesis to the data collected from Davidson Cove, there appears to be a somewhat different curve form. Flakes graphed by number and by length give a fairly irregular distribution (Figure 5.16). As previously noted, this might be expected when many different manufacturing sequences occurred in the same location, typical of a quarry/workshop site. This irregular distribution could also be caused by different types of manufacturing processes (Patterson 1990:550). When considering the function of the Davidson Cove site and the extensive time period over which it was likely utilized, may contribute to the atypical distribution. However, because of field sampling techniques, debitage smaller than ¼ inch was not included making it difficult to know if the true curve form is exponential or bimodal.

When examining the flakes plotted by average flake size (length/weight) vs. width, a more clearly defined relationship can be seen (Figure 5.18). It is apparent that the majority of flakes from Davidson Cove are relatively small (between 1 to 2cm² in size). In a similar study conducted by Leblanc (1996:109), she attributed this sort of distribution to the production of bifaces, and I would argue that a similar claim can be made for Davidson Cove. At a quarry/workshop site, it would be expected that bifacial reduction would account for the majority of flakes recovered.

Although this produced a comparable result to Patterson's (1990) study (Figure 5.17), it should be mentioned that he used all flakes present, rather than just considering the complete flakes. Also, consideration should be given to the fact that he produced these results as part of a set of controlled experiments. In this light, the results from Davidson Cove (Figure 5.16) may be due to multiple manufacturing events. A higher percentage of these flakes, may, however, be a result of the same manufacturing process, in this case, the initial stages of bifacial reduction. It is encouraging to imagine that a similar result would be seen if the entire collection of flakes were analyzed from this assemblage.

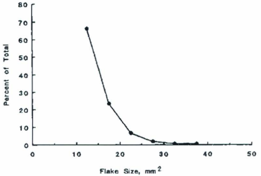

Figure 5.17 Flake-size distribution for bifacial reduction, Experiment II. (Adapted from Patterson 1990:51)

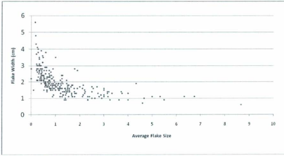

Figure 5.18 Flake-size (S) distribution for Davidson Cove. ***(S=length/weight)***

5.8 Discussion

Through this analysis, it is clear that the Scots Bay materials were quite important to the indigenous cultures inhabiting the areas surrounding the Minas Basin during the Late Woodland period: a large majority of lithics coming from this geological formation. As the only known area which provides access to exposed bedrock in which this material occurs, Davidson Cove continues to be the most likely point of origin for Scots Bay chert. Other possible sources of this material have been suggested to be Isle Haute and Cap D'Or, which also have areas of the exposed outcrop. Although these sites were inhabited contemporaneously with Davidson Cove, no evidence has been recovered to support extensive quarrying or stone tool reduction in these areas. In part, this could be the result of changing sea-levels in the Bay of Fundy, flooding areas that potentially held archaeological sites which relate to quarrying practices in this region (Sable 2010:5). It should also be noted however that the jaspers and chalcedonies of the Scots Bay formation are also found in the Five Islands, Parrsboro and Moose Island areas of the Maritimes.

While there few diagnostic artifacts were recovered from Davidson Cove, the radiocarbon dates suggest a two-fold interpretation. Considering the rate of heat-treating present in these collections, it is clear that the charcoal recovered for radiocarbon dating could be the result of either this processing technique or generic camp fires, which are equally likely considering the cold climate of Cape Split (Halwas 2006). Although diagnostic artifacts are lacking at Davidson Cove, the appearance of heat-treated diagnostics and other artifacts of Scots Bay materials at the Clam Cove and St. Croix sites make it possible to assume a direct association with the quarry/workshop there, or at least a similar quarry site, during the Late Woodland period.

When analyzing the collection from Davidson Cove, it is clear that the material is not ideal for knapping, given the abundant impurities, yet this location was visited often, if not seasonally, to exploit the lithic resources. But why? Was this the only known quarry in the area, and therefore were people forced to make do with the materials as those that were most readily available? Or did it serve more than a practical purpose, possibly being a place of spiritual importance?

The bifaces found in this collection are clearly the product of poor knapping skills, low material quality, or a combination of both. While heat-treating helped making the stone more workable, it still appears to be fairly unforgiving when knapped. Nevertheless, this material continued to be widely utilized throughout the region.

Despite the fact that the Scots Bay lithics were the most common in the assemblages considered here, the groups living in this area also clearly placed great importance on utilizing other local materials. White Rock quartzite available along the Gaspereau River, and white quartz can also be considered popular choices amongst the indigenous population at St. Croix. Being scattered throughout Nova Scotia, they were likely easy to acquire. Exploiting these materials near the camp-site would have limited the time needed to travel elsewhere, and may have been collected when trips to the Scots Bay quarry were not possible.

The assemblage from St. Croix exhibited quite a mix of materials. The large number of complete/broken projectile points as well as the presence of pottery supports the claim that St. Croix acted as a seasonal habitation site (Deal 2007; Halwas 2006). Given the amount of lithic debitage present, in varying materials, it can be hypothesized that St. Croix was used for maintenance of materials from afar and reduction/production of the local materials, such as White Rock quartzite. This is not to say that core reduction of the Scots Bay materials did not occur at this site; it is just more likely that the preforms were created at Davidson Cove before being transported to St. Croix. Deal (1989) suggests that St. Croix may have also acted as an area of distribution where blanks or preforms were exchanged with other indigenous groups in the area.

The site of Clam Cove appears to present a comparable picture. Although it can be considered in close proximity to Davidson Cove, it is likely that initial reduction of the Scots Bay lithics occurred at the quarry before being transported to this site. Although it is hypothesized to be the habitation site for Davidson Cove, the lithics provide one of the only links between the two, aside from a contemporaneous radiocarbon dates. Among the artifacts recovered in 2005 were two groundstone fishing weights and a number of ceramic sherds. This evidence tends to support the habitation claim. Whether or not this was the habitation for Davidson Cove is yet to be determined, a site closer to the quarry might yet be undiscovered.

In conjunction with the diagnostic artifacts recovered, another important facet of this research was the debitage analyzed from the Davidson Cove, Clam Cove and St. Croix sites. Through the combination of attribute and flake size analyses, we can better understand what types of manufacturing processes were occurring on each site. The idea that bifacial reduction was likely occurring at Davidson Cove is supported by the flake size data, but also by the analysis of striking platforms.

The exclusion of broken flakes and pieces of shatter, although telling in their own right, can also be combined with the information gained from individual flake analysis to paint a more complete picture of the range of activities occurring on site. Although some of these pieces of debitage may also illustrate bifacial reduction, their presence in the collection can also be attributed to activities such as initial or bipolar core reduction, namely the testing of chert cobbles.

In short, there is much to be learned from the debitage presented in this chapter. Not only does it support to certain hypotheses regarding the quarry/workshop site, it helps identify the activities within the various camp sites and how they may differ from (or be similar to) that at the quarry, presenting a dynamic picture of Late Woodland sites in this region of Nova Scotia .

5.9 Conclusions

Throughout this chapter, I have presented information obtained from the analysis of debitage and associated tools, both formal and informal, recovered from the Davidson Cove, St. Croix, and Clam Cove sites. It is clear that indigenous groups in this area intensively utilized the Scots Bay materials and depended on them in their daily lives. While collections from just three sites were analyzed, the use of this material is likely extensive and can be linked to other sites within the region through various site reports.

From the information gleaned through this research, past interpretations regarding the classification of these sites are bolstered, and we can begin to delve deeper into the function and importance of these sites in the Late Woodland period. By linking multiple sites in the region we can begin to model the underlying socio-economic network, in which acquisition and production of stone tools was a vital component of the lives of the indigenous inhabitants.

Chapter 6: Discussion and Conclusions

6.1 Introduction

This chapter examines how the archaeological data from the sites of Davidson Cove, Clam Cove and St. Croix aid in constructing a regional model of subsistence strategies, mobility and technological organization in the Minas Basin region. Drawing from the results of lithic analyses of these assemblages, it is clear that a certain dependence on Scots Bay materials existed during the Late Woodland, making lithic procurement practices a factor when considering movement and resource utilization in this region. Here, I attempt to infer how this affected the indigenous cultures that utilized the landscape both socially and economically, examining how lithic technology may reveal aspects of a society that are only subtly reflected through the other material culture left behind in the archaeological record.

6.2 Summary of Archaeological Data

From the archaeological analyses presented in the last chapter, it is clear that the collections are dominated by Scots Bay chert materials. Of the three sites analyzed, the proportion of Scots Bay chert to declines sharply as one moves from the quarry/workshop at Davidson Cove. As one would expect, Davidson Cove exhibited 100.0% of the Scots Bay materials, while 77.0% is represented in the Clam Cove assemblage and only 48.2% at St. Croix.

Generally, the flake size distributions at the Davidson Cove site are indicative of the initial stages of bifacial manufacture, with most falling between 0 to 3cm in length.

Although flake size distributions were not analyzed for the Clam Cove and St. Croix sites, it seems likely that, due to its proximity to Davidson Cove, some initial reduction also occurred at Clam Cove. From these sites, the material was probably transported as an unfinished bifacial preforms and further reduced at the site of St. Croix or another habitation location.

A variety of different patterns become clear when interpreting the tool assemblages at each site. At the Davidson Cove site, the lithic industry clearly points toward the initial stages of bifacial manufacture. As discussed in the last chapter, many of the discarded bifaces had a number of processing errors associated with their production. These point toward a low skill level, an inability to overcome impurities within the stone, or both. Indeed, these factors are connected, the knapper likely not having the knowledge to correct mistakes or compensate for the poor quality of the lithic material.

Some of the most intriguing artifacts from this site are the bipolar cores and scrapers. Although considered to have a dual purpose, the bipolar core is knapped in this way to maximize the material, and as a wedge. Considering the abundance of Scots Bay materials at Davidson Cove, there would be no need to maximize the resource; however bipolar reduction may have been the most efficient, quickly breaking down the material due to joints present within the stone. However, if bipolar cores were produced to be used as wedges, what would their purpose be at this location? Concerning the scrapers, it is highly unlikely that any domestic activities were taking place, given the lack of a habitation component. However, due to the quarry's proximity to other resources in the area, it is possible that these scrapers were used to process some other resources, and were knapped in response to this immediate need (see Brumbach 1987). Also, it is possible that these scrapers were used to maintain other tools, like antler billets, or other objects used in the extraction and reduction of chert at Davidson Cove.

At the Clam Cove site, a small number of bifacial preforms and projectile points comprised the assemblage. These preforms did not exhibit any of the manufacturing errors seen in the Davidson Cove collection. Considering the proximity of Clam Cove to Davidson Cove, the former site possibly acted as a seasonal camp to which, materials were transported before being taken elsewhere in the region. It is unclear what types of additional resource procurement activities took place, but the appearance of one complete projectile point, a small number of bases, two groundstone fishing weights, and a wide variety of plant remains suggest that some subsistence activities likely occurred here.

St. Croix, the farthest site from the quarry/workshop, had a combination of preforms and completed projectile points. The appearance of many unfinished tools suggests that the people inhabiting this site were preparing for the future, when trips to the quarry would not be possible. Traveling around the region, these groups were aware of their functional needs, and it is clear that they were actively utilizing both the Scots Bay and White Rock materials.

The mixture of these materials is seen within the assemblage of bifaces and diagnostic artifacts. The preforms appear to be in the initial stages of reduction, suggesting that the majority of tools probably entered the site in an unfinished state and were further reduced as needed. Combined with this is a high proportion of finished artifacts. The presence of both unfinished and finished tools suggests that manufacturing and subsistence activities were occurring at St. Croix, which is also supported by the scrapers and informal tools recovered.

In a regional sense, I argue that these assemblages reveal distinct information regarding site development through raw material use. Three different site functions are apparent: (1) The lack of diversity at Davidson Cove suggests that this site's primary function was as a quarry/workshop. Due to the amount of debitage recovered, it is clear that this site had a period of prolonged use and was of great practical importance to the peoples inhabiting this region. Fixed within the landscape, this outcrop was a reliable and effectively limitless source of tool stone; (2) The site at Clam Cove was clearly important given its proximity to Davidson Cove. If groups were traveling to this region to exploit the resources at Davidson Cove for an extended period of time, Clam Cove likely acted as the habitation component, or at least as a seasonal camp site. (3) At St. Croix, a period of continual use also exists. A larger habitation site, St. Croix produced artifacts that represent advanced planning, such as unfinished preforms. Made from both Scots Bay and White Rock materials, these preforms suggest that a certain degree of stockpiling was occurring. These tools were stockpiled at the site until various subsistence activities called for them to be finished.

6.3 Mobility and Resource Use

Considering regional mobility in terms of resource use, it appears that prehistoric people in the region relied on a predictable distribution of lithic sources. By understanding the specific locations at which resources could be procured and the timing of their availability, mobility patterns could be structured around these events. Regional land use reflects a high degree of mobility, with travel during summer and fall months to utilize as much of the available resources as possible.

In terms of transportation, the location of these sites along the coast of the Minas Basin, the Bay of Fundy and other waterways made travel by water rather than overland the most practical. It is clear that most of these sites were established with the various waterways in mind, allowing for easy access during the key times of resource use. When considering the quantities of resources that might be brought back to the settlement locations, using a watercraft of some kind would allow for ease of transportation as suggested by Blair (2010) in her examination of raw material procurement. While certain risks would be involved in transporting goods in this manner, it certainly would be faster than traveling over land and would allow for the bulk transportation of goods (Blair 2010:33).

Establishing large village sites, such as Melanson and St. Croix, along the waterways which feed into the Minas Basin would have proved essential to this pattern of regional mobility. This would have also allowed these groups to take advantage of the anadromous fish runs, in the warmer months (Nash and Stewart 1991; Deal 2004). It has been noted that large quantities of Scots Bay materials are present at Melanson (Nash and Stewart 1991:200). Nash and Stewart (1991:200) hypothesize that Melanson served as a base camp where flintknappers continued to reduce the blanks/preforms brought from this formation.

Although there are chert outcrops at Isle Haute and Cap D'Or, there is little evidence that these areas were heavily used for lithic production activities, like Davidson Cove. And, while they were lacking in this sense, groups probably travelled to Isle Haute to exploit other resources on the island, which is rich in floral resources (Christianson and Keenlyside 1997). Also, it is possible that Isle Haute was a stopping point for groups traveling to other parts of the region. This is implied by the lithic scatters that have been recorded in association with charcoal and native copper, suggesting there might have been a temporary camp site that provided a place to rest and resharpen lithic tools before heading on (Christianson and Keenlyside 2000:8). This is further supported by the fact that the materials identified in the lithic scatters were from "mainland deposits", further suggesting only casual reworking on Isle Haute rather than significant stone tool production (Christianson and Keenlyside 2000:8).

Of the known outcrops, Davidson Cove was the most likely one used by the residents of Melanson, being accessible through the waters of the Minas Basin and Scots Bay proper (Deal 1989). In terms of subsistence strategies at this location, an additional consideration is tidal action, given that the outcrop is only accessible at low tide. This could make a temporary camp site, like Clam Cove, necessary near the quarry/workshop. Having a temporary camp site close to the quarry would allow indigenous flintknappers to process the materials further before transporting them to permanent seasonal settlements (Halwas 2006:97). Another advantage of having a temporary camp-site at Clam Cove is the availability of clams and various hardwoods, as well as a host of medicinal and edible plant species, as identified by Halwas (2006:97-98).

6.4 Subsistence Strategies in the Late Woodland Period

Before examining the technological organization of the Late Woodland period in the Minas Basin, some inferences can be made regarding the subsistence strategies employed by these groups. In constructing a subsistence strategy, indigenous groups would have had detailed knowledge of what the landscape offered, when it was available, and the best ways to travel to these locations. While, it is difficult to determine whether or not the acquisition of some resources, especially lithic raw materials, was the result of trade or direct acquisition, it is likely that the same resources were exploited by all, and at similar times, based on comparable seasonal rounds.

According to other studies examining settlement and resource use in this region of Nova Scotia (Nash and Stewart 1991, Halwas 2006), the various ecozones had an abundance of aquatic, faunal and flora resources that have undoubtedly been used by prehistoric peoples during this time period.

Initially proposed by Nash and Stewart (1991) to discuss subsistence at the Melanson site, and then adapted by Halwas (2006) to explain regional subsistence with the inclusion of Clam Cove and St. Croix, these ecozones are useful for interpreting Late Woodland site distribution. The ecozones that are identified coastally along the Minas Basin and Scots Bay include Uplands, River, Bottomlands, Mudflats, Estuary and Lake (Figure 6.1). They would have been home to a variety of species and would likely have drawn larger game to their waters.

Combining this knowledge with the locations of various chert outcrops in the landscape, chert procurement practices can be viewed as embedded behavior. That is to say, it seems appropriate to consider trips to quarry locations as part of the exploitation of other resources. This also supports the idea that this resource was exploited during the warmer months, given the unforgiving freeze-thaw on this outcrop coupled with snow cover. Leblanc (1996:121) suggests the manufacture of blanks and preforms would have been easier at warmer seasons.

Looking at the location of Davidson Cove in relation to the ecozones (Figure 6.1), is it clear that the surrounding mudflats and estuary zones would have been perfect for taking advantage of soft shell clams and a variety of fish and mammal species that are supported by an estuary environment (Halwas 2006:94-95). These tasks cannot be considered mutually exclusive; having a wide range of were resources readily available at these outcrop locations and were likely simultaneously pursued.

Considering the groups living around the Gaspereau Lake outlet during the Late Woodland period in this way, it is likely that these people also took advantage of the various ecozones in the region. As Laybolt (1999:139) suggests, being able to access the Bay of Fundy by the Gaspereau River, groups could easily exploit the Scots Bay materials located at Davidson Cove, considering that Gaspereau Lake is only 12 km from the Minas Basin.

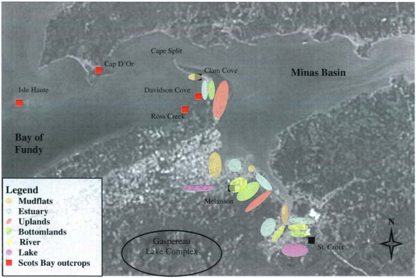

Figure 6.1 Map of study area. Note locations of ecozones, and outcrop locations for Clam Cove, Davidson Cove, Melanson and St. Croix. (www.rapidfire.sci.gsfc.gov/gallery, adapted from Nash and Stewart 1991)

6.5 Technological Organization in the Minas Basin

The degree of mobility present among the people of the Minas Basin can be best understood through their technological organization. While these strategies are related to the availability of lithic raw materials, the lithic industry in this region was not independent of other resources that the Minas Basin yielded. With this in mind, the following section examines how the archaeological evidence can be interpreted using a combination of approaches, incorporating the use of Scots Bay material into a larger system of resource exploitation.

As with most hunter-gatherer cultures, seasonal change would have been the greatest factor determining movement and resource use in the Minas Basin. This is not to say that technological organization is based on purely deterministic factors, but these types of activities during the winter months would have been quite challenging, expending large amounts of time and energy. If we adopt the "time-stress" model proposed by Torrence (1983), it can be hypothesized that groups would have maximized the benefits from their trips around the region, utilizing multiple resources on each part of the seasonal round. The technological organization of these people during the Late Woodland period can this be considered in terms of availability of a variety of resources.

What then can be said about how raw material availability figures into these types of strategies? As with any other resource, lithics can be considered vital to subsistence, exploiting this resource in a strategic manner. As discussed in Chapter 2, this type of technological organization is referred to as curation. While I believe that this is the main organizational approach employed, I would argue that indigenous cultures also considered expedience when exploiting the Scots Bay material. Considering factors presented by the environment and the individual choices made by these groups of people, neither curation nor expediency alone is sufficient for understanding the acquisition and production of lithic raw materials. As proposed by Nelson (1991:64), these strategies should be considered linked, especially with respect to transportation of materials and mobility through the landscape. I would argue that this was the case in the Minas Basin region. It is clear that, given the frequency of materials from Davidson Cove that exist at some sites, both curation and expediency were influences on the lithic procurement strategy.

As such, the lithic industry for this region can be described as primarily geared toward bifacial production. In this case, a high degree of mobility is likely, involving unfinished tools/preforms leaving the quarry/workshop site at Davidson Cove, being transported to other sites in the region and being completed at the habitation locations. This type of behavior can be viewed as curation. By transporting lithic materials in this form, it is likely that some sort of stockpiling was occurring at the St. Croix and Melanson sites.

From the point that the material leaves the quarry/workshop site and is stored at the habitation locations, it can then be said that utilization of that material tends toward expediency. While stockpiling shows planning, this stockpile would be utilized in times of need, manufacturing an implement when the situation called for it, thus in an expedient manner (Nelson 1991:65).

Though the model of curation/expedience behaviours presented above is just one example, it highlights the complexities of technological organization in this region and beyond. Human choice combined with socio-economic factors complicate the matter. It is therefore important to consider these activities alongside the social factors that drive raw material procurement and production. While these assemblages can reveal much regarding technological organization, I believe they can reveal even more about the groups of people that travelled to these areas.

6.6 Quarries and Craft Learning in the Minas Basin

Recently, a body of work has begun to be developed in the archaeological community concerning the reconstruction of human life through the interpretation of past populations, attempting to accurately portray gender (Ruttle 2010:64-65). By examining archaeological data with societal roles in mind, a broader appreciation of these groups as a whole and their activities can be provided. In this vein, many studies have attempted to address these interpretative issues by examining craft learning through novice lithic workmanship (see Bamforth and Finlay 2008; Finlay 1997; Shelley 1990). The quarry/workshop site at Davidson Cove, given the presence of low-skill preforms and the debitage resulting from their production, can begin to address these social relationships in the Minas Basin, and how they affected technological organization and resource use.

Often considered "invisible", women and children are rarely considered in the archaeological record (Conkey 2003:869). In analyses of subsistence strategies and mobility based on stone material culture, these groups of people are virtually nonexistent. Although we can draw some inspiration through recent studies related to the presence of children on archaeological sites (see Finlay 1997; Kamp 1997; 2001; Ruttle 2010), I believe it would be a misguided assumption to use the terms 'child' or 'children' in discussing lithic technological practices. While we may perceive children in one manner, other communities may view what constitutes a 'child' differently (Högberg 2008:113). While relevant, I am not suggesting that a particular gender or genders participated in the lithic procurement and production practices of the region, but instead that novices were present during trips to the quarry/workshop.

By understanding the needs of the novice, we first have to understand what would have been considered an optimal place for learning. As Bamforth and Finlay (2008) propose, a quarry site may have been the perfect location, providing abundant opportunities for novices to practice their craft (Figure 6.2). If we view the site of Davidson Cove in this way, it is easy to assume that novices travelled with experts to the quarry/workshop site during the optimal months for resource acquisition. If we view trips to the quarry as an embedded activity, we can also consider learning to have been an embedded activity. In this sense, seasonality would have affected learning, especially for novices who were new to the art of craft-learning. In a society that manages risk by stockpiling preforms for times of need, practicing at the habitation sites with these unfinished tools would be unlikely.

The presence of low-skill and high-skill bifacial preforms in the assemblage from Davidson Cove, adds an interesting dimension to the analysis of subsistence strategies and resource use. It is clear that both novices and experts were traveling to these locations, both for the practical purpose of supplying the habitation site with lithic raw material and other resources, but also for teaching novices about both the mechanics of stone tool production and the landscape as a whole. It is difficult to assess what a novice's economic contribution would have been, but I argue that the acquisition of skills that would be valuable in the future can be considered contribution enough. This type of knowledge transmission, related to the location of resources, how best to acquire them and at what time, would have benefited the society as a whole.

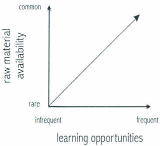

Figure 6.2 Possible relationship between raw material availability and learning opportunities (adapted from Bamforth and Finlay 2008:18)

Contributing to work related to novice lithic workmanship, Shelley (1990) and Bamforth and Finlay (2008) have identified various archaeological signatures which relate to skill (Figure 6.3). These mainly relate to an inability to overcome flaws in the material. If we examine the preforms from Davidson Cove, some of the classic symptoms of novice workmanship exist, in that many had an exaggerated midsection causing stacked steps. This often causes stacked step fractures on the face of the objective piece, as a result of misplaced blows. Combined with battering on the surface of the artifact, particularly around the areas where the flintknapper continually attempted (and failed) to remove the same flake from the same location, these stacked step fractures are visible indicators of poor knapping skills.

In terms of the debitage produced by a novice flintknapper, Shelley (1990) found that higher rates of step and hinge terminations were produced by novices than experts. This is presumably a symptom of striking flakes from the objective piece incorrectly. Although these techniques can sometimes be intentional in lithic reduction, in this case a novice is not able to judge the amount of force needed to remove a flake, either applying not enough force, causing step or hinge terminations, or applying too much force and causing a *outrepassé* (plunging termination) (Shelley 1990; Milne 2005). If we refer back to Table 5.5, this is the case at Davidson Cove, which exhibits a higher frequency of hinge and step terminations than the other sites examined.

Considering other artifacts at Davidson Cove with the novice in mind, also sheds light on the purpose of bipolar cores and scrapers. While a novice may fail at the production of a bifacial form, practicing other shapes would likely have been encouraged. Being fairly easy to make, scrapers would have helped a novice hone skills related to sharpening and rejuvenation. Clearly, this hypothesis would require more testing, as it would have analytic consequences (i.e., no use wear). A similar case can be made for bipolar cores, in that a wide range of techniques would have been part of a novice's education, and practiced in a location where the materials were plentiful.

Examining the absence of the high quality Scots Bay chalcedony from the quarry/workshop assemblage, it can be inferred why it appears at Clam Cove and St. Croix, but not at Davidson Cove. It is highly probable that during expeditions to the quarry/workshop, the smaller, likely more sought after chalcedonies were transported away from Davidson Cove for processing. Being a higher quality material, native flintknappers would want to utilize as much of it as possible and would not want to risk any unnecessary waste. Allowing novice flintknappers to practice on the Scots Bay cherts rather than the 'purer' chalcedonies likely taught them about the mechanics of stone reduction and how to overcome flaws, since it is such a poor quality material. A novice may have had to prove their skill with this material before being allowed to process anything of a higher quality.

By understanding the assemblages at these sites and how craft-learning was conducted in terms of resource use and technological organization, we can begin to reconstruct the populations that visited these places to exploit the available resources. Lithic artifacts might be the best way to do this. As the most durable materials to survive in the archaeological record, analysis can begin with stone tool production before branching into other areas of craft specialization. It is my hope that through the analysis of the locations of chert outcrops, the quality of materials that exist at these sites and the various ecozones that they were a part of, we can better understand not only regional networks of resource use, but how these settlements were established with the novice in mind.

Figure 6.3 Range and correlates of skill from novice to expert (adapted from Bamforth and Finlay 2008:17)

6.7 Conclusions

In this thesis, I have presented detailed information on the study area, describing the importance of the geological formation at Davidson Cove and in what forms those materials are found within multiple collections. It is clear that there is a wealth of information to be gained from lithic quarry and workshop locations, providing a glimpse into the organization of stone tool technology and how the tool forms created contribute to our overall understanding of the study area (Burke 2007:75). The data gained from the bifaces, flakes, scrapers, bipolar cores and other stone tools can also be used to generate hypotheses regarding who came to the quarry and why.

Clearly, Davidson Cove was an established location within the landscape and had great practical importance in terms of technological organization. At its most basic level, the quarry provided the lithic materials essential to the survival of the culture; however, I would argue that this place also provided the appropriate atmosphere to educate the next generation, while partaking in the experience of the seasonal round and learning the embedded behaviors that were a part of it. If we combine the archaeological evidence, resource zones and locations of known sites, I believe that both a regional settlement network can be reconstructed, but also a more subtle "knowledge network". Since groups traveling to this area were likely composed of both experts and novices, it is possible that the quarry/workshop site at Davidson Cove was just one stop in their educational training around the vast landscape and abundant waters of the Minas Basin.

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