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Late Maritime Woodland (Ceramic) and Paleoindian End Scrapers: Stone Tool Technology

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LATE MARITIME WOODLAND (CERAMIC) AND PALEOINDIAN END SCRAPERS: STONE TOOL TECHNOLOGY

By

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Thesis Advisor: Dr. David Sanger

An Abstract of the Thesis Presented
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Archaeologists tend to view lithic assemblages from a predominately morphological perspective, stressing the importance of the fluted point as the defining characteristic of the Paleoindian culture period (ca. 10,000 years B.P.). In applying such a characteristic, Paleoindian sites have been identified throughout the Northeast. However, there are no identified Paleoindian sites in New Brunswick. It is possible that some sites are largely ignored or thought to lack a Paleoindian component if a fluted point is absent. If such sites are being overlooked, then the database may under represent the Paleoindian culture period.

Spurred end scrapers commonly occur in known Paleoindian tool assemblages and are often considered diagnostic of the Paleoindian culture period. However, spurred end scrapers have also been identified in the Late Maritime Woodland (Ceramic) culture period (ca. 500 years B.P.). I designed the present study to determine if spurred end

scrapers from known Paleoindian and Late Maritime Woodland period sites can be differentiated and be diagnostic of a specific culture period.

A morphological and technological analysis of spurred end scrapers allowed me to complete a controlled comparative lithic study of the two culture groups. An analysis of the spurred end scrapers from the four sites indicates similarities between culture periods in the type of lithic materials employed in tool production as well as in the initial stages of core technology. Technological variability in the form of a longitudinal flake occurs on Paleoindian spurs.

I then applied the similarity and variability identified between culture periods to two multi-component sites in New Brunswick that have spurred end scrapers that morphologically resemble those from the two Paleoindian sites analyzed. However, no other evidence of a Paleoindian component had been identified at the sites. The technological analysis of the spurred end scrapers from the New Brunswick sites has not determined that a Paleoindian component does exist, but suggests further investigation is warranted. It is the presence, not absence, of the longitudinal flake down the center of the spur that may be used as an indicator to distinguish Early Paleoindian from Late Maritime Woodland spurred end scrapers.

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In Nova Scotia I would like to thank Steve Powell and Dr. David Christianson at the Nova Scotia Museum for providing access to and the loan of a portion of the Shubenacadie 3 and 5 collections, and to Dr. Stephen Davis at St. Mary's University for access and loan of a portion of the Belmont II collection.

In Ottawa I would like to thank Dr. David Keenlyside at the Canadian Museum of Civilization (CMC) for providing access to, and the loan and shipment of a portion of the Debert collection as well as giving freely of his time while I was at the CMC.

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CHAPTER 1

INTRODUCTION

The present study is a morphological and technological analysis of spurred end scrapers from six archaeological sites in northeastern North America: two known Early Paleoindian period sites and two known Late Maritime Woodland (Ceramic) period sites, from Nova Scotia, and two multi-component sites from New Brunswick that may have a Paleoindian component. The two Paleoindian and two Late Maritime Woodland sites are sites that do not have mixed cultural components. These sites allowed a controlled comparative lithic study of spurred end scrapers to be completed between the two culture groups. Archaeologists traditionally assign a time range of 11,000 to 10,000 ^{14}C years B.P. (uncalibrated) for the Early Paleoindian Period, and 1,000 to 500 years B.P. for the Late Maritime Woodland (Ceramic) Period. All dates given in the present study are uncalibrated dates.

Problem Statement

Analysis of regional Paleoindian period assemblages has traditionally focused on one tool type, the fluted projectile point. Such analyses often emphasized the morphology of the artifacts and overlooked the technological strategies employed in the production of these as well as other lithic tools. However, current research by Moore (In Prep) is going beyond just a morphological analysis and is placing greater emphasis on technology.

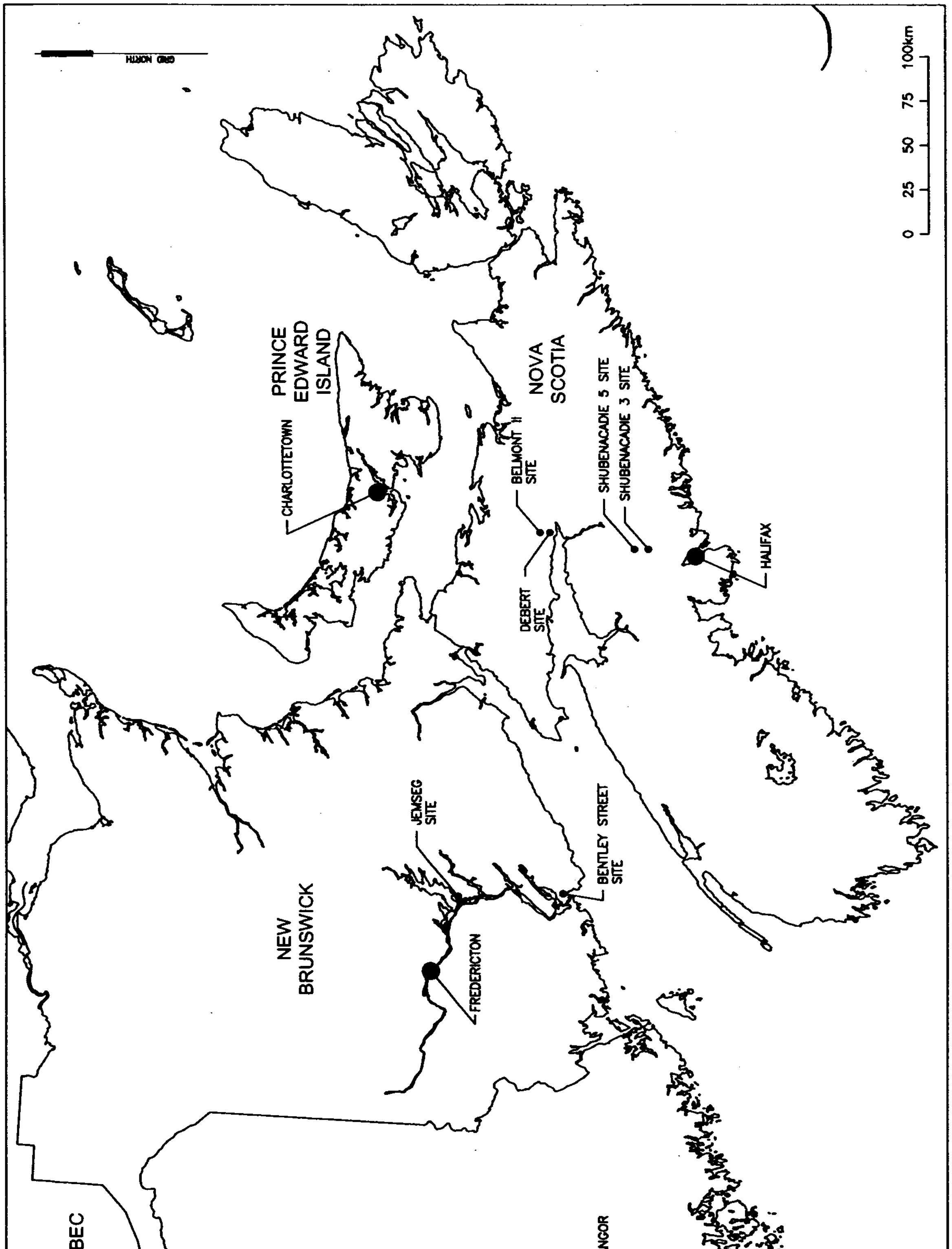
The presence of the fluted point is often the defining characteristic of the Paleoindian culture period. However, projectile points actually make up a very small percentage of the overall lithic artifacts from a site. Within the Debert Paleoindian lithic assemblage, from Nova Scotia, of the 12 artifact classes comprising about 4,000 specimens, 2.8 % of the assemblage consists of projectile points, whereas 34.7 % are end scrapers (MacDonald 1968). It is possible that a fluted point may not be present at every Paleoindian site. If no projectile point is found, cultural recognition may be a problem and the overall Paleoindian cultural database limited.

Additional site attributes, besides the presence of the fluted point, may be considered diagnostic of a Paleoindian site. Spiess and Wilson (1987) associate the use of high quality, often exotic, fine-grained lithic materials with Paleoindian site assemblages. However, such lithic materials are not exclusive to this early period (Bourque 1994). Site location has also been used as an attribute to define a Paleoindian site. Spiess et al. (1998) proposed that sites tend to be located on well-drained sandy soils. Finally, radiocarbon dating of a site is sometimes used as evidence placing site occupation within the Paleoindian period (MacDonald 1968). However, even radiocarbon dating of these early sites has been controversial (Curran 1996; Levine 1990).

Objectives

The spurred end scraper occurs commonly in known Paleoindian tool assemblages, but it has also been identified in other culture periods, such as the Late Maritime Woodland period. I designed the present study to determine if spurred end scrapers from known Paleoindian and Late Maritime Woodland period sites can be differentiated. If they can be, then it should be possible to ascertain whether or not individual specimens can be assigned to Paleoindian or later time periods.

In order to determine if spurred end scrapers could be assigned to either the Paleoindian or Late Maritime Woodland period I proposed to: i) determine the temporal range of technological variation of end scrapers that may be considered spurred; ii) determine if there are additional attributes that may be considered diagnostic of a Paleoindian lithic assemblage; and iii) determine if it is possible to place spurred end scrapers into a temporal period? To achieve the objectives, I analyzed end scrapers from six sites (Figure 1) that have spurred end scrapers. I define a spurred end scraper as being formed by flaking a lateral margin and the distal end to form a sharp angled projection (spur). This study presents a technological analysis from two identified Paleoindian sites, the Debert site (BiCu-1), located in Cobequid Bay, Nova Scotia, and the Belmont II site (BiCu-7), situated less than 1.5 km from the Debert site. I applied the same technological analyses to the two Late Maritime Woodland (Ceramic) period sites. The first Late Maritime Woodland period site is the Horne site, referred to as the Shubenacadie 3 site (BfCv-3), located on the north bank of the Shubenacadie River. The Shubenacadie 3 site is less than 1 km northeast of the outlet from Grand Lake, Nova Scotia. The second site, referred to as the Shubenacadie 5 site (BfCv-5), is 0.25 km north of the Shubenacadie 3 site. I then analyzed spurred end scrapers from two sites in New Brunswick that had a potential Paleoindian component. The Jemseg site is in south central New Brunswick, located on the east bank of the Jemseg River, less than one kilometer downstream from Grand Lake. The Bentley Street site is located northeast of Bentley Street, Saint John, on


GRID NORTH
0 25 50 75 100km
QUEBEC
MAINE
NEW BRUNSWICK
PRINCE EDWARD ISLAND
NOVA SCOTIA
CHARLOTTETOWN
FREDERICTON
BANGOR
HALIFAX
JEMSEG SITE
BENTLEY STREET SITE
DEBERT SITE
BELMONT II SITE
SHUBENACADIE 5 SITE
SHUBENACADIE 3 SITE

a bedrock shelf that overlooks the Saint John River. I traveled to Ottawa to the Canadian Museum of Civilization to get samples of spurred end scrapers from the Debert site and to Halifax, Nova Scotia to get samples from the Belmont II and Shubenacadie sites.

I examined the technological range and variation of spurred end scrapers and determined if the technology used in each culture period could be considered characteristic of that specific culture. Finally, I applied this analysis to two sites in New Brunswick that had spurred end scrapers made from similar lithic material to determine if they could be Paleoindian in age. The two New Brunswick sites are multi-component sites. However, the only artifacts or features that might be placed within the Paleoindian culture period were the spurred end scrapers.

The results of this research contributes to the growing body of information concerning the Late Maritime Woodland (Ceramic) and Paleoindian culture periods in the following ways: i) it presents a complete technological analysis of a lithic tool that received very little attention in the past (Cox 1986); ii) such an analysis is not regionally specific and therefore can be applied to regions outside the Maritime Provinces; and iii) it presents an environmental synthesis of the New Brunswick and Nova Scotia region for the early post-glacial time period.

Theoretical Approach

Since the seventeenth and eighteenth century, lithic studies have been based on stylistic patterns. However, these trends were not recognized as having chronological and cultural significance until the mid-nineteenth century (Trigger 1989). During the early and middle nineteenth century archaeologists pioneered seriation as a form of chronology that could be used to order cultural remains (Trigger 1989; Willey and Sabloff 1974). A culture history approach describes archaeological material in order to relate them temporally and spatially.

Cultural historical analysis of stone tool technology relies on the assumption that people have strong traditions and norms that will be reflected through the uniformity of technology in their material culture, resulting in comparable forms. Such an approach is balanced against a functional analysis that focuses on assumed utilitarian aspects of tools. This research will focus not only on morphological and functional aspects of the artifacts but also on the process of stone tool manufacture.

Morphologically similar artifacts may occur at various time periods. In the Northeast, spurred end scrapers found in both Paleoindian and Late Maritime Woodland assemblages are morphologically similar. A different kind of analysis, one that focuses on technology, or how the artifact is made, may be necessary to discriminate between spurred end scrapers from the two periods in the absence of clear contextual data.

CHAPTER 2

BACKGROUND

Prehistory of the Study Area and Vicinity (10,000 – 11,000 years B.P.)

The culture history of the Maritime Provinces is continually being refined as academics and consultants conduct surveys and excavations. The following is a brief summary of the Paleoindian culture period for New Brunswick and nearby regions.

Early Paleoindian Sites in the Maritime Provinces and the State of Maine

The Paleoindian culture period is not well represented in the prehistoric chronological sequence for the Maritime Provinces. An understanding of the Paleoindian cultural traditions for Maine and the Maritimes region has grown significantly in recent years as a result of the numerous Paleoindian sites that have been identified in the state of Maine. The use of high quality, fine-grained lithic materials, and the great distances that these lithic materials were transported from their sources, have led to speculation that the Maritime Peninsula region was culturally cohesive in some way during the Paleoindian period (Spiess and Wilson 1987).

The Debert site was the first locality that clearly placed Paleoindian people in the Maritimes region (MacDonald 1968). Excavation revealed 11 sections (loci) with 3,935 stone tools and 23,636 flakes. Charcoal samples yielded radiocarbon dates of Paleoindian age. Within a radius of less than 1.6 km from the Debert site five smaller Paleoindian sites have been located. This group of sites is known as the Debert/Belmont complex (Davis 1991, 1993). Nova Scotia also has a number of isolated, surfacecollected Paleoindian projectile points found throughout the province, two from the Minas Basin area and a third from the Northumberland Strait coast.

Six isolated Paleoindian projectile points have been found in New Brunswick: in the Bay of Fundy region, at Quaco Head and New Horton Creek (C. Turnbull Personal Communication 2000; Turnbull and Allen 1978); along the Saint John River near Kingsclear (Turnbull 1974); on the north bank of the Northwest Miramichi River (Turnbull and Allen 1978); at Tracadie (C. Turnbull Personal Communication 2000); and near Edmundston (Dickinson and Jeandron 2000). All of these projectile points were found on the surface with no further excavation completed.

Many more Early Paleoindian sites have been recorded and excavated in Maine (Bonnichsen et al. 1991; Gramly 1982; Spiess and Wilson 1987; Spiess et al. 1998). Research has stimulated models of settlement and subsistence, chronology, travel, and trade as well as social and technological customs for Paleoindian people in the region (Bonnichsen et al. 1985; Bonnichsen et al. 1991; Spiess et al. 1998).

Current Research on the Early Paleoindian Culture Period

There are a number of ways to look at the chronology of the Paleoindian period within the Maritime Peninsula. Spiess et al. (1998) used radiocarbon dates and point typologies based on seriation of projectile points to develop a Paleoindian point chronology. Most of the sites did not yield adequate contexts to get reliable radiocarbon dates; however, most of the sites did contain at least one fluted projectile point.

In the future it may be possible to learn more about Paleoindian subsistence activities through the analysis of floral and faunal remains. Some of the limited faunal remains that have been retrieved from sites include small burnt fragments of caribou, deer, and beaver bone (Spiess et al. 1985). From these limited burnt remains subsistence patterns of the Paleoindian people have been proposed (Funk et al. 1970; Spiess et al.1985). Some of these subsistence models suggest considerable dietary diversity (Bonnichsen et. al. 1985, 1991; Dincauze 2000; Spiess et al. 1998). Spiess (1984) argued that by utilizing the small amount of faunal remains that have been recovered, along with a paleoenvironmental reconstruction, it is possible to model subsistence by ethnographic analogy to northern caribou-hunting societies. Loring (1997) has criticized analogies to northern caribou dependent societies.

Paleoenvironmental reconstructions have also been used by archaeologists to help construct settlement, social, and technological patterns for the Paleoindian culture period (Bonnichsen et al. 1985; Spiess et al. 1998). Paleoenvironmental data as well as site location suggest that some Early Paleoindian people lived in an ice-marginal environment (Cwynar et al. 1994; Davis and Jacobson, Jr. 1985; Jones 1994; Joyce 1988; Kite and Stuckenrath 1989). In using these reconstructions to model Paleoindian site locations, Spiess et al. (1998) suggested that Paleoindian sites in the Northeast are located on well-drained, sandy soils. Late-glacial features such as kames or kame terraces, drumlins, and deltas were preferred. However, as Sanger (1996) noted for later periods, choosing settlement locations on the south side of hills or rivers would allow the inhabitants to get the sun all day, and still have some shelter against any winds. As discussed by Borns and Calkin (1977), kame terraces often occur on the south side of high mountain ridges. Therefore, warmth and wind protection may have played an important role in settlement patterns relating to these late-glacial features.

Following deglaciation, glacial lakes extended over portions of the Northeast. The strandlines and later dry basins of these glacial lakes are often thought of as high potential locations for Paleoindian sites (Bonnichsen et al. 1991; Nicholas 1988; Storck 1984). These areas may have been possible locations for fish runs and big game animal movement, which followed the orientation of the glacial shorelines (Julig 1984; Roberts 1984; Storck 1984).

A number of different types of Paleoindian sites have been identified in the region. One of the most common site types is a habitation site, such as Debert in Nova Scotia (MacDonald 1968). Also identified have been kill sites like that identified at Vail (Gramly 1982), and quarry-related sites like those near the chert outcrops at Munsungun Lake, Maine (Bonnichsen et al. 1991). Spiess and Wilson (1987) proposed another type of site used by early scouting parties prior to the larger group entering the region. Such sites may include the Lamoreau and Dame sites in Maine, and possibly the Belmont Complex in Nova Scotia.

Early Paleoindian sites in the Maritime Peninsula region exhibit lithic assemblages that contain artifacts made from fine-grained materials. Many of these assemblages have large amounts of non-local lithic materials, leading archaeologists to consider various models of lithic procurement. The widespread distributions of these fine-grained lithics are regarded as indicative of travel or trade, and communication over great distances (Ellis and Lothrop 1989; Julig 1984). The lithic types identified at some archaeological sites have also been utilized by archaeologists to try and predict settlement patterns (Curran and Grimes 1989; Spiess and Hedden 2000).

Current Research on the Late Maritime Woodland Culture Period

The Maritime Woodland culture period begins with the introduction of the use of ceramics in the area and ends with European contact. The presence of ceramics and the use of ceramic typologies is one of the most common ways archaeologists look at the chronology of the Maritime Woodland period within the Maritime Peninsula (Petersen and Sanger 1991; Bourgeois 1999).

The earliest reliably dated ceramics (ca. 3000-2200 B.P.) are known throughout most of the Northeast as Vinette 1 or for the Maritime Peninsula as CP 1. The Early Maritime Woodland period is also characterized by a florescence of archaeologically visible mortuary ritual as seen in the Meadowood and Middlesex or Adena-related burial sites. During the Middle Maritime Woodland period (ca. 2200-1200 B.P.) there is a peak in ceramic manufacture and regional variability (Bourgeois 1999). During the transition from the Middle to Late Maritime Woodland period (ca. 1200-500 B.P.) this regional variability is heightened between the interior and coastal sites (Bourgeois 1999). Mortuary ritual is seen again in the archaeological record during the Late Maritime Woodland period in the form of copper kettle burials (Whitehead 1991).

In New Brunswick there is regional variation between the northeast and southwest portions of the province as seen in the materials used for ceramic tempering and decoration, as well as in the projectile point sequences for the period (Rutherford 1991). Other frequently observed lithic tools used throughout the Maritime Woodland period include the end scraper, which exhibits a variety of sizes and forms and non-stemmed bifaces or knives. Decreasing with the transition between the Archaic and Maritime Woodland periods is the number of ground stone tools such as ground stone axes, adzes and celts, indicating a reduced emphasis on wood working tools (Rutherford 1991). Some of the limited faunal remains that have been retrieved from sites include a variety of bone, antler, beaver incisors and shark teeth (Rutherford 1991).

Current Research Pertaining to Early Paleoindian Stone Tools

Over the last few decades there has been an increasing interest among archaeologists in lithic analysis or the techniques of tool manufacture. Although some archaeologists have focused on technology (Bonnichsen 1977; Cox 1986), much of the research in the Northeast emphasized artifact morphology (Hayden 1986). Other archaeologists have inferred function from lithic analysis by ethnographic analogy (Gould et al. 1971; Siegel 1984) or laboratory analysis and replicative experiments of wear pattern and edge angle studies (Cantwell 1979; Odel 1981; Wilmsen 1968).

History of Selected Sites

Debert Site (BiCu-1)

The use of the area around the Debert Paleoindian site during the Second World War included an air base and staging area for troops going overseas, and later a mortar range for the military. E. S. Easton and his wife first recognized the Debert site in 1948. In 1962 D. S. Byers, from the Peabody Foundation for Archaeology, and R. S. MacNeish, chief archaeologist of the National Museum of Canada, began archaeological testing in the area. Testing confirmed that sections of the Paleoindian occupation remained intact. Full-scale excavation took place in 1963 and 1964, supported by the National Science Foundation, the National Museum of Canada, and the province of Nova Scotia.

The Debert site assemblage of artifacts and features are representative of the Paleoindian culture period. Charcoal samples from a number of features yielded radiocarbon dates also representative of the Paleoindian culture period. Bifacial tools included fluted projectile points, bifacial knives, pièces esquillées, and drills. Unifacial tools included side scrapers, end scrapers, and perforating tools. Many of these artifacts were located within a disturbed zone; however, deep pockets of hearths or pits did retain original context (MacDonald 1968). Frost action, vegetation, fauna, land clearing, military activities, and stump burning account for much of the disturbance to the site.

Discrete boundaries could be defined for 11 sections or loci within the site (MacDonald 1968). Eight of the sections included a 61 x 183 m area, and the three remaining sections encompassed an area of approximately 8 ha. Using artifact distribution patterns along with the location of features, MacDonald (1968) discovered three distinct loci clusters. Twenty-three features within these three loci included hearths, presumed hearths, and pits. Fifteen charcoal samples taken from the identified features yielded radiocarbon dates ranging from 5,019 ±70 to 11,011 ±225 years B.P. (P – 739-741, 743-744, 778, 966-967, 970-975, and 977). Almost 4,000 artifacts were recovered from the Debert site.

Belmont II Site (BiCu-7)

The Belmont II site is located 1.5 km north of the Debert site. The site was located in 1989 when a 1 x 5 m vertical cut permitted the soil stratigraphy to be recorded in the area selected for possible industrial development. The Belmont II Paleoindian project became a major research activity of the archaeology laboratory at Saint Mary's

University, under the supervision of S. Davis. In 1990 the excavated trench became a 6 x 6 m horizontal block excavation.

Disturbed cultural material extended from the surface to 75 cm below surface. However, from 75 to 105 cm below surface an original living floor was defined. Artifacts representative of the Paleoindian culture period discovered within the undisturbed soil included a fluted point, spurred end scrapers, large side scrapers, and gravers (Davis 1993; Brewster et al. 1996).

Shubenacadie 3 Site (BfCv-3)

The Shubenacadie 3 site (Horne site) was located in Hants County, Nova Scotia in 1970 during a survey of the Shubenacadie River system by B. Preston of the Nova Scotia Museum. The Shubenacadie 3 site is only one of a number of prehistoric sites located along the north bank of the Shubenacadie River. A number of test pits revealed occupation layers ranging from 8 to 15 cm in depth. A more extensive excavation was completed in 1971 (Preston 1974).

The site is located on the north bank of the Shubenacadie River approximately 1.2 km northeast of the outlet from Grand Lake. The site occupies a slight knoll, and is roughly oval in plan with its long axis running parallel to the river. The site appears to be about 55 x 27 m in area. The excavation in 1971 yielded ceramic and lithic material including stemmed points, end scrapers, bifacial knifes and flakes, a number of hearth features, and a dwelling floor. One radiocarbon assay yielded a date of 540 ±55 years B.P. (S–1018). Despite the shallowness of the cultural deposit, there were indications of stratification, and at least two Late Maritime Woodland components were represented at the site.

Shubenacadie 5 Site (BfCv-5)

The Shubenacadie 5 site was also located during a survey of the Shubenacadie River system. Located less than 0.4 km north of the Shubenacadie 3 site, the occupation layers were shallow, ranging from 8 to 15 cm in depth. Although no ceramic material was recovered, artifacts such as a corner-notched point, end scrapers, flakes, and a native copper gorge appeared to be from the Late Maritime Woodland culture period (Preston 1974).

Jemseg Site (BkDm-14)

The Jemseg site was first recognized in 1994 upon completing an environmental impact assessment for a new Trans Canada Highway bridge alignment that was proposed to cross the Jemseg River between Moncton and Fredericton. In August of 1996, the provincial Archaeology Branch of the Province of New Brunswick requested that mitigation of the archaeological resources at Jemseg be undertaken. Excavations commenced in September 1996 with S. Blair as project archaeologist.

Included in the site assemblage are artifacts and features representative of the historical period, Middle, and Late Archaic as well as Early Maritime Woodland culture periods (Blair 1998). There are also some artifacts that may date to 10,000 years B.P. Possible Paleoindian artifacts include spurred end scrapers, bi-polar cores, and a number of possible denticulate tools. Many of these artifacts were located within the eastern portion of the site on an upper terrace overlooking the Jemseg River. A large portion of the site has been utilized for mixed farming and crop production since the eighteenth century. Some of the precontact artifacts, on the upper terrace, were found in undisturbed sediment below the ploughzone. It has been argued that artifacts within a ploughzone retain a useful degree of horizontal distribution although they may lack vertical distribution (Odell and Cowan 1987; Roper 1976). In total, over 40,000 artifacts including stone debitage were recovered from the Jemseg site.

Bentley Street Site (BhDm-2)

G. Fisher first recognized the Bentley Street site in the late 1950s. In 1974 archaeologist D. Burley officially recorded the site. Finally, from October 6 to 24, 1997, P. Allen, an archaeologist at the Archaeological Services Branch for the Province of New Brunswick, carried out an archaeological testing project.

Included in the site assemblage are artifact types that are similar to Late Archaic and possibly Paleoindian types. In the preliminary statement Allen (1997) considered some artifacts tentatively to be Paleoindian in age. These artifacts include a spurred end scraper, bi-polar cores, and a Munsungun-like chert scraper. The spurred end scraper and one bipolar core were located in undisturbed sediment at the site. The area that includes the undisturbed sediment measures approximately 20 x 45 m and is located along the western side of the bedrock shelf (Allen 1997). The top 20 to 25 cm of the area has been impacted by historical activity. However, the sediment depth in this area varied between 50 and 60 cm. Cultural material recovered during the excavation included over 2,500 artifacts and flakes.

Environmental Setting

The following paragraphs summarize the physical and biological environment of the New Brunswick, and Nova Scotia region. The purpose of this summary is to provide a contextual basis for the timing of possible early post-glacial culture history in the region, and to allow cross comparison with other early archaeological sites. The terrestrial physical environment profoundly affected early people in North America. Some of the key aspects of the terrestrial environment are: physiography, bedrock geology, soils, glacial history, paleoclimatology, vegetation, and sea-level fluctuations. Awareness of the developments that have occurred on the regional landscape since deglaciation greatly enhances an understanding of the prehistory of the maritime region.

As the stratigraphic record is not complete, or accurately dated at all locations, correlating widely separated localities can present problems. Careful paleoenvironmental interpretation may enhance this fragmented stratigraphic record. All climatic records have different temporal considerations. Different climatic indicators react differently with regard to the climate, as some systems vary more closely in phase with climatic variations, others lag behind (Bryson and Wendland 1967; Fiedel 1999). Because of differences in response time to climatic variations, not all climate indicators are comparable.

Physiography

New Brunswick is the largest and northernmost of the Maritime Provinces of Canada's mainland. Situated at approximately 45° N latitude and 66° W longitude, it covers an area of 73,405 square km. The province falls into three large physiographic units: the New Brunswick Highlands (Caledonian, Edmundston, St. Croix, and Miramichi), the Chaleur Uplands, and the New Brunswick Lowlands or Maritime Plain (Rampton et al. 1984). The New Brunswick Highlands cover much of the central, southern, and eastern portion of the province bordering the Bay of Fundy. The New Brunswick Lowlands are located in the south-central portion of the province, and are almost entirely enclosed by the three New Brunswick Highlands. Finally, the Chaleur Uplands are located in the northwestern portion of the province, and are bordered to the west by the state of Maine. The Saint John River valley is a major physiographic feature within the province, and forms a deep trench through the New Brunswick Uplands, Highlands, and Lowlands. The Saint John River, as it empties into the Bay of Fundy, divides the St. Croix Highlands, west of the river, and the Caledonian Highlands, east of the river. Of the southern Highlands the largest and highest of these is an upland ridge following along the Bay of Fundy, east of the Saint John River. Much of the New Brunswick Lowlands are a flat, swampy area, with erratic drainage patterns caused by glaciation.

The province of Nova Scotia is situated southeast of New Brunswick at approximately 45° N latitude and 63° W longitude. The land mass area of Nova Scotia is smaller than that of New Brunswick at 55,467 square km. Nova Scotia has two large physiographic units, a group of Upland/Highlands, and a group of Lowlands or Valleys (Goldthwait 1924). Four Highlands/Uplands (Southern Upland, North Mountain, Cobequid Mountain and the Highlands of Eastern Pictou, and Antigonish Counties) break up the province. Nova Scotia also consists of four Lowlands or Valleys (Annapolis-Cornwallis valley, Cumberland-Pictou Plain, Lowlands of Antigonish and Guysborough, and the Lowlands of Hants and Colchester Counties). The longest remnant of the Atlantic Upland in the Maritime Provinces is the Nova Scotia Southern Upland. This Upland area occupies the southern part of the Nova Scotia peninsula. The northern portion of the province consists mainly of Lowlands that surround some small central Highlands starting near the northern portion of the Minas Basin, and continuing east to the western portion of Georges Bay.

Bedrock Geology

The bedrock geology of the New Brunswick Highland, Upland, and Lowland areas is complex (Rampton et al. 1984; Seaman et al. 1993). The Chaleur Uplands in the northwestern portion of New Brunswick consists mainly of Early Paleozoic marine clastic and calcareous sediments. The New Brunswick Lowlands, which are flanked to the west and south by Highlands, are comprised mainly of Late Paleozoic continental clastic sediments. Finally, the three New Brunswick Highlands are comprised mainly of Early Paleozoic, clastic continental and marine sediments, volcanic rocks, and granite and minor gabbro. Precambrian volcanic rocks and clastic continental and marine sediments underlie much of the coastal Caledonian Highlands. The southern portions of the St. Croix Highlands as well as the southern portion of the Chaleur Uplands, that border the New Brunswick Lowlands, are comprised of igneous and plutonic acidic rocks. The bedrock geology of southwestern New Brunswick in particular is very complex, with the greatest complexity occurring adjacent to the Bay of Fundy coast where the topography is much more rugged.

The bedrock geology of Nova Scotia is also complex (Clayton et al. 1977; Roland 1982). The Nova Scotian Highlands/Uplands consist mainly of early Paleozoic age granites, with some slates, greywacke, and quartzites. However, the North Mountain of the Annapolis valley consists mainly of basalt with some sandstone and shales. The Nova Scotia Lowlands, which are located in the northern portion of the province, are comprised mainly of late Paleozoic age sandstone, limestone, gypsum, and other sedimentary rocks. The more southeastern portions of the Nova Scotia Lowlands consist of igneous, and plutonic acidic rocks.

Soils

Related to geology is the distribution of soil types. Soil distribution affected the distribution of past floral, and faunal communities. The general soil conditions of New Brunswick favor paludification (Clayton et al. 1977). Podzolic soils in New Brunswick are along the coastal Highlands, and the Highlands bordering the state of Maine. Almost all of the naturally developed soils are podzols. The environmental factors favoring the formation of podzols are relatively abundant precipitation, long cold winters, short cool summers, and natural forest vegetation composed largely of coniferous trees. The Central Lowlands of New Brunswick favor a gray luvisolic soil, similar to a hapludalf in the United States system of taxonomy (I. Fernandez Personal Communication 2001). Luvisolic soils develop under well to imperfectly drained mineral soils where there is growth and decomposition of forest vegetation within a mild to cold climate. In addition, the glacial deposits in the New Brunswick Lowlands derive from sandstone or from acid crystalline rocks. Consequently, the soils tend to be acidic, leached, and infertile (Putnam et al. 1952).

Nova Scotia soil conditions are very similar to those found in New Brunswick, with podzolic soils dominating most of the landscape. Throughout the Lowlands, in the northern portions of the province, there is also some gray, well to imperfectly drained, luvisolic soils (Clayton et al. 1977).

Glacial History

The last major event that helped shape the surface features of the Maritime Provinces was the effect of the Late Wisconsinian Laurentide Ice Sheet. The Maritime Provinces, Newfoundland, and a portion of Quebec are considered part of the Appalachian Glacier Complex (Stockwell 1957). Glaciation sculpted current landforms, followed by marine and lacustrine submergence, isostatic rebound, alluviation, stream erosion, and weathering. The Maritime Provinces were at the eastern margin of the Laurentide Ice Sheet. South of James Bay, Ontario, a major Laurentide ice center existed (Hyland 1986). There is evidence of smaller local ice caps in Nova Scotia and New Brunswick following the Laurentide glacial maximum (Fulton et al. 1984; Rampton et al. 1984; Stea et al. 1998).

As proposed by Prest and Grant (1969), the ice retreat from the southern coast of the Bay of Fundy occurred about 13,700 years B.P., from the east Atlantic coast about 12,900 to 12,800 years B.P., and from the northern Chaleur Bay coast about 13,000 years B.P. The ice dissipated from the Upland areas in central New Brunswick about 11,500 to 11,000 years B.P. Rampton et al. (1984) suggested that by about 12,400 years B.P. the southwestern portion of New Brunswick was completely deglaciated. This interpretation was debated by Nicks (1988) who proposed that there was a readvance of ice in southern New Brunswick, in the Saint John region, around 12,600 to 12,800 years B.P., followed by a second readvance around 11,500 to 11,000 years B.P.

Glacial and postglacial events in the Maritimes continue to be debated. Studies of foraminifera found in sediment core samples from raised basin lakes in the Maritime Provinces suggested that southwestern New Brunswick was an ice free and emerging landmass approximately 16,000 years B.P. (Gadd 1973; Scott and Medioli 1980). These dates may be spuriously early due to the "hard water effect" (Bradley 1999).

The glacial evidence in New Brunswick and Nova Scotia includes geological features such as moraines, drumlins, kames, eskers, and other glacial and ice cap features. However, systematic mapping of these features is incomplete. The pattern and sequence of ice-flow marks throughout the province are complex. The changing flow directions of glaciers are revealed by striae on rock outcrops. However, the orientations of larger features such as drumlins are also used to determine ice flow direction.

In the western and southern parts of New Brunswick ice-flow marks reveal a south to southeast trend, and in the eastern parts of the province they have an east to northeast trend. Personal communication with A. Seaman (2001), Quaternary Geologist for the Province of New Brunswick, suggested that ice-flow marks are much more complicated than previously thought. It has been determined that strong ice flow took place along defined channels throughout the province, such as the Saint John River valley (Prest and Grant 1969). The complete Saint John River drainage area includes 20,000 square miles that encompasses part of Quebec, New Brunswick, and the state of Maine (Blair 2001; Putnam 1952).

During deglaciation, ice in the province of Nova Scotia separated into two masses, one with radial outflow along the southeastern border of the Caledonian Highlands, and another ice lobe in the Chignecto Bay region (Foisy and Prichonnet 1991). Small, separate ice caps that formed in the province included one over southern Nova Scotia, the Northumberland Strait area, and the Antigonish Highlands in northern Nova Scotia (Stea et al. 1998). The pattern of ice flow is also complex for Nova Scotia. On the Atlantic coast of Nova Scotia, ice flow was south to southeastward, while along the northern portion of the province overlooking the Bay of Fundy ice flow was northwest to westward (Stea et al. 1998; Stea and Mott 1998). Again, this may be an oversimplification of ice-flow patterns.

Paleoclimatology and Vegetation

Climate is an important determinant of the distribution of biotic communities. The Late Wisconsin and Early Holocene period has included several major glacial and interglacial intervals resulting in a number of small-scale climatic variations. During these climatic variations there were changes in mass between the oceans and ice sheets. These changes affected the environment, and had a pronounced affect on climatic indicators such as pollen.

Paleoenvironmental reconstructions for the northeastern portion of North America are largely based on palynological (pollen) studies, which often include constraints such as migration rate of species. Fossil pollen grains found in sediments deposited in ponds, lakes, and bogs are often representative of specific climatic and vegetation conditions. Davis (1969), Davis and Jacobson (1985), Levesque et al. (1993a; b), Mayle et al. (1993), Mott (1975,1994), and Mott et al. (1986) developed a paleoenvironmental reconstruction for parts of the Maritime Provinces. Determining the types and abundance of pollen present in such sediment deposits has permitted development of regional pollen diagrams. The transitions between different pollen zones, or vegetation regions are based on diagnostic and sometimes obvious changes in the pollen spectra. The differing vegetational regions may be translated into a climatological division of the recent past (Davis 1969; Mott 1975).

Davis (1969) and Mott (1975) determined that with the retreat of the ice by at least 13,000 years B.P. a tundra environment dominated the Maritime region and the landscape became vegetated by grasses, shrubs, and herbs. About 12,600 years B.P. birch, poplar, and willow became more abundant, and by 12,000 years B.P. the environment became open spruce Maritime Woodland with shrub birch. From approximately 11,000 years B.P. until 10,000 years B.P. spruce started to decline as a cool-climate tundra environment increased. This is referred to as the Younger Dryas cold event (Cwynar et al. 1994; Mott et al. 1986).

The Younger Dryas has been recognized throughout the Maritime Provinces. Radiocarbon dates obtained from the pollen stratigraphy for New England yielded dates suggesting the beginning and termination of the Younger Dryas in the Northeast. Actual radiocarbon dates for the beginning and terminations of the Younger Dryas in the Northeast were obtained from pollen stratigraphy for New England. Peteet et al. (1993) suggested a date of 10,740 ±420 years B.P. for the beginning, and 9,920 ±230 years B.P for the end of the Younger Dryas. The onset of the Younger Dryas was quick, and occurred in less than 20 years (Mayewski et al. 1996). During the Younger Dryas the region became colder and wetter and there was a decline in trees, and an increase in shrubs and herbs. This event corresponded with the Paleoindian occupation in the Northeast (Mott and Stea 1994). Winter snow and ice probably persisted throughout the summers, and remnant glaciers re-advanced throughout the Maritime Provinces (Nick 1988; King 1994; Lamothe 1992; Mott and Stea 1994).

Finally, around 10,000 years B.P. pine, poplar, spruce, and aspen began to spread again as the climate became increasingly warm and dry. This stabilization of the climate was the beginning of the present Holocene period. Birch trees and other taxa associated with a warming climate closed in the forest shortly after 10,000 years B.P. Finally, by around 9,000 years B.P. spruce, pine, and mixed hardwoods emerged.

Recent research has suggested that the early paleoclimatology and vegetation of New Brunswick was much more complicated, and regionally specific than previously interpreted. Using lake sediments from the northern as well as southern portions of the province, Mott et al. (1986) developed pollen diagrams from buried organic sediments. At the Basswood Road Lake site, in the southwestern portion of the province, shrub tundra emerged after 12,600 years B.P., followed by peaks of spruce and popular forests that continued until 11,300 years B.P. Finally, after 11,300 years B.P. spruce declined in the region, and shrub and herb tundra increased. At around 10,000 years B.P. popular and spruce became dominant in the region. The pollen in the lake sediments at Roulston Lake, from the northern portion of the province, suggested that shrub tundra dominated the region until 11,100 years B.P. followed by herbaceous tundra. Finally, poplar and spruce entered the region again around 10,000 years B.P.

Such regional climatic and vegetational differences included the province of Nova Scotia as well. Levesque et al. (1993b) studied the organic content of sediment, as measured by loss-on-ignition, at 12 lake sites from New Brunswick and Nova Scotia. This study also included pollen analysis at six of the locations. These studies suggested that a spruce and poplar forest dominated southern New Brunswick and central Nova Scotia prior to 11,160 years B.P., whereas a shrub tundra environment dominated central New Brunswick, and southern and northern Nova Scotia (Levesque et al. 1993b). Research by Mayle et al. (1993) also suggested that mainland Nova Scotia and southern New Brunswick changed from a closed forest to shrub tundra around 11,000 years B.P., at the same time central New Brunswick changed from shrub tundra to herb tundra.

Research by Levesque et al. (1993a) at the Stillman Pond site in Nova Scotia postulated that vegetation in the region around the Debert Paleoindian site was mainly poplar, dwarf birch, and sweet gale prior to 11,160 years B.P. A cooling trend followed with an increase in sedge, grass, and herbs until a rewarming began around 10,910 years B.P. There was a brief warming during which spruce began arriving in the region. This warming trend did not last long, as the major cooling of the Younger Dryas event soon began (Levesque et al. 1993a).

The Younger Dryas included a tundra environment supporting shrub birch, and dwarf willow. The Debert Paleoindian site, dated between 7,685 ±92 and 11,106 ±311 years B.P., could have been occupied during the onset of the Younger Dryas when the vegetation was changing from one that included spruce trees to a cooler environment that supported a more tundra-like environment. The initial arrival of Paleoindian people into the region could have been when spruce was still in the region, prior to the full tundra-like environment of the Younger Dryas. Charcoal removed from hearth features at the Debert site included wood samples identified as conifer charcoal, most likely of the genus *Picea* (spruce) (MacDonald 1968). Human movement into the region may also have occurred well into the Younger Dryas event. In this case, the spruce found burned in the hearth features would not actually have grown in the region of the site, but constituted bits of wood scavenged from nearby regions of a previously forested surface. The site chronology is too insecure to resolve this question.

Sea-level Fluctuations

Global sea level has risen approximately 120 m as a result of melting of the Late Pleistocene ice sheets (Fairbanks 1989) and over the last 12,000 years has fluctuated a number of times. Therefore, it is important to understand coastal processes and incorporate that understanding into paleoenvironmental reconstructions. Watters et al. (1992) proposed that the recognition of past shorelines is key to environmental interpretations of archaeological sites. Ancient sea levels are marked along the coast by relict beaches, eroded terraces, and by glaciomarine deltas. Understanding whether the level of sea or of the adjacent land has changed due to natural processes is important to consider when reconstructing a geological setting. However, past sea level fluctuations are complicated, as they may vary in any given region because of local geological factors, especially the isostatic crustal movements due to loading and unloading by glacial ice.

The coast of New Brunswick, including the Bay of Fundy region, is environmentally diverse with its rocky cliffs, sand and cobble beaches, salt marshes, and mud flats. The indications of the changing geology and ecology are interwoven with the changing sea levels of the past, which are also important to the understanding of human prehistory within the region (Sanger and Kellogg 1989).

Marine limits were higher in the regions deglaciated earliest, such as the Bay of Fundy (Stea et al. 1998). The cause of the amplification in the tidal range in the Bay of Fundy has been debated. Grant (1970) proposed that increased water depth widened and deepened the entrance to the Bay of Fundy, permitting more water to cross the threshold, thus increasing the tidal range. Grant (1970) further suggested that the rate of tidal change has increased regularly with time. However, research by Scott and Greenberg (1983) argued that the growth of the tidal range was uneven, not linear, and that the water depths controlled it over Georges Bank instead of variations of relative sea level.

Glaciation had a major effect on sea level. The weight of the ice sheets depressed the land, allowing the sea to transgress into the lower Saint John River valley (Rampton et al. 1984). However, Seaman now believes that "the interpretation of Lee (1957) is more likely correct, and that a glacial lake, probably dammed by ice in the Saint John area, occupied much of the Saint John valley until the ice dam broke and allowed an estuary to develop in the valley" (A. Seaman Personal Communication 2001). The depressed land then began to rise in response to the decreasing ice load as the glacier melted and retreated. By about 12,000 years B.P., raised features such as hills and ridges first began to emerge in and around the City of Saint John (Rampton et al. 1984).

Stea et al. (1994) developed a relative sea level curve for Nova Scotia based on shell dates, suggesting sea level dropped to –65 m around 11,600 years B.P., establishing a level shoreline surface over most of the eastern and southern shores of the province. This stable shoreline formed during a period of crustal stability. The initial drop in relative sea level might be due to crustal rebound as the ice retreated (Stea et al. 1994). Rampton et al. (1984) proposed minimum sea levels from –25 to –65 m between 7,000 and 10,000 years B.P. Such an interpretation of the past relative sea level suggests that if people occupied the coast during the Early Holocene, all the sites within the large exposed coastal zone, including the Maine coast, would now be under water (Barnhardt et al. 1995).

The marine invasion of the City of Saint John and surrounding region at the beginning of deglaciation extended inland along the Saint John River valley, as evidenced by marine sediments (Rampton et al. 1984). Rampton et al. (1984) suggested that the maximum submergence of the Saint John area under the invading sea was placed at 69 m, whereas Gadd (1973) suggested 73 m. Within the Saint John area, marine sediments containing fossil remains have been found. Lowdon et al. (1970, 1971) completed radiocarbon dating of these fossil remains that yielded an age of around 13,000 years B.P. These dates have helped to trace the history of the relative sea level movements in the region. Fluctuations in water levels had profound effects upon early prehistoric settlement and subsistence patterns, first inundating and then exposing vast land areas. However, the history of the early Holocene sea level fluctuations in the Bay of Fundy is a complex one, and still debated.

Environmental Context of Selected Sites

Debert and Belmont II Sites

The Debert and Belmont II sites are located on the North shore of Cobequid Bay, Nova Scotia, and approximately four kilometres south of the town of Debert. Cobequid Bay drains into the Minas Basin, which ultimately drains into the Bay of Fundy. These sites are situated on a low sandy ridge, and due to the porous nature of the sandy soil, drainage in the area is good. The vegetation in the region is considered the same as that found in New Brunswick, a southern mixed forest that includes white and red pine, birch, spruce, maple and oak with a boreal prehumid to humid climate, moderately cool and damp (Clayton et al. 1977).

The Debert and Belmont II sites are situated in the Hants-Colchester Lowlands physiographic region, approximately 10 km from the Cobequid Highlands to the north. According to Stockwell (1957), Triassic sedimentary and volcanic rocks underlie the area. These rocks include argillite, quartzite, limestone, andesite, volcanic breccia, and tuff.

MacDonald (1968) postulated that during the occupation of the Debert site an active ice cap, as close as 97 km away, was situated in the Cobequid Mountains. The Debert site is situated on laminated sands and an underlying till sheet. Till fabrics suggest that the direction of the last glacial ice sheet was from the northeast (MacDonald 1968).

Research by Stea and Mott (2001) agreed with MacDonald's assessment of an active icecap not far from the Debert site at the time of occupation. A regional till sheet can be traced to ice-marginal deposits near the Cobequid Highlands to the south.

Radiocarbon dates from two pieces of wood from two locations under this till yielded dates of 10,900 and 10,800 years B.P. (Stea and Mott 2001). Further evidence suggesting that the Cobequid Highlands were covered by ice during the Younger Dryas comes from lake sediments in northern Nova Scotia, which "do not record organic deposition until 10,000 years ago" (Stea and Brewster 1996: 85). As no earlier organic material has been recovered to date, Stea and Brewster (1996) proposed that prior to 10,000 years B.P. these lakes were under regionally isolated glaciers.

Shubenacadie River Sites

The Shubenacadie River sites (BfCv-3 and BfCv-5) are located along the Shubenacadie River approximately 1,200 m northeast of the outlet from Grand Lake, Nova Scotia. The general soil type in the area is a sandy loam over a clay loam till derived from shale and sandstone (Preston 1973). The Shubenacadie 3 site is located on level land at the top of a slight knoll, and extends to a gentle slope that leads to the riverbank. The Shubenacadie 5 site is situated on a level grassy clearing on the north bank of the river. The river is wide and shallow but fast flowing. The forest in the area is of mixed softwoods and hardwoods. During deglaciation, glacial lakes formed in the Shubenacadie River valley as ice dammed their outlets into the Minas Basin (Stea and Brewster 1996).

Jemseg Site

The Jemseg site is in south central New Brunswick, on the east bank of the Jemseg River in the Grand Lake Meadows region of the province. The Jemseg River drains Grand Lake to the north and is a tributary of the Saint John River to the south. East of the Jemseg River the area is better drained as it slopes gently toward the river. The area where the site is located is not well drained, and floods in the spring.

The Jemseg site is located in the New Brunswick Lowland physiographic region, within the Grand Lake Basin subdivision boundary. This region is a low relief area occupied by flat lying sedimentary rocks. Stockwell (1957) described the area as underlain by Pennsylvanian, mainly sedimentary rocks such as sandstone, shale, and conglomerate as well as some volcanic rocks. The vegetation in the region is also a southern mixed forest with a boreal prehumid to humid climate, moderately cool and damp (Clayton et al. 1977).

Modern drainage in the area derives mainly from the reestablishment of pre-glacial drainage systems controlled by the bedrock structure. Glaciers of late Wisconsin age covered the area, and glacial striations on the bedrock surface indicate southerly and southeasterly ice flow directions (Rampton et al. 1984).

The glaciers deposited till of variable thickness throughout the region. The Jemseg site is located on sediments of a glaciofluvial and alluvial origin that infilled an abandoned pre-glacial channel. The site is located on the eastern bank of this pre-glacial channel. The alluvial deposits overlie earlier glaciofluvial deposits. A review of literature with a focus on when early people could have lived along the Jemseg River revealed little information. Most work pertaining to postglacial environments within the province of New Brunswick has focused on the northern and southern portions of the province. However, Seaman speculated that the region around the Jemseg site could have been inhabitable between 11,000 and 10,000 years B.P. (A. Seaman Personal

Communication 2001). These interpretations follow from research by Levesque et al. (1993b), which suggest Killarney Lake, in Fredericton New Brunswick, was not glaciated during the Younger Dryas, as shown by pollen and midge studies.

Bentley Street Site

The Bentley Street site is located in Saint John, New Brunswick, on a high bedrock shelf situated at the mouth of the Saint John River, east of Reversing Falls. The bedrock shelf is approximately 45 m wide and 200 m long, and it lacks extensive soil deposition and vegetation. The area is moderately well drained except for local shallow depressions. The site overlooks the Saint John Harbor and part of the Saint John River. Also, the site faces southeast and has a warm, sunny exposure.

The Bentley Street site is located in the Caledonian Highlands physiographic region east of the Saint John River in southern New Brunswick. The area is underlain by Cambrian and Lower Ordovician, mainly sedimentary rocks consisting of red conglomerate, quartzite, breccia, siltstone, grey shale, and sandstone as well as minor limestone (Alcock 1938). These sedimentary rocks overlie the Precambrian strata. The vegetation in the region is the same as that found at the Jemseg site, a southern mixed forest including white and red pine, birch, spruce, maple and oak with a boreal prehumid to humid climate (Clayton et al. 1977). The strong maritime influence of the Bay of Fundy causes the coastal region to have cooler summers and warmer, wetter winters than the adjacent mainland regions (MacKay et al. 1978).

Glaciers covered the region during the Pleistocene. Today the region is covered by glacial and fluvioglacial deposits. However, there are areas of the Caledonian

Highlands that consist mainly of deeply weathered bedrock, such as is found at the Bentley Street location. Rampton et al. (1984) proposed that the degree to which this bedrock is weathered suggests that the Caledonian Highlands may have been one of the earliest regions to be deglaciated. However, this weathering of the bedrock may be preglacial.

Work by Nicks (1988) at Sheldon Point, Saint John, used the sediments and radiocarbon dated material (shell and peat) from the Sheldon Point moraine to approximate the glacial retreat from the coastal lowlands of southern New Brunswick. Nicks (1988) argued that the last glacial ice readvance occurred in the region between approximately 11,600 and 10,800 years B.P. Just following this ice readvance, between 10,800 to 10,500 years B.P., sea level fell quickly, exposing an area where peat formed (Nicks 1988). Research by Nicks contradicted earlier research on ice retreat from southern New Brunswick, near the Bentley Street site location, which suggested that glacial ice had retreated from southern New Brunswick between 12,800 and 12,600 years B.P. (Rampton et al. 1984).

Chronology of the Late Pleistocene and Early Holocene

Models predicting when Paleoindian people occupied a particular location have been proposed using climate and resource parameters (Bonnichsen et al. 1985; Curran 1999; Jones 1994), morphology of projectile points and tool technology (Anderson 1991; Ellis et al. 1998; Keenlyside 1985), lithic distribution and raw material source locations (Kelly and Todd 1988), and population growth and movement across the landscape (Ellis et al. 1998; Spiess et al. 1998). Radiocarbon dates from Paleoindian sites have also been applied to address questions about when Paleoindian people inhabited the Northeast. Ideally, chronological evidence for Paleoindian sites should include radiocarbon-dates. However, as noted by Curran (1999) there are many problems associated with obtaining relevant carbon samples.

Recent research comparing pollen records and ice cores suggested that radiocarbon ages became younger at the onset of the Younger Dryas due to an abrupt increase in radiocarbon in the atmosphere (Bjorck et al. 1996). The increase in radiocarbon may be due to cold glacial melt water inputs into the oceans (Bjorck et al. 1996), or a decrease in thermohaline circulation (Tomasz et al. 1995). Evidence from coral and ice core records suggested that late Pleistocene carbon samples would appear approximately 2,000 years younger than they really are. From such evidence the radiocarbon age of Paleoindian sites should be closer to 13,000 years B. P. than 11,000 years B.P. (Fiedel 1999). Such radiocarbon plateaus (date compression) or abrupt age jumps are not specific to the Northeast but are global in extent (Denton and Hendy 1994; Lowell et al. 1995).

Other problems with radiocarbon analysis that are not limited to the Paleoindian period include root intrusion and decay in dated features, which may lead to late radiocarbon dates from early features. Further, charcoal and burned bone from early features, such as hearths, may become mixed with soil and charcoal from later forest fires. Such problems can happen due to natural bioturbation of the soils or disturbance by tree-throws (MacDonald 1968). Finally, construction can damage or destroy sites. Spiess and Wilson (1987) noted that Paleoindians in the region located their sites in similar settings, which tended to be on well-drained sandy soils. Glacial sand and gravel deposits are also highly desired today for construction purposes. Therefore, these deposits are often disturbed or eliminated prior to archaeological testing (Dickinson and Jeandron 2000).

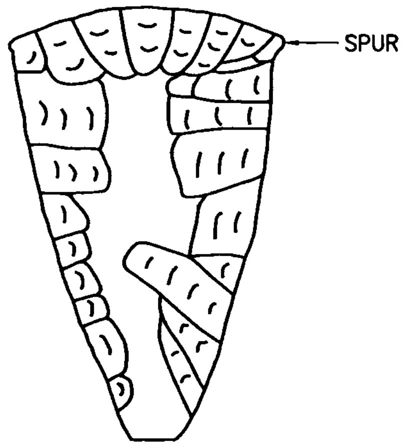
Often a number of radiocarbon dates from a site are averaged (MacDonald 1968). Levine (1990) argued that it is possible that averaging multiple radiocarbon dates may obscure the actual age of the site. The Debert site returned 24 radiocarbon dates from 15 dated features, located in 3 separate loci within the site. A tree throw, root disturbance, or bulldozer had stratigraphically disturbed a number of features; however, within each feature an average value of the radiocarbon dates was calculated (MacDonald 1968). An overall combined average age estimate was then generated for the entire site based on 13 of the features. This averaging of radiocarbon dates produced an average age for the site of 10,600 ±47 years B.P. (MacDonald 1968).

CHAPTER 3

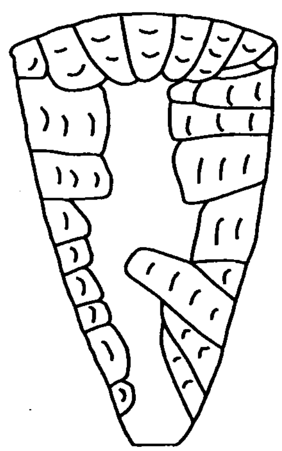
METHODOLOGY

For this study I defined uniface end scraper as a lithic tool that has the primary working surface opposite the bulb of percussion with fine distal end modification, and flaking on one surface only. The end scraper working edge (distal end) is convex and may have varying degrees of edge angles, often considered to be related to tool function. A "spurred end scraper" is an end scraper that has been retouched along the distal end and lateral margins, and has an isolated protrusion where the working edge intersected the lateral margin at a sharp angle on one or both sides of the distal end. The term isolated, for the purpose of this research, is somewhat subjective but usually consists of a retouched concavity on one or both sides of the protrusion or spur (Figure 2).

End scrapers can be viewed within a framework of a lithic reduction sequence (Andrefsky 1998; Bradley 1975). This reduction sequence encompasses the technical operation, which includes elements such as the raw material, the physical actions as well as the knowledge of the knapper. This sequence ultimately leads to the production of a stone tool. Viewing end scrapers as part of this process may lead to suggestions about the technology of the stone tool. This analysis included end scraper assemblages from two known Early Paleoindian sites and two Late Maritime Woodland (Ceramic) sites. To prepare for this analysis, I first developed a morphological type description for the end scrapers that were to be analyzed, in order to facilitate comparisons with sites from a different cultural time period. The morphological type description included end scrapers



SPURRED END SCRAPER



END SCRAPER

Figure 2: End Scraper and Spurred End Scraper

The figure shows the morphological difference between an end scraper and a spurred end scraper.

that had sharp angles where the distal end met a lateral margin. Such angles are also often referred to as beak, borer, graver, cutter, piercer, tip, or spur.

I examined the lithic attributes of spurred end scrapers from six sites. The Debert Paleoindian site (BiCu-1) provided radiocarbon-dated associations allowing primary temporal control (MacDonald 1968). The Belmont II site (BiCu-7) and the Shubenacadie Maritime Woodland culture period sites, BfCv-3 and BfCv-5, served as secondary dated samples that can be indirectly assigned to the Paleoindian (Davis 1991), and later Maritime Woodland culture periods (Preston 1974:), respectively. This cultural assignment was based on tool class and stylistic comparison.

A detailed attribute analysis provided an accurate and representative description of the spurred end scrapers. An attribute analysis is necessary to measure technological variability within both a regional and a broader context. The known Paleoindian site spurred end scraper assemblages were compared with the Late Maritime Woodland period site assemblages in order to isolate potentially diagnostic attribute trends, which could then be applied to the New Brunswick (Jemseg and Bentley Street) sites that may contain a Paleoindian component.

Selection of the Tool Study Group

Both the Late Maritime Woodland and Early Paleoindian culture period assemblages contained end scraper type tools. Scrapers in general are one of the most common tools in Paleoindian assemblages (Cox 1986; Gramly 1982; Irwin and Wormington 1970; Johnson 1989; Witthoft 1952). Many northeastern Paleoindian site assemblages, such as those from the Bull Brook II site (Grimes et al. 1984), the Shoop site (Cox 1986), the Whipple site (Curran 1984), the Vail site (Gramly 1982), and the Debert site (MacDonald 1968), contain spurred end scrapers. Due to the large number of such tools, I selected spurred end scrapers for a comparative analysis.

Archaeologists have often interpreted the spur on an end scraper differently, leading to the interpretation of different lithic technologies. Some archaeologists have suggested that the spurs on the end scrapers functioned as composite tools such as gravers or perforators, or as tools for ripping and tearing (House 1975; Irwin and Wormington 1970; MacDonald 1968; Rule and Evans 1985; Witthoft 1952). However, other archaeologists have proposed that the spurs resulted from resharpening the working edge of the scraper (Clark and Kurashina 1981; Grimes et al. 1984; Morse and Morse 1983; Rule and Evans 1985; Shott 1995; Spiess and Wilson 1987).

Individual site conditions dictated minor modifications in the sample selection from the six sites. However, generally the sample procedure consisted of:

- laying out the entire lithic collection for each site;
- eliminating all non-end scraper tools and debitage from the analysis (ie. side scrapers, abrading stones, hammer stones, and projectile points);
- end scrapers that were not complete or mostly complete, or had more than half the distal end missing were eliminated; and
- I analyzed only those end scrapers from the six sites that had defined flaking on the distal and lateral margins that met to form a sharp angle.

Morphological Classification and Attribute Analysis

The attributes applied in this analysis followed from those applied by other researchers in the Maine-Maritime region (Sanger 1987; Spiess and Hedden 1983; Turnbull 1990; Cox 1986). The general information recorded for each artifact included: provenience information, lithic material, morphology, condition of the artifact, and metrics. The developed worksheets included these variables (Appendix A). This information included a total of 52 variables, of which 23 were independent and 29 were dependent. Of the independent variables, 15 included qualitative data and 8 included quantitative data. The dependant variables included 17 qualitative and 12 quantitative data variables. Attribute data for each of the six sites analyzed is summarized in Appendix B.

The first major category on each work sheet consisted of the provenience information. This category included information, if available, such as: site name, artifact number, the unit and layer the artifact was recovered from, associations with known radiocarbon dates or other artifacts, association with features, any additional provenience information, excavation history, and current location of the artifact.

The next category on the work sheets included lithic material information. David Black (1997, 1998) at the University of New Brunswick previously completed the lithic analysis for the Jemseg and Bentley Street sites. A petrographic series for the sites included geological description and type examples. The Debert artifacts also had a previous lithic analysis completed. If there was no previous lithic analysis completed on an artifact or collection, I compared it with the petrographic series, and the lithic types identified from the Debert site.

The lithic material data entered on the work sheets included the name of the raw material, followed by the raw material lithology. The lithology included the color, texture, opacity, or translucency. The analyst, the date of the analysis and the methodology used in the lithic analysis is also noted.

The next category entered onto the data sheets was the morphology of the tool. I defined the striking platform as the surface impacted to remove the flake. The analysis included the presence or absence and description of the striking platform. Characteristics of the striking platform included: if the platform was either abraded (evidence of additional preparation in the form of grinding or rubbing), simple (recognized as a smooth flat surface), complex (recognized as having an angular surface, or more than one facet), crushed (destroyed or broken platform), cortex (visible cortex from the original surface of the core), or not applicable (platform missing).

I noted the amount of abrasion on the striking platform as: no abrasion present (0); slight abrasion if it was possible to see an arris separating the dorsal surface of the artifact from the striking platform (1); complete abrasion if the dorsal margin of the striking platform was abraded to the point that the arris separating the dorsal surface of the artifact from the striking platform was unrecognizable (2); and if the striking platform was missing (n/a).

Tactile and visual inspection determined the presence of a lip or hasp on the ventral surface of the striking platform. Characteristics recorded pertaining to the lip or hasp included presence and absence, or striking platform missing (n/a).

I defined the striking platform angle as the angle formed by the intersection of the striking platform surface and the ventral surface. Measurements of the striking platform angle were taken to the nearest five degrees using cardboard with angles cut out in five-degree intervals. Other striking platform measurements included the platform length and platform width. The striking platform length was the distance across the striking platform from lateral margin to lateral margin. The striking platform width was the maximum distance on the striking platform from the dorsal to ventral surface.

The next attribute was presence of a spur. I defined a spur as a protrusion isolated as a result of flaking on the distal and lateral margins that formed a sharp angle. This isolation included flaking that often ended in a concavity on one or both sides of the protrusion. If a spur was present I recorded the number, position (bit end, proximal end, left lateral, right lateral, or combination), and pattern of flaking on the spur. The pattern of flaking and morphology of the spur consisted of flaking along the sides of the spur (vertical pattern), longitudinal flaking (running the length of the spur), snapped lateral edge (forming a protrusion), combination of the above, indeterminate (only base of protrusion present), or not applicable (no spur present).

I defined cortex as the presence of the original outer surface of the nodule from which the tool came. Cortex has a weathered character in contrast to the appearance of the inner material. If cortex was present, the analysis included an estimated percentage of the area that had cortex present, along with the location (ventral, dorsal, proximal, distal, left lateral, and right lateral margins, or combination).

The next attribute was the presence or absence of hafting. Attributes that indicated the presence or absence of hafting included: ground laterals/proximal, retouched laterals/proximal/concavities on lateral margins either flaked or snapped, ground central arris on dorsal surface, or combination. The attribute was labeled not applicable if the artifact was broken in such a way that it was not possible to determine the presence of the attribute.

There was a distinction between ventral and dorsal finishing, and ventral and dorsal retouch. Visual inspection determined the presence of finishing and retouch on an artifact. I defined ventral and/or dorsal finishing as the morphology of the facial surface (presence or absence of arrises or flaking aside from retouch on the lateral margins). If ventral finishing was present, the analysis included an estimated percentage of the area flaked. If dorsal finishing was present, the analysis included determining if the flake pattern was multidirectional across the dorsal surface, single arris, multi-arris, or flat.

I defined ventral and/or dorsal retouch as the presence of edge removals or modification by percussion or pressure flaking with the intention of finishing the tool. The location of the retouch included the distal or proximal end, right or left lateral margins, or combination. The analysis of the retouch included the type of retouch. Type of retouch consisted of: short retouch, if flakes extended less than half the length of the edge angle; long retouch, if flakes covered over half the length of the edge angle; invasive retouch, if over half of the entire face of the artifact was impacted by flake scars, or combination. The attribute was labeled not applicable if the artifact was broken or no flakes were present.

The locations of the working end of the artifact included the proximal end, distal end, left or right lateral margin, or combination. I defined the working end as the location where a steep convex edge was produced by the removal of retouch flakes. This attribute helped with the initial artifact selection; however, final analysis may suggest that the working end of an artifact may include a combination of an additional margin and a distal end. The location of the working end angle was measured in degrees using a goniometer where the distal flaking was the longest. The maximum measure of the working edge height was recorded at the location where the distal flaking was the longest on the modified edge.

The tool shape included a number of variables. Visual inspection determined the planar shape of the overall artifact as triangular, oval, round, rectangular, square, or indeterminate. Indeterminate planar shape consisted of broken or irregular shaped artifacts. The primary working edge morphology included convex, pointed, flat, irregular, or indeterminate (broken). I defined the longitudinal cross-section as the shape of the artifact from the proximal to the distal end, with the dorsal side of the artifact facing up, and the ventral facing down. The lateral cross-section was defined as the shape of the artifact from the lateral margins of the distal end, with the dorsal side facing up, and the ventral side facing down. Visual inspection determined the longitudinal and lateral cross-section profiles, and included: concave/convex, planar/convex, convex/convex, or indeterminate. The cross-section was indeterminate if the artifact was broken in such a way that a determination was impossible. Measurements of the edge angles of the right and left lateral margins were taken to the nearest five degrees using cardboard with angles cut out in five-degree intervals. Finally, the last attribute in the morphology section included the weight of each complete artifact, measured in grams.

The next major category on the work sheets noted the condition of the artifact. Incomplete artifacts consisted of the absence or partial absence of the proximal or distal end of the tool, or one of the lateral margins. The final category on the work sheets included the metric attributes of each artifact. This category consisted of the geometry of the specimen, and contained a number of variables. I defined the maximum length of the artifact as the distance from the proximal to the distal end of the artifact perpendicular to the width, and the maximum width was defined as the distance across the artifact measured perpendicular to the length. The maximum thickness of the artifact was defined as the distance between the ventral and dorsal surfaces from the maximum transverse dimension of the artifact. I defined the span width as the length of the convex working edge. The span included the length of any spurs found on the distal end. I measured the span by rolling the distal end in clay, and measuring the length of the imprint. The maximum measure of any retouched margins, such as right lateral, left lateral or proximal end, was also recorded.

CHAPTER 4

ANALYSIS

As discussed earlier, the analysis identified similarities and/or variability within one specific tool type, spurred end scrapers. I examined lithic artifacts from two known Paleoindian sites as well as two known Late Maritime Woodland sites from Nova Scotia. The samples chosen for analyses were based solely on the morphology of the artifacts. The samples were initially examined to determine if there was a point or projection (spur) at one or both sides of the distal end. This exercise resulted in the identification and further analysis of 82 Paleoindian and 31 Late Maritime Woodland end scrapers. The spurred end scrapers from these four sites allowed for a controlled comparative lithic study to be completed between the two culture groups. I also analyzed end scrapers from two additional multi-component sites from New Brunswick using the same methodology.

To evaluate the significance of the variables recorded on each specimen I employed a statistics based analysis. Formulas used in the analysis that summarized the attributes included the mean value of a sample, standard deviation, and student t-tests ($p<0.05$). Reference points used in the analysis of the end scrapers are presented in Figure 3.

Lithic Material

Lithology does not vary much between artifact samples. I determined that the spurred end scrapers from all six sites are predominantly chert; however, also identified is a rock of volcanic origin and quartz. Table 1 presents the distribution of material found

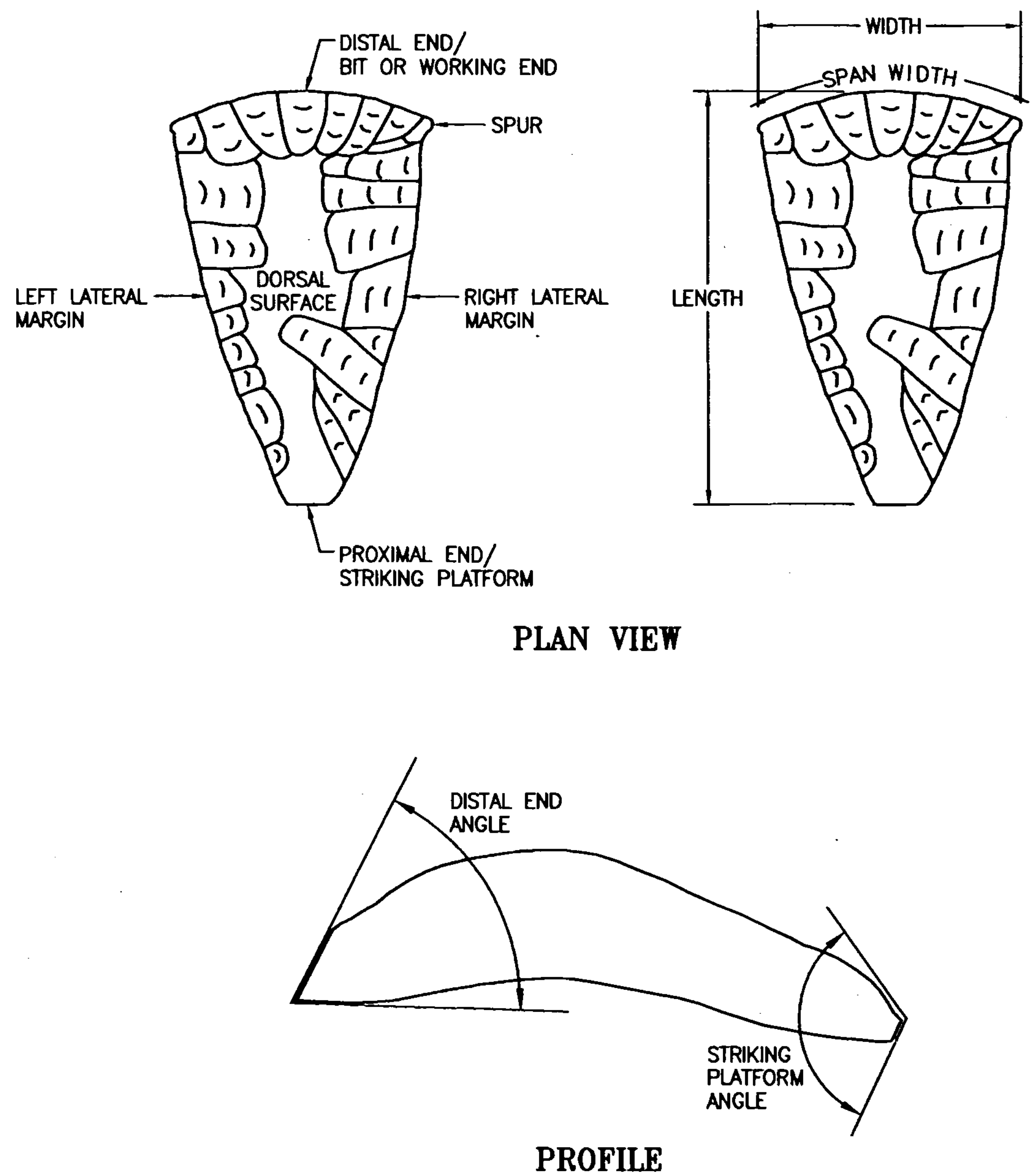


Figure 3: Reference Points of the End Scrapers

The figure shows the reference points that are used in the analysis of the end scarpers.

at each site as a proportion of the total sample for that site. Chert comprised 100 percent of the lithic material for four of the six sites, and a very large percentage for the other two sites. At Debert, 2.7 percent of the spurred end scrapers are identified as a rock of volcanic origin, while at the Shubenacadie 5 site 14.3 percent are identified as quartz.

Table 1: Lithology of Lithic Materials Present

Site	N	Chert (%)	Volcanic (%)	Quartz (%)
Debert	74	97.3	2.7	0
Belmont II	8	100	0	0
Shubenacadie 3	24	100	0	0
Shubenacadie 5	7	85.7	0	14.3
Jemseg	14	100	0	0
Bentley Street	2	100	0	0

Notes: N= total number of specimens.

The lithologies included chert, rock of volcanic origin, or quartz, because more precise designations are unlikely to result in significantly different tool form or technology. In this analysis chert refers to an aphanitic, opaque, semi-transparent to translucent/semi-translucent rock that exhibits excellent to good conchoidal fracturing properties and has a smooth fracture surface. Chert includes a wide range of materials and intergrades with chalcedony in this analysis. Some examples include a black opaque chert with gray/brown veins, a mottled pink, gray, red, orange opaque chert with brown/beige veins, and a red opaque chert with black/gray veins. The semi-transparent to translucent/semi-translucent chert includes beige, gray, and white mottled chert, and a red, pink, beige, and orange mottled chert. Rock of volcanic origin refers to a very dense, translucent rock with conchoidal fracture properties that may contain scattered crystals. An example includes a yellow/beige/brown opaque volcanic. The term quartz refers to a granular grained, transparent to sub-translucent rock that exhibits good conchodial fracturing with striated prismatic crystals often white in color.

Chert is the most common lithic material used at the sites analyzed, perhaps because of the characteristics predominantly inherent in chert. Not all the chert identified is from the same derivation, as a closer look at the lithologies would reveal chalcedonies and jaspers, for example. However, different flaking technologies would not be constrained by fracture mechanics, and instead individual choice and experience would determine technology and methods applied in forming the spurred end scraper.

Artifact Dimensions

Maximum length, width, thickness, span width, and weight measurements of the spurred end scrapers are presented in Table 2, with t-test results that measure the statistical significance with respect to the similarity of sample assemblages, in Table 3. T-scores indicate the statistical differences between the values of each quantitative variable obtained for each sample tested against the value for every other sample. T-test significance levels are set at $p<0.05$.

The mean maximum lengths of the spurred end scrapers for all six sites range between 21.9 and 29.2 mm. The means of the Jemseg and Bentley Street site samples are at the upper end of that range and the Maritime Woodland sites are at the lower end. The mean lengths of the samples from the two Paleoindian sites are very close with only a 0.4 mm difference. The Maritime Woodland sites have a slightly lower maximum length with a 1.0 mm difference between the two site means. Applying a t-test to the sample reveals that the maximum lengths between the two Paleoindian site samples are not

Table 2: Artifact Dimensions

Site	Maximum Length (mm)	Maximum Width (mm)	Maximum Thickness (mm)	Maximum Span Width (mm)	Weight (g)
Debert N=74	x=24.8 s=4.1 R=16.9-32.8	x=23.9 s =3.7 R=17.1-34.4	x=6.6 s=1.8 R=3.4-12.1	x=26.4 s=4.7 R=18.3-40.0	x=4.1 s=1.8 R=1.9-8.7
Belmont II N=8	x=24.4 s=2.6 R=21.2-24.8	x=21.0 s=2.5 R=18.0-24.3	x=6.5 s=1.1 R=4.9-8.0	x=22.6 s=3.1 R=19.2-28.5	x=3.4 s=1.0 R=2.2-4.9
Shubenacadie 3 N=24	x=21.9 s =5.9 R=17.6-29.0	x=21.0 s=3.0 R=17.2-27.8	x=5.7 s=1.2 R=4.2-9.0	x=20.2 s=5.5 R=3.7-30.7	x=2.7 s=1.0 R=1.7-5.4
Shubenacadie 5 N=7	x=22.9 s=3.6 R=18.5-27.6	x=21.6 s=3.3 R=18.2-28.2	x=5.4 s=1.0 R=5.0-7.0	x=23.6 s=4.6 R=18.7-32.2	x=2.3 s=0.6 R=1.5-3.4
Jemseg N=14	x=29.2 s=4.1 R=21.3-36.1	x=20.2 s=2.2 R=17.1-24.4	x=7.1 s=1.6 R=3.3-9.4	x=21.9 s=3.2 R=16.3-25.3	x=3.8 s=1.2 R=2.0-5.7
Bentley Street N=2	x=29.0 n/a R=29.0	x=25.8 s=0.1 R=25.7-25.8	x=7.4 s=1.8 R=6.1-8.7	x=21.6 s=8.1 R=15.9-27.3	n/a

Notes: N=number of specimens; x =mean of sample; s=standard deviation; R=range; n/a=not applicable.

Table 3: Artifact Dimensions T-tests

Attribute	Paleoindian/Woodland	Debert/Belmont II	Shubenacadie 3/ Shubenacadie 5
Mean Maximum Length	0.034646 Yes	0.796197 No	0.640064 No
Mean Maximum Width	0.001916 Yes	0.016571 Yes	0.675012 No
Mean Maximum Thickness	0.000638 Yes	0.683174 No	0.505174 No
Mean Maximum Span Width	0.0000727114 Yes	0.009756 Yes	0.217131 No
Mean Weight	0.0000259860 Yes	0.185133 No	0.202583 No

Notes: Debert=74 specimens; Belmont II=8 specimens; Shubenacadie 3=24 specimens; Shubenacadie 5=7 specimens; Yes=statistically dissimilar; No=not statistically dissimilar; t-test, $p<0.05$.

statistically dissimilar. The same result was obtained by comparing the two Maritime Woodland site samples. The Paleoindian and Maritime Woodland culture period samples together are statistically dissimilar with regard to sample length.

The mean maximum width of the spurred end scrapers is relatively close between the six sites, 20.2 to 25.8 mm. After applying a t-test, the two Maritime Woodland site samples are not statistically dissimilar, whereas the two Paleoindian site samples are statistically dissimilar. There is a statistically significant difference between the combined Paleoindian and Maritime Woodland period sample widths.

The mean maximum thickness of the spurred end scrapers is consistent within culture periods, 5.4 to 7.4 mm. The difference in maximum thickness between the two Paleoindian site samples is 0.1 mm, and between the two Maritime Woodland samples is 0.3 mm. Maximum thickness of the two Maritime Woodland site samples is smaller than the Paleoindian samples. The Jemseg and Bentley Street samples tend to be thicker than that of the two Paleoindian site sample means. A t-test reveals no significant dissimilarity between the thickness of the samples between the two Paleoindian sites, or the two Maritime Woodland sites. However, there is a significant difference between the Paleoindian and Maritime Woodland period samples as a whole.

The final artifact dimension is the maximum span width. As discussed in the methodology chapter, the span width is the maximum length of the convex working edge and includes the length of any spurs present on the working edge. There is little consistency between the individual mean span widths of the samples, as the means overlap between culture periods. The range of the maximum mean span width for the six sites is 20.2 to 26.4 mm. The t-tests reveal that the samples from the two Maritime

Woodland sites are not significantly dissimilar. However, there is statistical dissimilarity between the two Paleoindian site samples. The t-tests also reveal that the Paleoindian and Maritime Woodland combined samples are statistically dissimilar with respect to sample span widths.

Table 2 shows that the mean weights of the spurred end scrapers for the two Maritime Woodland site samples tends to be less than the means of the samples from the two Paleoindian sites. None of the artifacts analyzed from the Bentley Street site are complete; therefore, no mean weight is recorded. A t-test reveals that there is no significant dissimilarity between the weight of the samples from the two Paleoindian site samples, or the two Maritime Woodland samples. However, there is a statistically significant difference between the Paleoindian and Maritime Woodland site samples as a whole.

Comparisons of the artifact dimensions and weight indicate that there is no significant dissimilarity between maximum length, width, thickness, span width, or weight between the two Maritime Woodland site samples analyzed, whereas between the two Paleoindian sites only the maximum length, thickness, and weight of the samples are not significantly dissimilar. Applying a t-test to the two Paleoindian site samples indicates that maximum width, and span width are statistically dissimilar. When a comparison between culture periods is completed, t-tests reveal all the attributes are significantly dissimilar.

Striking Platform Dimensions

Table 4 summarizes the mean angle, maximum length, and maximum width of the striking platform for each artifact analyzed. T-tests for statistical significance with respect to the dissimilarity of sample assemblages, between and within culture periods, are presented in Table 5.

Table 4: Striking Platform Dimensions

Site	n	Angle (degrees)	Maximum Length (mm)	Maximum Width (mm)
Debert N=74	43	x=59.4 s=11.1 R=40-85	x=8.5 s=3.4 R=2.6-18.3	x=3.0 s=1.3 R=1.2-7.8
Belmont II N=8	4	x=57.5 s=16.6 R=35-70	x=7.1 s=2.5 R=4.2-9.9	x=2.7 s=0.4 R=2.7-3.3
Shubenacadie 3 N=24	18	x=69.7 s=11.7 R=50-90	x=7.0 s=2.4 R=17.6-29.0	x=2.6 s=1.1 R=17.2-27.8
Shubenacadie 5 N=7	5	x=65.0 s=12.7 R=50-80	x=4.9 s=1.6 R=2.5-7.1	x=1.8 s=0.5 R=1.2-2.3
Jemseg N=14	8	x=66.3 s=14.8 R=50-90	x=6.2 s=2.1 R=3.5-8.8	x=2.7 s=1.2 R=1.5-4.9
Bentley Street N=2	0	n/a	n/a	n/a

Notes: N=total number of specimens; n=number of specimens with attribute; x=mean of sample; s=standard deviation; R=range; n/a=not applicable.

The mean platform angles of the Debert and Belmont II site samples are slightly less than the mean of the two Maritime Woodland site specimens. The differences in the striking platform mean angle between the two Paleoindian site samples is 1.9 degrees. The difference between the striking platform mean angles for the two Maritime Woodland site examples is larger at 4.7 degrees. The mean platform angle of the Jemseg

Table 5: Artifact Striking Platform T-tests

Attribute	Paleoindian/Woodland	Debert/Belmont II	Shubenacadie 3/ Shubenacadie 5
Platform Angle	0.002789 Yes	0.834162 No	0.483937 No
Platform Length	0.011679 Yes	0.378171 No	0.046901 Yes
Platform Width	0.071571 No	0.379139 No	0.035916 Yes

Notes: Debert =74 specimens; Belmont II=8 specimens; Shubenacadie 3=24 specimens; Shubenacadie 5=7 specimens; Yes=statistically dissimilar; No=not statistically dissimilar; t-test, $p<0.05$.

site samples are between the mean for the two Maritime Woodland site samples. Both scrapers from the Bentley Street site are missing the striking platform. Means of the platform angles between the two Maritime Woodland sites are not significantly dissimilar. Similarly, the two Paleoindian site samples are not dissimilar with respect to the striking platform angle. However, t-tests reveal that the striking platform angle is statistically dissimilar between culture periods.

There is a wide range in the means between sites with regard to the striking platform length. The mean of the Debert site samples is longest, whereas the mean of the Shubenacadie 5 site samples is shortest. The difference between these two sites is 3.6 mm. The Belmont II and Shubenacadie 3 site sample means fall closest to the Debert site mean. The mean of the Jemseg striking platform length is just below the mean of the Shubenacadie 3, and Belmont II sample means. As the t-tests indicate, there is significant dissimilarity between the two Maritime Woodland sites in striking platform lengths; however, there is not a significant dissimilarity between the two Paleoindian sites. The complete Paleoindian and Maritime Woodland samples indicate that there is a statistical difference in length of striking platform between the Paleoindian and Maritime Woodland culture period samples as a whole.

The mean maximum platform widths between the five sites range from 1.8 mm for the Shubenacadie 5 site samples to 3.0 mm for the Debert site samples. The slight difference between the two Maritime Woodland samples is enough that the t-test reveals a statistically significant difference between the two sites, whereas the two Paleoindian sites were not statistically dissimilar. A t-test also reveals that the Paleoindian and Maritime Woodland site samples as a whole are not statistically dissimilar with regard to the striking platform widths.

Comparisons of the platform dimensions between samples discussed above indicate that there is not significant dissimilarity between platform angle, length, and width between the two Paleoindian site samples. Within the two Maritime Woodland site samples there is no statistical dissimilarity in platform angle. However, t-tests did reveal statistical dissimilarity in platform length, and width. Between culture periods, t-tests reveal no significant dissimilarity between the striking platform widths. T-tests indicate that the angles and lengths of the striking platforms of the samples analyzed between culture periods are significantly dissimilar, which may imply different core form.

Striking Platform Characteristics

Table 6 summarizes the qualitative data in combination with the mean angles obtained from the striking platforms. The analysis indicates a wide range of means with regard to the simple striking platforms between the Paleoindian and Maritime Woodland samples. Within the Debert site sample 27.0 percent have simple platforms. The mean

Table 6: Striking Platform Description

Site	Platform Description	Description of Platform (%)	Mean of Platform Angle
Debert N=74	Complex	27.0	57.8
	Simple	27.0	60.2
	Cortex	2.7	60.0
	Crushed	4.1	75.0
	n/a	39.2	n/a
Belmont II N=8	Complex	37.5	58.3
	Simple	12.5	55.0
	Cortex	n/a	n/a
	Crushed	n/a	n/a
	n/a	50.0	n/a
Shubenacadie 3 N=24	Complex	20.8	65.0
	Simple	54.2	71.5
	Cortex	n/a	n/a
	Crushed	n/a	n/a
	n/a	25.0	n/a
Shubenacadie 5 N=7	Complex	14.3	55.0
	Simple	57.1	67.5
	Cortex	n/a	n/a
	Crushed	n/a	n/a
	n/a	28.6	n/a
Jemseg N=14	Complex	35.7	66.0
	Simple	14.3	62.5
	Cortex	7.1	75.0
	Crushed	n/a	n/a
	n/a	42.9	n/a
Bentley Street N=2	Complex	n/a	n/a
	Simple	n/a	n/a
	Cortex	n/a	n/a
	Crushed	n/a	n/a
	n/a	100.0	n/a

Notes: N=total number of specimens; n/a=not applicable.

of the samples with simple platforms is much lower for the Belmont II site at 12.5 percent. This difference in means between the two Paleoindian sites may be due to the Belmont II site only having one specimen with a simple platform. Within the Maritime Woodland site samples just over 50 percent of both site samples have simple platforms. The difference in the means between the Maritime Woodland site samples is 2.9 percent.

The range of means of the complex platforms also does not overlap between culture periods. Of the Debert site samples 27.0 percent have complex platforms, the same percentage as simple striking platforms. The percentage of complex striking platforms identified within the Belmont II site specimens is 37.5 percent. The Shubenacadie 5 site has 14.3 percent of the specimens with a complex striking platform, whereas, 20.8 percent of the Shubenacadie 3 specimens have complex platforms. The two Paleoindian site samples have a higher percentage of complex striking platforms than the two Maritime Woodland site samples. A small sample of specimens from the Debert site has platforms with cortex present, or is partially to completely crushed. The Jemseg site also has one platform with cortex. No striking platforms are present on the Bentley Street samples. The means of the simple and complex platforms for the Jemseg site is very similar to the means from the Belmont II site samples.

The relation of the angle of the striking platform and the platform description suggests that the means of the angles overlap between types of striking platforms. The range of the means of the angles for sites with samples of simple striking platforms is 55.0 to 71.5 degrees. The range of the means of the angles for the complex striking platforms is 55.0 to 66.0 degrees. The complex striking platform range falls within the simple striking platform range. With regard to both simple and complex striking platforms, the two Paleoindian sites have lower striking platform angles than the two Maritime Woodland site samples, except for the mean angles of the Shubenacadie 5 complex striking platforms. The means of the simple striking platform angles for the Debert site sample is 60.2 degrees, whereas it is lower at 55.0 degrees for the Belmont II sample. The mean of the simple striking platform angles for the Shubenacadie 3 site samples is 71.5 degrees, whereas the mean is 67.5 degrees for the Shubenacadie 5 site sample. The complex striking platform angle trend is similar, with the Paleoindian site samples having lower platform angles than the Shubenacadie 3 site samples. The Shubenacadie 5 site sample has a lower platform angle than the two Paleoindian sites. This may be because the Shubenacadie 5 site only has one sample with a complex platform.

A summary of the abrasion present on the striking platforms is presented in Table 7, and how that relates to the platform description and angle indicated in Table 8. As noted in the methodology, Chapter 3, an abraded platform has complete abrasion if the dorsal margin of the striking platform is abraded to the point that the margin or arris was unrecognizable. The striking platform has slight abrasion if it is possible to see the dorsal margin or arris of the striking platform through the abrasion. Slight abrasion is more common within culture periods than specimens with complete abrasion.

Most of the specimens from the two Maritime Woodland site samples have no abrasion present on the striking platform. A higher percentage of Paleoindian specimens have abrasion, as do a high percentage of the analyzed Jemseg site scrapers.

Table 7: Abrasion Present on the Striking Platform

Site	N	No Abrasion (%)	Slight Abrasion (%)	Compete Abrasion (%)	No Platform (%)
Debert	74	18.9	23.0	16.2	41.9
Belmont II	8	25.0	0	25.0	50.0
Shubenacadie 3	24	37.5	25.0	4.2	33.3
Shubenacadie 5	7	42.8	0	28.6	28.6
Jemseg	14	14.2	42.9	0	42.9
Bentley Street	2	0	0	0	0

Notes: N=total number of specimens.

Table 8: Correlation Between Striking Platform Description, Abrasion and Angle

Platform Description with Abrasion	Debert N=74	Belmont II N=8	Shubenacadie 3 N=24	Shubenacadie 5 N=7	Jemseg N=14
Simple/Abraded (%)	60.0	100	38.5	25.0	50.0
Angle (degrees)	x=58.3	x =55.0	x =71.0	x =50.0	x =70.0
Complex/Abraded (%)	75.0	33.3	40.0	100	100
Angle (degrees)	x =54.3	x =35.0	x =52.5	x =55.0	x =66.0
Cortex/Abraded (%)	100	0	0	0	0
Angle (degrees)	x =60.0	0	0	0	0

Notes: N=total number of specimens; x =mean of sample.

Of the simple striking platforms from the Debert sample, 60 percent of the simple platforms and 75 percent of the complex platforms are abraded. From the Shubenacadie 3 site, 39 percent of the simple platforms and 40 percent of the complex platforms are abraded. The Belmont II site scrapers have 100 percent of the simple platforms abraded and 33.3 percent abraded-complex platforms. The Shubenacadie 5 site samples have 100 percent of the complex platforms abraded and 25 percent abraded-simple platforms.

The mean angles of the simple and complex-abraded platforms from the Debert site samples are 58.3 and 54.3 degrees, respectively. Two specimens with cortex present on the striking platform also have some abrasion present with a mean 60 degree angle. This pattern of steeper, simple-abraded platforms is consistent for all other sites except the Shubenacadie 5 site samples.

Paleoindian specimens that have slightly abraded simple platforms are more frequent than specimens with complete abraded platforms (Table 9). Slight abrasion is also more frequent than complete abrasion on abraded complex platforms. This trend also appears within the Maritime Woodland specimens. However, there is a greater difference in the percentage between the slightly and completely abraded striking platforms within the Maritime Woodland site samples.

As indicated in Table 10, 51.2 percent of the two Paleoindian site specimens have a lip on the ventral side of the striking platform, while 6.1 percent have none. This is similar for the two Maritime Woodland site specimens. Of those with striking platforms present, 61.3 percent have a lip or hasp, and 6.5 percent have none present.

Table 9: Correlation of Striking Platform Abrasion and Striking Platform Description

Site	n	Platform Description	Amount of Abrasion
Debert N=74	7	Simple/Abraded	Slight
	5		Complete
	9	Complex/Abraded	Slight
	6		Complete
Belmont II N=8	1	Simple/Abraded	Slight
	0		Complete
	0	Complex/Abraded	Slight
	1		Complete
Shubenacadie 3 N=24	4	Simple/Abraded	Slight
	1		Complete
	2	Complex/Abraded	Slight
	0		Complete
Shubenacadie 5 N=7	0	Simple/Abraded	Slight
	1		Complete
	0	Complex/Abraded	Slight
	1		Complete
Jemseg N=14	1	Simple/Abraded	Slight
	0		Complete
	5	Complex/Abraded	Slight
	0		Complete
Total Paleoindian N=82	11	Simple/Abraded	Slight
	6		Complete
	9	Complex/Abraded	Slight
	7		Complete
Total Woodland N=31	5	Simple/Abraded	Slight
	1		Complete
	2	Complex/Abraded	Slight
	1		Complete

Notes: N=total number of specimens; n=number of specimens with attribute.

Table 10: Presence of a Lip on the Striking Platform

Sites	Yes (%)	No (%)	n/a (%)
Debert/Belmont II N=82	51.2 n=42	6.1 n=5	42.7 n=35
Shubenacadie 3/Shubenacadie 5 N=31	61.3 n=19	6.5 n=2	32.2 n=10

Notes: N=total number of specimens; n=number of specimens with attribute; n/a=not applicable.

The Maritime Woodland site scrapers have more abraded-simple striking platforms than abraded-complex platforms. Within the Paleoindian samples the Debert site has an equal percentage of simple and complex striking platforms present, while the Belmont II site samples have more complex platforms. Among the Paleoindian and Maritime Woodland site scrapers, there are a greater percentage of specimens with complete abrasion than with slight abrasion. Over half of the artifacts that have striking platforms present also have a lip present on the ventral side of the striking platform. Less than 10 percent of the striking platforms have no lip present.

I compared the means of the striking platform angles and the presence and absence of a lip (Table 11), for the five sites that have specimens with striking platforms present. The mean of the striking platforms that have a lip present range from 58.29 to 69.00. The mean of the striking platforms that do not have a lip present range from 68.00 to 80.00. The presence of a lip on the striking platform correlates with a more acute platform angle. The proximal end is not present on the remaining percentage of samples.

Table 11: Striking Platform Angle and Presence of Lip

Site	Angle with Lip Present	Angle with No Lip Present
Debert N=74	x =58.3 s=10.7	x =68.0 s=11.5
Belmont II N=8	x =57.5 s=16.6	x =n/a s =n/a
Shubenacadie 3 N=24	x =69.0 s=12.4	x =80 s=n/a
Shubenacadie 5 N=7	x =61.3 s=11.1	x =80 s=n/a
Bentley Street N=2	x =n/a s=n/a	x = n/a s= n/a
Debert/Belmont II	x =57.3 s=12.6	x =68.0 s=11.5
Shubenacadie 3/ Shubenacadie 5	x=64.4 s=16.9	x =80.0 s=n/a

Notes: N=total number of specimens; x =mean of sample; s=standard deviation; n/a=not applicable.

Artifact Retouch

Table 12 records the lengths of any retouched margins such the right and left lateral, proximal, and distal (working) ends. Table 12 also summarizes the mean of the sample, range, and standard deviation for the retouch lengths. T-tests for statistical significance of the data are presented in Table 13.

The two Paleoindian site samples have longer mean retouch lengths along the right lateral margins than the two Maritime Woodland site samples. The mean retouch lengths along the right lateral margins of the Jemseg and Bentley Street samples are longer than the mean lengths of the other four sites. T-tests reveal that the samples from the two Paleoindian sites are not statistically dissimilar. A t-test could not be completed on the two Maritime Woodland site samples as the Shubenacadie 5 site has only one

Table 12: Retouched Margins

Site	Length of Maximum Retouch Right Lateral (mm)	Length of Maximum Retouch Left Lateral (mm)	Length of Maximum Retouch Proximal End (mm)	Length of Maximum Retouch Distal End (mm)
Debert N=74	x =15.8 s=5.6 R=2.2-27.0 n=37	x =15.0 s=4.8 R=4.0-24.4 n=39	x =13.3 s=8.0 R=7.8-27.2 n=5	x =22.7 s=4.9 R=2.9-34.1 n=57
Belmont II N=8	x =18.2 s=6.7 R=6.0-26.5 n=6	x =13.2 s=7.3 R=1.7-21.4 n=6	n/a	x =21.8 s=3.8 R=17.8-29.3 n=8
Shubenacadie 3 N=24	x =12.9 s=7.9 R=4.2-30.0 n=10	x =15.2 s=8.6 R=5.8-30.3 n=7	x =13.1 s=n/a R=13.1 n=1	x =20.4 s=3.3 R=15.1-27.5 n=23
Shubenacadie 5 N=7	x =2.2 s=n/a R=2.2 n=1	x =12.6 s=8.0 R=3.4-17.6 n=3	x =9.1 s=n/a R=9.1 n=1	x =21.0 s=3.6 R=16.8-27.9 n=7
Jemseg N=14	x =20.4 s=8.2 R=7.8-29.2 n=9	x =20.9 s=5.8 R=13.5-30.2 n=9	x =8.2 s=n/a R=8.2 n=1	x =19.2 s=1.8 R=16.2-21.4 n=10
Bentley Street N=2	x =40.7 n/a R=40.7 n=1	x =2.7 s=n/a R=2.7 n=1	x =4.5 s=n/a R=4.5 n=1	x =20.5 s=7.3 R=15.3-25.6 n=2

Notes: N=total number of specimens; n=number of specimens with attribute; x =mean of sample; s=standard deviation; R=range; n/a=not applicable.

Table 13: Artifact Retouch T-tests

Attribute	Paleoindian/Woodland	Debert/Belmont II	Shubenacadie 3/ Shubenacadie 5
Right Lateral Retouch	0.1293996659 No	0.442036 No	n/a
Left Lateral Retouch	0.914395 No	0.58719 No	0.658245 No
Proximal End Retouch	0.618864 No	n/a	n/a
Distal End Retouch	0.019603 Yes	0.593698 No	0.70894 No

Notes: Debert=74 specimens; Belmont II=8 specimens; Shubenacadie 3=24 specimens; Shubenacadie 5=7 specimens; Yes=statistically dissimilar; No=not statistically dissimilar; n/a=not applicable; t-test, $p<0.05$.

artifact that is complete enough to allow for a right lateral retouch measurement. There was also no significant difference between culture periods with regard to the length of the right lateral margin retouch.

There is some overlap in the mean left lateral retouch lengths between the two Paleoindian and two Maritime Woodland sites samples. The left lateral retouch length for the Jemseg site samples is greater than the mean for any of the other sites. The mean of the left lateral retouch for the Bentley Street site samples is much lower than the other five sites. T-test results are similar to those pertaining to the right lateral retouch lengths, with the two Paleoindian site samples as well as the samples between culture periods, not statistically dissimilar. A t-test completed between the two Maritime Woodland site samples reveals the sites are not statistically dissimilar.

Few samples from any of the sites have retouch on the proximal end. The mean length of proximal end retouch between sites suggests significant variability. T-tests for significance could not be completed within culture periods, due to the limited number of samples with proximal end retouch. T-test between culture periods on the measurements of the proximal end retouch reveals no statistical difference.

There was a slight difference in the distal (working) end retouch length between the Paleoindian and Maritime Woodland samples, with the mean lengths of the Paleoindian sites being slightly longer. The mean length of the distal end retouch for the Jemseg site samples is just below the two Maritime Woodland sample means. The Bentley Street samples are between the two Maritime Woodland site sample means. T-tests reveal that there is not significant dissimilarity between the length of the distal end retouch of the artifacts within the two Paleoindian site samples as well as within the two Maritime Woodland site samples.

A comparison of the retouched margins between site samples discussed above indicates that there is not significant dissimilarity between the lengths of retouch within culture periods. The statistical significance with regard to differences between culture periods only applies to the length of the distal end retouch. All other areas of marginal retouch are not dissimilar between culture periods. I correlated the distal end retouch length with specimen width. The distal end retouch length is a dependent variable positively correlated with the width of the specimen.

Angle Measurements

Tables 14 and 15 record the bit edge angle and height as well as the angle of the right and left lateral margins. Summaries include the mean of the sample, range, and standard deviation for each measurement. T-tests for statistical significance are presented in Tables 16 and 17.

Table 14: Angle Measurements and Bit Edge Height

Site	Bit Edge Angle (degrees)	Bit Edge Height (mm)
Debert N=74	x=67.3 s=11.7 R=30.0-90.0 n=73	x=7.4 s=3.5 R=3.4-30.0 n=73
Belmont II N=8	x=67.1 s=9.5 R=50.0-90.0 n=8	x=6.8 s =1.3 R =5.6-9.5 n=8
Shubenacadie 3 N=24	x=78.8 s=6.1 R=70.0-90.0 n=24	x=5.5 s=1.4 R=3.6- 9.5 n=24
Shubenacadie 5 N=7	x=78.6 s=9.0 R=70.0-90.0 n=7	x=5.6 s=1.3 R=4.0-7.1 n=7
Jemseg N=14	x=73.0 s=8.2 R=60.0-90.0 n=14	x=7.2 s=2.3 R=3.9-10.3 n=14
Bentley Street N=2	x=55.0 s=7.1 R=50.0-60.0 n=2	x=8.3 s=3.4 R=5.9-10.7 n=2

Notes: N=total number of specimens; n=number of specimens with attribute; x=mean of sample; s=standard deviation; R=range.

Table 15: Angle Measurements of Lateral Margins

Site	Right Lateral Angle (degrees)	Left Lateral Angel (degrees)
Debert N=74	x=58.5 s=13.0 R=30.0-80.0 n=68	x=56.9 s=14.9 R=30.0-90.0 n=72
Belmont II N=8	x=70.0 s=9.3 R=50.0-80.0 n=8	x=70.0 s=9.3 R=60.0-80.0 n=8
Shubenacadie 3 N=24	x=45.0 s=16.4 R=30.0 n=6	x=41.7 s=11.5 R=20.0-70.0 n=24
Shubenacadie 5 N=7	x=30.0 s=n/a R=30.0 n=6	x=44.3 s=15.1 R=30.0-70.0 n=7
Jemseg N=14	x=53.1 s=15.5 R=40.0-80.0 n=13	x=47.3 s=14.9 R=30.0-70.0 n=11
Bentley Street N=2	x=40.0 s=n/a R=40.0 n=1	x=70.0 s=14.1 R=60.0-80.0 n=2

Notes: N=total number of specimens; n=number of specimens with attribute; x=mean of sample; s=standard deviation; R=range; n/a=not applicable.

Table 16: Bit Edge Angle and Bit Edge Height T-tests

Attribute	Paleoindian/Woodland	Debert/Belmont II	Shubenacadie 3/ Shubenacadie 5
Bit edge angle (degrees)	0.0000051258 Yes	0.976253 No	0.961946 No
Bit edge height (mm)	0.000116 Yes	0.355279 No	0.806733 No

Notes: Debert=74 specimens; Belmont II=8 specimens; Shubenacadie 3=24 specimens; Shubenacadie 5=7 specimens; Yes=statistically dissimilar; No=not statistically dissimilar; t-test, $p<0.05$.

Table 17: Lateral Margin Angles T-tests

Attribute	Paleoindian/Woodland	Debert/Belmont II	Shubenacadie 3/ Shubenacadie 5
Edge Angle Right Lateral (degrees)	0.0000458915 Yes	0.016906 Yes	0.000451 Yes
Edge Angle Left Lateral (degrees)	0.000001532 Yes	0.004527 Yes	0.593795 No

Notes: Debert=74 specimens; Belmont II= specimens; Shubenacadie 3=24 specimens; Shubenacadie 5=7 specimens; Yes=statistically dissimilar; No=not statistically dissimilar; t-test, $p<0.05$.

The mean bit edge angle is relatively uniform within culture periods, with the Maritime Woodland period site samples being slightly steeper. The mean bit edge angles of the Jemseg site samples fall between that of the two Paleoindian and two Maritime Woodland samples means. The Bentley Street mean is well below that of all other sites. T-tests reveal that there is not significant dissimilarity between the bit edge angles of the samples from the two Paleoindian sites, or between the two Maritime Woodland site samples. There is significant dissimilarity between the combined Paleoindian and Maritime Woodland samples.

The Jemseg and Bentley Street sample means for the bit edge height are similar to the Paleoindian sample means. The Bentley Street site samples are longest. A t-test reveals that there is not significant dissimilarity between the bit edge height of the two Paleoindian samples, or the samples from the two Maritime Woodland sites. There is a significant difference between the Paleoindian and Maritime Woodland sample means.

The angle of the right lateral margin exhibits a wide range of means. The means from the two Paleoindian site samples tend to be steeper than the means from the two Maritime Woodland site samples. The right lateral mean angles for the Jemseg and Bentley Street site samples fall between the two Paleoindian site means, and the two Maritime Woodland site means. T-tests reveal statistical dissimilarity between the samples from the two Paleoindian sites as well as statistical dissimilarity between the two Maritime Woodland sites samples. Also, between culture periods, the edge angle of the right lateral margin is statistically dissimilar.

The edge angle of the left lateral margin exhibits a wide range of means. The mean of the samples from the two Paleoindian sites is steeper than the mean from the two Maritime Woodland sites. The mean left lateral angle of the Jemseg site samples is closest to the two Late Maritime Woodland site means. However, the Bentley Street sample means are closest to the two Paleoindian site samples. T-tests reveal that the samples from the two Maritime Woodland sites are not statistically dissimilar, whereas the samples from the two Paleoindian sites are statistically dissimilar. Between culture periods the edge angle of the left lateral margin is statistically dissimilar.

The bit edge angle and bit edge height are not statistically dissimilar between the two Maritime Woodland site samples. The angle of the left lateral margin is also not statistically dissimilar between the two Maritime Woodland site samples. The bit edge angle and bit edge height are not statistically dissimilar within the two Paleoindian site samples. Comparing the Paleoindian and Maritime Woodland samples, all three attributes are statistically dissimilar.

Cross-Section Characteristics

A summary of the qualitative data obtained from the longitudinal and lateral cross-section morphology is summarized in Table 18. The morphology is described as concave/convex, planar/convex, convex/convex, or indeterminate (artifact broken).

The most frequent of the longitudinal cross-sections at five of the six sites are planar/convex and convex/convex. Planar/convex cross-sections are most frequent at all sites except at the Shubenacadie 5 site where a convex/convex longitudinal cross-section is more prevalent. Concave/convex and planar/convex cross-sections for the Jemseg site samples are significantly more frequent compared to the other five sites.

Concave/convex and planar/convex cross-sections are the most frequent lateral cross-sections from all the samples analyzed. Within the two Maritime Woodland site samples as well as the Belmont II site samples, the planar/convex cross-section has the highest rate of occurrence. The concave/convex cross-section is most prevalent in the Debert, Jemseg, and Bentley Street site samples.

Dorsal Surface

Table 19 summarizes the qualitative data obtained and analyzed from the dorsal surface morphology of the artifacts. Spurred end scrapers with a single or multiple

Table 18: Longitudinal and Lateral Cross Section

	Debert N=74		Belmont II N=8		Shubenacadie 3 N=24		Shubenacadie 5 N=7		Jemseg N=14		Bentley Street N=2	
Cross Section	Long. (%)	Lat. (%)	Long. (%)	Lat. (%)	Long. (%)	Lat. (%)	Long. (%)	Lat. (%)	Long. (%)	Lat. (%)	Long. (%)	Lat. (%)
Concave/ Convex	4.1	51.4	12.5	25.0	0	25.0	0	42.9	21.4	78.6	0	100
Planar/ Convex	51.3	33.8	62.5	50.0	54.2	70.8	42.9	57.1	71.4	14.3	100	0
Convex/ Convex	43.2	9.4	25.0	12.5	45.8	0	57.1	0	7.2	7.1	0	0
Indeterminate	1.4	5.4	0	12.5	0	4.2	0	0	0	0	0	0

Notes: N=total number of specimens; Long.=longitudinal cross section; Lat.=lateral cross section.

Table 19: Dorsal Surface Morphology

Site	N	Single Arris (%)	Multiple Arris (%)	Flat (%)	Multi-Directional Flaking (%)
Debert	74	44.6	8.1	31.1	16.2
Belmont II	8	37.5	12.5	37.5	12.5
Shubenacadie 3	24	58.3	12.5	12.5	16.7
Shubenacadie 5	7	57.1	28.6	14.3	0
Jemseg	14	71.4	0	0	28.6
Bentley Street	2	50.0	0	0	50.0

Notes: N=total number of specimens.

arrises occur most frequently within the Paleoindian and Maritime Woodland sites samples. Artifacts with flat dorsal surfaces constitute 31.7 percent of the Paleoindian site samples; 15.9 percent have dorsal surfaces with multi-directional flake scars. Few samples, 12.9 percent, have flat dorsal surfaces or multi-directional flake scars within the Maritime Woodland site samples. As indicated, both the Jemseg and Bentley Street sites have only dorsal surfaces with a single arris or multi-directional flaking present.

Planar Shape

Table 20 presents a summary of the planar shapes of the artifacts. The Debert and Shubenacadie 3 sites have samples that fit into all five of the planar shape categories. The Belmont II specimens are all triangular, and the Shubenacadie 5 site is triangular or square in planar shape. However, each of these two sites has small sample numbers. The Jemseg site specimens are mostly triangular, but rectangular and oval are also represented. The one complete specimen from the Bentley Street site is rectangular. Overall, the most frequent planar shape for all six sites is triangular.

Table 20: Planar Shape

Site	N	Round (%)	Oval (%)	Square (%)	Rectangular (%)	Triangular (%)	Ind. (%)
Debert	74	8.1	1.3	9.5	6.8	50.0	24.3
Belmont II	8	0	0	0	0	87.5	12.5
Shubenacadie 3	24	8.3	16.7	20.8	16.7	20.8	16.7
Shubenacadie 5	7	0	0	28.6	0	57.1	14.3
Jemseg	14	0	14.3	0	7.1	71.5	7.1
Bentley Street	2	0	0	0	50.0	0	50.0

Notes: N=total number of specimens; Ind.=indeterminate planar shape.

Spurs

As discussed in Chapter 3, going beyond initial morphology I defined a spur as an isolated protrusion that has flaking on the distal and lateral margins that forms a sharp intersecting angle. The resulting protrusion often has a concavity on one or both sides. Therefore, the spurred end scrapers selected from the six sites for study are based on a highly selective sample. The qualitative data are summarized in Table 21. Samples from the two Paleoindian sites have a higher proportion of isolated spurs than the samples from the Maritime Woodland sites, at 98.8 and 77.4 respectively. 71.4 percent of the Jemseg specimens, and 50 percent of the Bentley street specimens have a spur present.

Flaking Pattern on Spurs

Table 22 summarizes the qualitative data obtained from the flaking pattern on the spurs. I identified four different flaking patterns on the spurs. The first two flaking patterns consist of flaking along the sides or longitudinal flaking of the spur. The third pattern consists of a snapped lateral edge not modified by flaking. The final flaking pattern consists of side flaking of the spur as well as the removal of a longitudinal flake down the center. The Debert site is the only site that has samples placed into all four

Table 21: Spurs Present

Site	n	Spur Present (%)
Debert N=74	73	98.6
Belmont II N=8	8	100
Shubenacadie 3 N=24	18	75.0
Shubenacadie 5 N=7	6	85.7
Jemseg N=14	10	71.4
Bentley Street N=2	1	50.0
Combined Paleoindian sites N=82	81	98.8
Combined Woodland sites N=31	24	77.4

Notes: N=total number of specimens; n=number of specimens with attribute.

flaking categories. There are only a limited number of specimens within all six sites that have only longitudinal flaking present on the spur, or have a snapped lateral edge that produced a spur. The most frequent flaking pattern on the spurs from the two Paleoindian sites consists of spurs with both flaking along the sides of the spur with a longitudinal flake down the center of the spur. The second most frequent flaking pattern consists of flaking along the sides of the spurs only. Of the spurs from the two Maritime Woodland site samples, 61.3 percent have a flaking pattern that consists of flaking along the sides of the spurs only.

Table 22: Flaking Pattern on Spurs

Site	N	Along Sides (%)	Longitudinal Flaking (%)	Snapped Lateral Edge (%)	Sides and Longitudinal (%)	n/a (%)
Debert	74	37.8	2.7	2.7	55.4	1.4
Belmont II	8	37.5	0	0	62.5	0
Shubenacadie 3	24	62.5	0	8.3	4.2	25.0
Shubenacadie 5	7	57.1	14.3	0	14.3	14.3
Jemseg	14	42.9	0	14.3	21.4	21.4
Bentley Street	2	0	0	0	50.0	50.0
Combined Paleoindian Sites	82	37.8	2.4	2.4	56.2	1.2
Combined Woodland Sites	31	61.3	3.2	6.5	6.5	22.5

Notes: N=total number of specimens; n/a=not applicable.

CHAPTER 5

INTERPRETATIONS

This study begins with the problem of Paleoindian site recognition. The problem narrows and becomes focused on the spurred end scraper. A uniface spurred end scraper is made into a multi-purpose tool by flaking along the margins of a flake from the same face to form a working end, which includes a pointed projection or spur. Photographs of spurred end scrapers are presented in Appendix C. Uniface tools such as end scrapers that are based on a flake are finished with a minimum amount of modification. Therefore, attributes that indicate the technological process in their formation are often present on the finished product.

Summary of Identifiable Trends

This analysis begins with a multivariate approach to analyzing spurred end scrapers and works towards recognizing continuity and variability within two Paleoindian site samples. To help determine if the assumption that spurred end scrapers are diagnostic of the Paleoindian period is correct, I analyze two Maritime Woodland site samples. After determining that the presence of spurs on end scrapers is not solely a Paleoindian attribute, I analyze the technology used to produce the spurs. This analysis focuses on Paleoindian spurred end scrapers that morphologically are generally similar to spurred end scrapers from the Late Maritime Woodland period. In this chapter I discuss some of the key attributes used to indicate continuity and variability between spurred end scrapers from the Paleoindian and Maritime Woodland culture periods.

Paleoindian and Late Maritime Woodland Trends

Two technological attributes that indicate similarity between the Paleoindian and Late Maritime Woodland spurred scrapers are choice of lithic material and lithic core type. Also, there are two attributes connected to similarities in function and use wear within, as well as between, culture periods, the method of hafting and the type of tool use.

Raw Material

Flaking characteristics, predominantly inherent in chert material, may have been a primary concern in the selection of raw material from the six sites analyzed. This interpretation is supported by the fact that cherts were often imported into sites where these materials do not occur naturally, even though less desirable stones may have been available locally in quantity (Gramly 1982; Spiess and Wilson 1987). Such lithic selectivity is not only a distinguishing characteristic of the Paleoindian period (Goodyear 1982), but it is also noted in the Late Maritime Woodland period (Bourque 1994). Of the total samples analyzed from the six sites, 97 percent were identified as a chert. Therefore, different flaking techniques are not constrained by the fracture mechanics of the stone. Individual choice and experience would determine the technology and methods applied in forming the spurred end scraper. I discuss the possible driving force behind the individual choice at the end of this chapter.

Core Type

Flakes can be probabilistically attributed to different core types based on different attributes. One such attribute is their striking platform. There are a number of core types that result in different platform angles and platform morphology (Kuhn 1995; Whittaker 1994). I discuss two types of cores, tabular and biface. Tabular cores are often not modified to a high degree and are morphologically similar to the way the chert is found at the quarry site. The modification to a biface core consists of flaking a piece of lithic material on at least two opposing sides in such a manner so as to get a desired shape. Flakes struck from each of these core types have different striking platform characteristics.

The most constant feature of the end scraper is the working end on one of the narrow ends of the flake, usually opposite the bulb of percussion. All of the specimens analyzed have the bulb of percussion at the proximal end, or opposite the working end. As the proximal end has little or no retouch present it is possible to determine the shape and angle of the platform. Specimens from the two Paleoindian sites have an equal amount of simple (flat) and complex (faceted) platforms. There are a minimum number of specimens with crushed platforms or platforms with cortex present. However, the two Maritime Woodland site samples have double the number of simple platforms as compared to complex platforms. Often one of the distinguishing characteristics of a tabular core reduction flake is a flat or single facetted-striking platform. In contrast, the striking platform of a biface core reduction flake is often facetted. However, as a biface core can be struck from many different locations around the perimeter of the core, it is possible that some flakes struck may have simple as opposed to complex platforms. Therefore, on a single specimen the platform description alone cannot predict the type of core from which the flake originated.

The platform description, in combination with the angle of the platform, is a more precise indicator of the type of core from which the flake was struck. Tabular core reduction flakes often have striking platform angles that are close to 90 degrees, whereas the striking platform of a biface core reduction flake usually has a striking platform angle that is less than 70 degrees. The two Paleoindian site samples have mean striking platform angles just slightly over 50 degrees, and the two Maritime Woodland site samples have mean striking platforms angles just under 70 degrees.

A biface core reduction flake often has a lip present at the base of the striking platform on the ventral side. This characteristic is present on approximately 95 percent of the Paleoindian and Maritime Woodland specimens.

Based on the attributes of the two Paleoindian and Maritime Woodland site samples analyzed it appears that both culture periods utilized a similar lithic material and lithic core type. The description of the striking platform, the striking platform angle, and the presence of a lip suggests that the end scrapers analyzed primarily came from biface cores. Therefore, the initial production technology is similar within as well as between culture periods. Such a similarity may indicate the distance of the four sites from the lithic source, or the form the material was found in.

Spurs

In Wilmsen's (1970) analysis of artifacts from ten Paleoindian sites across the United States, tools that had an edge angle between 66 and 75 degrees occurred on 65 percent of all accessory tool tips and concavities, including spurs. Table 23 summarizes data on location of the spurs and lateral margin angles from the six sites I analyzed. The data indicated that a higher percentage of Paleoindian spurs occurred on the left lateral margin where the mean angle of the margin was 55 degrees, lower than the right margin that had a mean angle of 61.9 degrees. This pattern was reversed for the Maritime Woodland data. Within the Maritime Woodland samples a higher percentage of spurs occurred on the right lateral margin, which had a mean angle of 43.3 degrees. Within the two Paleoindian and two Maritime Woodland samples analyzed there was no observed relationship between the edge angle and the presence of a spur.

Table 23: Angle of Lateral Margin and Spur Presence

Attribute	Paleoindian N=82	Woodland N=31
No Spur (percent) Angle right lateral (degrees) Angle left lateral (degrees)	n=8 (9.8 %) x=56.7 x =55.7	n=14 (45.2 %) x =44.0 x =44.2
Spur on both laterals (percent) Angle right lateral (degrees) Angle left lateral (degrees)	n=15 (18.3 %) x =59.3 x =62.0	n=0 (n/a) n/a n/a
Spur on right lateral (percent) Angle right lateral (degrees)	n=26 (31.7 %) x =61.9	n=11 (35.5 %) x =43.3
Spur on left lateral (percent) Angle left lateral (degrees)	n=33 (40.2 %) x =55.0	n=6 (19.3 %) x =38.3

Notes: N=total number of specimens; n=number of specimens with attribute; x =mean of sample; n/a=not applicable.

Ninety nine percent of the Paleoindian end scrapers had spurs, and 77 percent of the Maritime Woodland end scrapers had spurs. I defined spurs in this research as projections with flaking on both lateral margins that formed a sharp angle. From this research I determined that it is not possible to use just the presence of a spur on an end scraper to distinguish between the Late Maritime Woodland and Early Paleoindian culture periods. However, the technology used in preparing and isolating the spur is a distinguishing feature between these culture periods.

There is one attribute that relates to the flaking pattern on the spurs that is distinctly different between culture periods -- the presence of a longitudinal flake down the center of the spur. Within the Paleoindian and Maritime Woodland period samples the spur was made by flaking along the distal end and lateral margin(s) of the tool until a sharp angle was formed. This flaking pattern ultimately isolated a protrusion at one or both of the margins at the distal end. Within each of the Maritime Woodland site samples one specimen had a longitudinal flake removed down the center of the spur horizontal to the flaking along the sides (Figure 4). This additional longitudinal flake on the spur was much more frequent in the Paleoindian samples where it occurred in 56.2 percent of the samples. It is the presence, not absence, of this technology that may be used as an indicator to distinguish Paleoindian from Late Maritime Woodland spurred end scrapers.

The presence of a center longitudinal flake may have been an intentional way of thinning the spur for some functional purpose. However, the flake may also have been the unintentional result of use wear. As flaking is completed along the sides of the lateral margin to produce a sharp angled projection (spur), a raised ridge would form up the center of the spur. If the spur was used for puncturing or graving, the downward pressure exerted on the spur could result in a flake being driven off following that center ridge. The majority of the Maritime Woodland site samples do not have this longitudinal flake; therefore, they may have been used for a functionally different purpose than the spurs with the longitudinal flake identified in the Paleoindian samples. Alternately, the longitudinal flake may be associated with isolation and sharpening of the spur tip.

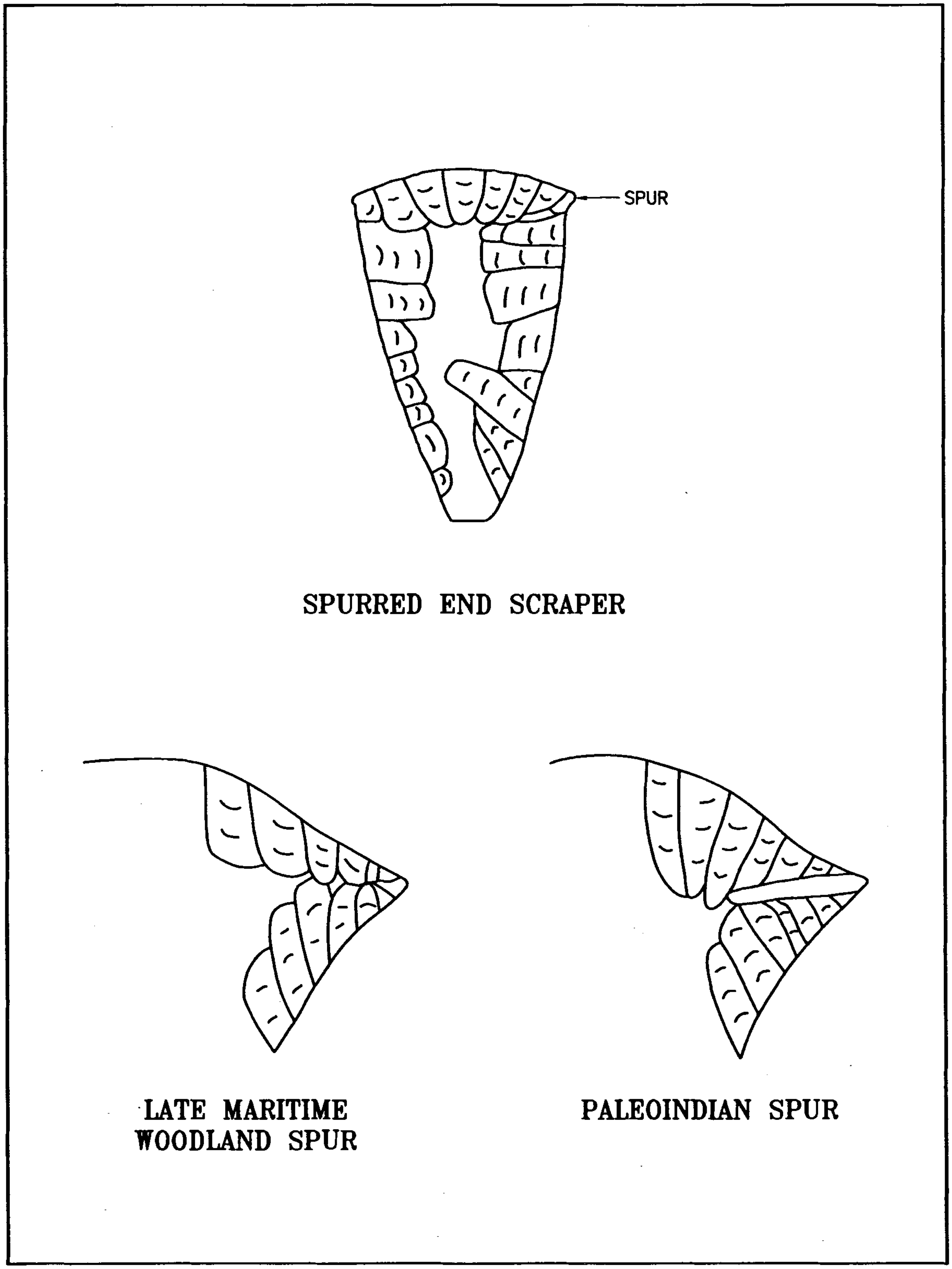


Figure 4: Flaking Pattern on the Spur

The figure shows the flaking pattern on the spur of an end scraper from the Late Maritime Woodland (Ceramic) and Paleoindian culture period

Hafting

The Debert and Belmont II site samples had right and left lateral margin angles that had means of 61 degrees and 58 degrees, respectively. The Shubenacadie 3 and Shubenacadie 5 site samples had right and left lateral margin angles that had means of 43 degrees and 42 degrees, respectively. The more than ten-degree difference in lateral angles between culture periods may be related to the accommodation of a particular type of haft.

Hafting evidence can be inferred from several morphological attributes. A very high proportion of artifacts in both the Paleoindian and Maritime Woodland samples had evidence of hafting. One way to determine if end scrapers were hafted is to look at the breakage pattern of the specimens (Grimes and Grimes 1985). If pressure were placed on the artifact while it was in a haft the breakage pattern would be across the width of the artifact parallel with the working end. As indicated in Table 24 this form of breakage pattern on the end scrapers was present on many of the specimens analyzed from the six sites. It seems unlikely that sufficient loading to cause a fracture could have been imposed in a hand-held use pattern due to the thickness of many of the specimens.

Table 24: Breakage Pattern of Artifacts

Site	N	Artifacts Not Broken (%)	Proximal End Missing (%)
Debert	74	45.9	27.0
Belmont II	8	75.0	25.0
Shubenacadie 3	24	75.0	5.4
Shubenacadie 5	7	85.7	14.3
Jemseg	14	50.0	35.7
Bentley Street	2	0	50.0

Notes: N=total number of specimens.

Almost all of the spurred end scrapers analyzed from the two Paleoindian sites had retouch present on at least one of the lateral margins. The lateral retouch was slightly lower for the two Maritime Woodland site samples where approximately half had some lateral retouch present. The need to fit the stone tool into a socketed haft could account for some of the lateral retouch found on the tools (Grimes and Grimes 1985). The explanations for the bimodality in edge angles between cultures may therefore be the result of resharpening in order to fit the tool into a particular type of haft. Wilmsen (1970) suggested that socketed end scrapers are included in a steep edge angle category of artifacts. With a socketed haft there may be a need to retouch or thin the width of the end scraper to fit it into a particular size socket.

Evidence of hafting could also be indicated by the presence of a concavity on both lateral margins. These concavities could aid in lashing the artifact to a haft. Almost 18 percent of the Debert specimens may have been hafted in this manner. However, the other five sites had three or less specimens each that had concavities on both lateral margins. The percentage of specimens with concavities increases when artifacts that have a concavity only on one lateral margin are included. Therefore, the concavities may actually be the result of retouching the lateral margins of a specimen to allow it to fit into a socketed haft. Also, notching an end scraper for a haft would significantly weaken the durability of the tool when pressure was applied for scraping or cutting.

Just over 50 percent of the Paleoindian specimens and 75 percent of the Maritime Woodland specimens had at least one raised arris with little to no retouch. Such dorsal morphology would allow a great deal more pressure to be placed on the tool, suggesting if they were broken during use they were probably hafted. Socketed hafts would have critical dimensional limits in almost all directions. However, it would be much easier to accommodate thicker tools, or tools with a raised arris on the dorsal surface within a socketed haft than a split haft.

Finally, proximal end retouch would be much more frequent on artifacts that had been lashed to a split haft, as the proximal end would have to be thinned to fit the haft. This may not be as important for those end scrapers placed into a socketed haft. The Debert site had five specimens with proximal end retouch present, both Maritime Woodland sites as well as the Jemseg and Bentley Street sites each had one specimen with proximal end retouch present. The Belmont II site had no specimens with proximal end retouch.

There are a number of attributes that suggest that most of the specimens analyzed were hafted. The artifact retouch as well as the thickness and dorsal surface morphology of the specimens indicate that the majority of the specimens from the Paleoindian and Maritime Woodland sites were probably hafted using a socketing technique as opposed to a lashing technique.

Function and Use Wear

The statistical analysis revealed that there were seven attributes that were not statistically dissimilar within culture groups, and were at the same time, statistically dissimilar between culture groups. Five of those attributes are dependent variables and can be connected to function and use wear; therefore, they cannot be related to the technology or production of the flake. These attributes included the length of the retouch along the working end, maximum length of the artifact, weight, bit edge angle, and bit edge height. Each of these attributes are closely connected with the "life history" of the tool, as an end scraper may be sharpened several times during a single episode of use. The other two attributes that are not statistically dissimilar within culture groups, and at the same time statistically dissimilar between culture groups, are the striking platform angle, and maximum thickness of the artifact.

General categories of functional effectiveness have been suggested for differences in bit edge angle modes (Cantwell 1979; Wilmsen 1970). It has been inferred that cutting operations or hide scraping are associated with the most acute modes (less than 65 degrees). Suggested functions for tools with edge angles greater than 65 degrees are wood and bone working as well as heavy shredding. The majority of the scrapers analyzed have bit edge angles over 65 degrees. However, it is important to keep in mind that many of these scrapers are probably at the end of their "life history". Wilmsen (1970) also suggested that individual end scrapers might have been used for different tasks depending on the edge angle at the time of use. This type of maximization of tool "life" was probably very important to mobile people who chose to use a specific type of lithic material.

Technology

Technologically there are similarities as well as differences between the Paleoindian and Maritime Woodland samples. It is possible to suggest that specific lithic materials, producing specific flake forms, were being sought and selected. Such selection is indicated by the striking platform angle and maximum thickness of the artifact. As the initial stages of choosing a lithic material as well as core technology tended to be the same between culture groups, later technological deviations in the process of forming the finished product, the spur, may have changed. Often such changes in technology are concluded to be the result of an adjustment to different environmental factors (Bonnichsen et al. 1985; Curran 1984; Goodyear 1982).

The focus on the relationship between environment and culture is conceptually anchored in positivism (Binford 1962). Despite alternative paradigms (e.g., Preucel and Hodder 1996), much of the archaeological literature still incorporates a human ecological approach. The environment did change drastically from the Paleoindian period to the Late Maritime Woodland Period (Davis and Jacobson 1985). Therefore, the tools analyzed may indicate the tendency of a basic technological tradition to be modified to meet different environmental conditions. Environment and tool function are structurally interrelated with cultural systems, and technology would be part of that system. However, the change in the pattern of the flaking on the spurs between culture periods may actually be related to the function of the tool, and not to technology. Such a change in function may be an indicator of cultural differences. Future research focusing on use wear analysis of the spurs may determine if longitudinal flake removals are related to technology or function.

From the analysis it is evident that morphology cannot always distinguish between cultural groups. It is possible for tools to be morphologically similar; however, the technology applied to each flake may be different. All the tools used in this research have a similar morphology and were made from similar lithic materials. However, after completing a technological analysis it is possible to determine that although the morphology of the tool may be similar between culture groups the complete technology that goes with it may not.

Jemseg and Bentley Street Sites

Research pertaining to the paleoenvironment of New Brunswick is regionally uneven and incomplete, making it difficult to get a complete understanding of what the environment was like at the Bentley Street and Jemseg site locations 10,000 years ago. This regional unevenness in the available data can be attributed to research goals and lack of field research. As indicated in Chapter 2, it is possible that both the Jemseg and Bentley Street site locations were inhabitable during the Paleoindian period. No fluted projectile points were found at either site location; however, end scrapers were identified that morphologically resemble spurred end scrapers from known Paleoindian sites such as the Debert site.

Raw Material and Core Type

From the analysis discussed above there are at least two, and possibly three, technological similarities between the Paleoindian and Maritime Woodland specimens. The first two technological similarities relate to the choice of lithic material and lithic core type. The third attribute, flaking pattern on the spurs, may also be attributed to technology. All of the Jemseg and Bentley Street specimens are identified as being produced from a chert. However, these same end scrapers do not all conform to being struck from the same core type. In the Paleoindian and Maritime Woodland samples, attributes such as platform angle, type of platform, and the presence or absence of a lip were analyzed to help determine the type of core the flake was struck from. Six of the 14 Jemseg site artifacts analyzed do not have a striking platform present. Of the eight specimens with a platform, five are attributed to being struck from a biface core, and three from a tabular type core. The difference in core type being used may be related to the lithic material and the form it is found in. For example, one type of chert identified at the Jemseg site crops out in a tabular form not far from the site (Black and Wilson 1999). The two specimens from the Bentley Street site do not have intact striking platforms; therefore, the type of core the flakes may have been struck from cannot be determined.

Spurs

From the analysis discussed above there is one possible technological difference between the Paleoindian and Maritime Woodland specimens, the flaking pattern on the spurs. As noted, the flaking pattern on the spurs that was utilized within the Paleoindian samples indicated a side flaking technology as well as side flaking that also included longitudinal flaking on the spur. Aside from one specimen that was found in each of the Maritime Woodland site samples, only flaking along the sides of the spur was present at that time.

The flaking pattern on the spurs can be determined on 11 of the 14 specimens from the Jemseg site. Of the 11 specimens, the flaking pattern on three conforms to flaking along the side of the spur with a longitudinal flake down the middle. One of the two specimens from the Bentley Street site has a spur with the longitudinal flake present.

Where the New Brunswick Sites Fit

Of the 16 quantitative attributes analyzed, statistical tests revealed seven attributes that are not statistically dissimilar within the two Paleoindian and two Maritime Woodland site specimens, but are statistically dissimilar between culture groups. Also, this research suggests that the flaking pattern on the spurs may be considered the most diagnostic attribute of the spurred end scrapers; therefore, it is considered in conjunction with the seven most diagnostic statistical test attributes (Table 25). The data are then compared to the mean of the sample, standard deviation of the mean, and the range for the Paleoindian and Maritime Woodland specimens for these same seven variables. Much of the data from the Jemseg and Bentley Street site samples falls closest to the data obtained from the Paleoindian samples. However, some of the Jemseg and Bentley Street site samples overlap with the Maritime Woodland data. Six of the ten Jemseg specimens have more attributes that are closer to the Paleoindian means, and two specimens have attributes closer to the Maritime Woodland means. Two specimens are indeterminate. All the attributes that are present for the Bentley Street site specimen are closest to the Paleoindian means.

The Jemseg site and the Bentley Street site cannot be dismissed as lacking a Paleoindian component. The attributes mentioned above, together with the location of the artifacts on the landscape within the site, suggest that these specimens have potential as being Paleoindian in age. As discussed further in the last chapter, the next step is to go beyond a specific artifact analysis and consider the complete assemblage at each of these site locations.

Table 25: Statistical T-test Attributes Compared with Flaking Pattern on the Spur

Jemseg Artifact Number	Platform Angle (degrees)	Distal End Retouch (mm)	Max. Thickness (mm)	Max. Length (mm)	Weight (grams)	Bit Edge Angle (degrees)	Bit Edge Height (mm)	Flaking Pattern on Spur
7413	75 (W)	n/a	6.8 (P)	21.3 (W)	n/a	90 (W)	4.8 (W)	side
9581	n/a	18.8 (W)	6.7 (P)	n/a	n/a	70 (P)	8.9 (P)	side
10175	n/a	20.7 (W)	6.6 (P)	32.4 (P)	4.3 (P)	70 (P)	7.8 (P)	snapped lat.
10659	n/a	16.9 (W)	7.4 (P)	n/a	n/a	80 (W)	7.2 (P)	side/ longitudinal
14527	n/a	20.0 (W)	7.7 (P)	29.2 (P)	4 (P)	70 (P)	6.8 (P)	side
17068	n/a	20.0 (W)	9.0 (P)	26.0 (P)	2.8 (W)	80 (W)	10.3 (P)	side/ longitudinal
24391	80 (W)	n/a	7.7 (P)	32.8 (P)	n/a	70 (P)	6.9 (P)	side
26234	60 (P)	17.5 (W)	3.3 (W)	26.4 (P)	2.0 (W)	70 (P)	3.9 (W)	side
26117	55 (P)	n/a	9.2 (P)	29.4 (P)	n/a	70 (P)	13.0 (P)	side
27956	50 (P)	20.6 (P)	6.5 (P)	29.4 (P)	4.1 (P)	80 (W)	7.1 (P)	side longitudinal
Bentley Street Artifact Number	**Platform Angle (degrees)**	**Distal End Retouch (mm)**	**Max. Thickness (mm)**	**Max. Length (mm)**	**Weight (grams)**	**Bit Edge Angle (degrees)**	**Bit Edge Height (mm)**	**Flaking Pattern on Spur**
197	n/a	25.6 (P)	8.7 (P)	29.0 (P)	n/a	50 (P)	10.7 (P)	side/ longitudinal
N(P)=x	59.3	22.5	6.6	24.7	4.0	69.9	7.3	
S	1.7	0.59	0.19	0.52	0.26	1.4	0.38	
R	35-85	2.9-34.1	3.4-12.1	16.9-32.8	1.9-8.7	30-90	3.4-30.0	
N(W)=x	68.7	20.5	5.6	22.1	2.6	78.7	5.5	
s	2.5	0.61	0.20	1.1	0.19	1.2	0.24	
R	50-90	15.1-27.9	4.2-9.0	2.8-34.0	1.5-5.4	70-90	3.6-9.5	

Notes: N(P)=total samples from both Paleoindian sites; N(W)=total samples from both Maritime Woodland sites; (P)=most like the Paleoindian samples; (W)=most like the Maritime Woodland samples; x=mean of sample; s=standard deviation; R=range; n/a=not applicable.

At the end of the Jemseg project, 746 square meters of the site had been excavated. The excavations revealed Middle and Late Archaic habitation material and a large Early Maritime Woodland base camp (Blair 1998). The cultural components got older with distance from the Jemseg River. As the highest elevations consisted of Middle and Late Archaic as well as a portion of the Early Maritime Woodland components of the site, it is probable that there would be a mixed sample of scrapers present. However, end scrapers are not typical of regional Middle and Late Archaic assemblages (D. Sanger Personal Communication 2001).

Without any indication of provenance of the 203 scrapers recovered from the Jemseg site, 14 were selected for analysis because of the morphology, which indicated a spur. Of the 10 specimens spurred all but one was located on the upper terrace of the site. The three spurred specimens that had side flaking and a longitudinal flake removed were all located within a small area on the upper terrace. Unfortunately, the back of the upper terrace is now covered by four to five meters of fill and some of the oldest archaeological material recovered at the site seems to continue under this fill.

A hearth feature that yielded a radiocarbon date of 2,520 ±70 B.P. (B – 101508) was located in close proximity to the three spurred end scrapers that had the longitudinal flake on the spur. A second radiocarbon-dated feature was partially located in the same unit as one of the spurred scrapers with the longitudinal flake on the spur. This feature was thought to be a semi subterranean pithouse. This feature returned a radiocarbon date of 2,140 ±60 B.P. (B – 105892). Other features in the area of these three spurred end scrapers included two refuse pits, two hearths, and four undetermined features (Blair 1998).

The Jemseg site is a multi-component site. The analysis on the spurred end scrapers from the site has not determined that a Paleoindian component does exist. What the analysis does suggest is that further investigation is warranted.

The Bentley Street site is a small multi-component site. The excavations revealed Late Archaic as well as Early Maritime Woodland cultural material (Allen 1997). Much of the site had been disturbed during the nineteenth and twentieth century. However, there are two areas, the southeastern and southwestern portions of the site, that had been identified as having undisturbed lower levels. At the end of the excavation forty-seven 50 centimeter square test pits, and 4.5 additional square meters were excavated. During excavation eight scrapers were recovered. In the preliminary report, Allen (1997) summarized some of the significant findings recovered from the site. Such findings included one end scraper identified as having a spur at the distal end, and a second end scraper of a chert material (Munsungun) that had been identified in Paleoindian sites throughout Maine. Both scrapers were from the same unit, located in the large undisturbed area of the site.

Similar to the Jemseg site, the analysis on the spurred end scrapers from the Bentley Street site has not determined that a Paleoindian component exists, but suggests the possibility. After determining what attributes of spurred end scrapers may be diagnostic of the Paleoindian period, 60 percent of the Jemseg site samples could be Paleoindian in age. At the Bentley Street site, one of the two specimens is possibly Paleoindian in age.

Because highly visible artifacts such as projectile points may not always occur at small sites, other evidence must be considered. End scrapers are one of the most frequent artifacts found in Paleoindian sites; therefore, they should be viewed more critically to determine their potential as distinctive and culturally diagnostic artifacts. As the Jemseg and Bentley Street sites appear to have potential Paleoindian components, this conclusion can be tested with further excavation that may locate fluted points. At this time the portion of the Jemseg site that could contain further evidence of the presence of a Paleoindian component is covered with four to five meters of fill. The Bentley Street site has been placed on the Provincial list of protected National Historic Sites. Therefore, at this time further excavation at both sites is not possible. However, without further excavation, other ways of gathering information about these sites include looking at the total excavated assemblage for other tools that may be found within the Paleoindian tool kit. Additional evidence can be determined by considering their dispersal across the site.

At the Jemseg site approximately 20,000 lithic artifacts were recovered. A full analysis of those artifacts has not yet been completed. Therefore, the collection has not been analyzed in detail looking specifically for other tools that may be Paleoindian in age. However, a preliminary analysis identified denticulates, also referred to as gravers by MacDonald (1968). Within the approximately 2,700 lithic artifacts from the Bentley Street site, Allen (1997) noted several bi-polar cores or pièces esquillées. Both tool types have also been identified at many Paleoindian sites across Maine, as well as at the Debert site in Nova Scotia (MacDonald 1968). Their presence in later sites is not unknown, however.

CHAPTER 6

CONCLUSIONS AND DISCUSSION

Research Objectives

The study proposed to: 1) determine the range of technological variation of Early Paleoindian and Late Maritime Woodland spurred end scrapers; 2) determine if there are additional attributes that may be considered diagnostic of a Paleoindian assemblage; and 3) determine if it is possible to place spurred end scrapers into a temporal period. In answering these questions, a summary of the results is presented. Also, directions for future research will be discussed.

This research included a review of the paleoenvironmental literature and a technological analysis of spurred end scrapers from two known Early Paleoindian and two known Late Maritime Woodland sites. Used in this analysis were scrapers that morphologically resembled spurred end scrapers from Paleoindian and Maritime Woodland sites. There had been little previous analysis completed on end scrapers even though they are one of the most common artifacts found in any Paleoindian site. Much of the research to date has involved a morphological analysis with little attention given to the technology of the tool. It should be noted that my analysis is preliminary in nature, and is intended as a framework on which to build future research.

From the analyzed samples of Paleoindian and Maritime Woodland spurred end scrapers I determined that there are two technological attributes that suggest continuity between the Early Paleoindian and Late Maritime Woodland culture periods. These technological attributes are the choice of lithic material and the lithic core type utilized.

An attribute that indicates variability between culture periods is the flaking pattern on the spurs. The presence, not absence, of a longitudinal flake down the center of the spur may be used as an indicator of a possible Paleoindian component at a site. Through further research on use wear studies it may be possible to determine if this longitudinal flake is indicative of the technology or the function of the spur. Two other attributes that are not statistically dissimilar within culture groups, and at the same time statistically dissimilar between culture groups, include the striking platform angle and the maximum thickness of the artifact.

There are other indicators that suggest similarity between culture periods. A number of attributes indicate that the most common method of hafting the spurred end scrapers is some form of socketed haft. Also, the angle of the working end is similar between culture periods. This congruence in working end angle may be the result of the type of material the end scrapers were used on (Cantwell 1979), or it may indicate that the point at which the tools were discarded was similar.

The production or function of the spurs was the one attribute that holds the greatest potential as a diagnostic attribute of Paleoindian spurred end scrapers. Also, statistical analysis indicated that seven other attributes may indicate significant difference between culture periods. Spurred end scrapers from two sites in New Brunswick were tested against these attributes. The results are not definitive but do indicate that the Jemseg and Bentley Street sites should be considered further for the potential of having a Paleoindian component.

Such research can be applied to other small sites that do not contain diagnostic fluted points, but do contain other attributes that have been cited as characteristic of

Paleoindian sites, such as site location and lithic material (Spiess et al. 1998). There is a strong possibility that many small Paleoindian sites are scattered across the landscape (Spiess et al. 1998; Spiess and Hedden 2000). Such small sites, with no fluted points, are often overlooked or disregarded as contributing much information to the archaeological record. However, such sites may help to develop a better understanding of the Paleoindian culture period.

This research indicated that just the presence of a spurred end scraper is not indicative of a Paleoindian site, and that temporally the range of technological variation in spurred end scrapers is very small. However, the flaking pattern on the spurs may help to indicate a Paleoindian presence when considered with other indicators.

Future Research

Small samples that have been already excavated hold potential in answering the question of whether the problem of invisible Paleoindian sites in New Brunswick is real or not. The goal of this research was not to prove that New Brunswick sites did contain a Paleoindian component, but to test a hypothesis and develop a methodology that could be applied to other sites. Further research at the Jemseg and Bentley Street sites may indicate with certainty that indeed these multi-component sites are much older than previously thought. These sites did add to research pertaining to the Paleoindian period within the province, as the potential of an early age for these sites has been established.

The information and concepts that have been generated from this research could serve as a basis for further study. This analysis did contribute to the overall database pertaining to not only Early Paleoindian research but also Late Maritime Woodland research by completing a technological analysis of a lithic tool that has had relatively little attention in the past. This research not only contributes to the archaeology in Nova Scotia and New Brunswick, but also can be applied in a broader northeastern regional context.

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APPENDIX A

WORK SHEET

GENERAL INFORMATION WORK SHEET

Provenience Information
Site:
Artifact number:
Unit:
Layer:

Materials
Raw material description:
JCAP type number:
Analyst and date:
Methodology:

Morphology
Striking Platform present?
If Yes, striking platform description: simple, complex, abraded, crushing
Platform angle (degrees):
Striking platform width:
Striking platform thickness:
Lip present on striking platform:
Spur present?
Number?
Position: bit end, proximal end, left lateral, right lateral
Pattern of flaking on spur: along sides of spur, longitudinal flaking, snapped lateral edge
Cortex present?
If Yes, % of area (est.):
Location of cortex: ventral, dorsal, proximal, bit, left lateral, right lateral
Presence of hafting?
If Yes, what evidence?
Ventral finishing present?
If Yes, % of area (est.):
Dorsal finishing present?
If Yes, muntidirectional flaking, single ridge, multi-ridge (#), flat
Ventral retouch present?
If Yes location, distal end, proximal end, right lateral, left lateral
If Yes extent, distal end, short, long, invasive (covering large part of face)
extent, proximal end, short long invasive
extent, right lateral, short, long, invasive
extent, left lateral, short, long invasive

Dorsal retouch present?
If Yes location, distal end proximal end, right lateral, left lateral
If Yes extent, distal end, short, long, invasive (covering large part of face)
extent, proximal end, short long invasive
extent, right lateral, short, long, invasive
extent, left lateral, short, long invasive
Location of bit end: proximal, distal, left lateral, right lateral
Bit edge angle (degrees):
Bit edge height:
Planar shape: triangloid, oval, round, rectangular, square, indeterminent
Primary working edge shape: convex, pointed, flat, irregular
Lateral cross-section: concave/convex, planar/convex, convex/convex
Longitudinal cross-section: concave/convex, planar/convex, convex/convex
Edge angle – right lateral (degrees):
Edge angle – left lateral (degrees):
Weight:

Condition
Complete?
If No, breakage pattern:

Metrics
Maximum length (mm along longitudinal axis):
Maximum width (mm):
Maximum thickness (mm):
Span width (mm):
Retouched edge lengths(s) (mm)
Right lateral:
Left lateral:
Proximal:
Distal:

APPENDIX B

ATTRIBUTE FREQUENCY TABLES

Table A1: Debert Site Attribute Data: Provenience Information and Lithic Material

Provenience Information			Information on Lithic Material		
Artifact Number	Unit	Layer	Raw Material Lithology	Raw Material Name	JCAP Type Number
1	s140w162	surface	Chert	Chalcedony	n/a
10	s237w69	surface	Chert	n/a	n/a
27	w405s41	surface	Chert	Chalcedony	n/a
33	s98e31	surface	Chert	Chalcedony	n/a
82	s235w90	0.8	Chert	Chalcedony	n/a
91	s230w80	0.08	Chert	Brecciated	n/a
170	s75w45	1.21	Chert	Chalcedony	n/a
239	s225w70	1.3	Chert	Chalcedony	n/a
241	s225w75	0.9	Chert	Chalcedony	n/a
252	s225w75	1.2	Chert	Chalcedony	n/a
267	s75w45	0.88	Chert	Brecciated	n/a
268	s80w45	1.65	Chert	Brecciated	n/a
308	s75w40	1.31	Chert	Chalcedony	n/a
318	s80w45	2.5	Chert	Brecciated	n/a
334	e50s64	surface	Chert	Chalcedony	n/a
355	s225w75	1.5	Chert	Brecciated	n/a
357	s225w75	1.4	Chert	Chalcedony	n/a
392	s235w80	0.25	Chert	Chalcedony	n/a
402	n/a	n/a	Chert	Brecciated	n/a
545	n770e400	0.5	Chert	Chalcedony	n/a
629	s15w130	0.51	Chert	Chalcedony	n/a
648	s25w125	1.25	Chert	Chalcedony	n/a
733	s30w130	0.8	Chert	Brecciated	n/a
734	s30w130	0.8	Chert	Chalcedony	n/a
741	s30w130	1.26	Chert	Minas Basin	n/a
746	s30w130	0.8	Chert	Brecciated	n/a
863	s235w70	6	Chert	Chalcedony	n/a
1065	s30w120	1.1	Chert	Chalcedony	n/a

Table A1: Continued

Provenience Information			Information on Lithic Material		
Artifact Number	Unit	Layer	Raw Material Lithology	Raw Material Name	JCAP Type Number
1221	s35w120	1.2	Chert	Brecciated	n/a
1260	s40w125	0.23	Chert	Chalcedony	n/a
1307	s45w130	surface	Chert	Chalcedony	n/a
1348	n140w75	0.58	Chert	Chalcedony	n/a
1375	s35w130	0.25	Chert	Chalcedony	n/a
1406	n140w75	0.35	Chert	Chalcedony	n/a
1411	n140w65	1.15	Chert	Chalcedony	n/a
1415	s35w130	0.25	Chert	Chalcedony	n/a
1573	s105w135	1.1	Chert	Brecciated	n/a
1623	s95w150	0.6	Chert	Chalcedony	n/a
1673	s105w145	0.37	Chert	Red Munsungun	n/a
1722	s75e45	0.6	Chert	Chalcedony	n/a
1739	s165w150	1	Chert	Chalcedony	n/a
1751	s110w150	1.2	Chert	Minas Basin	n/a
1828	s110w140	0.62	Chert	Chalcedony	n/a
1998	s110w130	0.9	Chert	Chalcedony	n/a
2208	s115w135	0.95	Volcanic	Felsic	n/a
2408	s115w130	0.85	Chert	Chalcedony	n/a
2495	n145w70	0.85	Chert	Chalcedony	n/a
2517	n150w80	0.76	Chert	Chalcedony	n/a
2554	s170w155	0.8	Chert	Chalcedony	n/a
2803	n155w85	1.05	Chert	Chalcedony	n/a
2927	s170w160	0.6	Chert	Chalcedony	n/a
2946	n/a	n/a	Volcanic	Felsic	n/a
2974	n/a	n/a	Chert	Brecciated	n/a
3001	s350w105	1.1	Chert	Chalcedony	n/a
3090	s340w105	0.75	Chert	Chalcedony	n/a
3121	n175w85	1.75	Chert	Chalcedony	n/a

Table A1: Continued

Provenience Information			Information on Lithic Material		
Artifact Number	Unit	Layer	Raw Material Lithology	Raw Material Name	JCAP Type Number
3129	n165w85	0.39	Chert	Chalcedony	n/a
3271	n165w70	0.7	Chert	Chalcedony	n/a
3380	n/a	n/a	Chert	Chalcedony	n/a
3461	n/a	n/a	Chert	Chalcedony	n/a
3692	w95s345	2.24	Chert	Chalcedony	n/a
3717	n180w85	1.95	Chert	Chalcedony	n/a
3720	s35w120	0.9	Chert	Chalcedony	n/a
3771	s345w105	0.53	Chert	Chalcedony	n/a
3794	s345w105	0.62	Chert	Chalcedony	n/a
3861	s370w95	0.79	Chert	Chalcedony	n/a
3904	s234w105	0.9	Chert	Chalcedony	n/a
3979	n/a	n/a	Chert	Chalcedony	n/a
3982	n/a	n/a	Chert	Chalcedony	n/a
4031	n/a	n/a	Chert	Chalcedony	n/a
4036	n/a	n/a	Chert	Chalcedony	n/a
4081	n/a	n/a	Chert	Brecciated	n/a
4097	n/a	n/a	Chert	Chalcedony	n/a
4098	s234w105	3	Chert	Chalcedony	n/a

Table A2: Debert Site Attribute Data: Striking Platform

Striking Platform							
Artifact Number	Striking Platform Present (Y or N)	Platform Description	Platform Grinding	Lip on Platform	Platform Angle	Platform Length(mm)	Platform Width
1	No	n/a	n/a	n/a	n/a	n/a	n/a
10	No	n/a	n/a	n/a	n/a	n/a	n/a
27	Yes	Sim/Abra	1	Yes	55	8	1.9
33	No	n/a	n/a	n/a	n/a	n/a	n/a
82	No	n/a	n/a	n/a	n/a	n/a	n/a
91	Yes	Complex	0	Yes	50	12.5	3.5
170	Yes	Sim/Abra	1	Yes	55	14.6	5.9
239	Yes	Sim/Abra	2	Yes	50	6.5	2.4
241	Yes	Simple	0	Yes	70	8.8	3.9
252	No	n/a	n/a	n/a	n/a	n/a	n/a
267	Yes	Com/Abra	1	Yes	70	18.3	7.8
268	No	n/a	n/a	n/a	n/a	n/a	n/a
308	No	n/a	n/a	n/a	n/a	n/a	n/a
318	Yes	Simple	0	Yes	80	7.3	2
334	Yes	Simple	0	Yes	45	6.6	2.5
355	Yes	Sim/Abra	2	Yes	60	7	3
357	No	n/a	n/a	n/a	n/a	n/a	n/a
392	No	n/a	n/a	n/a	n/a	n/a	n/a
402	Yes	Complex	0	Yes	65	15.6	4.5
545	Yes	Crushing	0	No	75	7.1	3.8
629	Yes	Com/Abra	1	Yes	65	4.5	1.6
648	No	n/a	n/a	n/a	n/a	n/a	n/a
733	No	n/a	n/a	n/a	n/a	n/a	n/a
734	Yes	Com/Abra	2	Yes	60	4.8	1.5
741	No	n/a	n/a	n/a	n/a	n/a	n/a
746	Yes	Sim/Abra	2	Yes	55	8.2	1.2
863	No	n/a	n/a	n/a	n/a	n/a	n/a
1065	No	n/a	n/a	n/a	n/a	n/a	n/a

Table A2: Continued

Striking Platform							
Artifact Number	Striking Platform Present (Y or N)	Platform Description	Platform Grinding	Lip on Platform	Platform Angle	Platform Length(mm)	Platform Width
1221	Yes	Sim/Abra	1	Yes	60	9.2	3.9
1260	No	n/a	n/a	n/a	n/a	n/a	n/a
1307	No	n/a	n/a	n/a	n/a	n/a	n/a
1348	No	n/a	n/a	n/a	n/a	n/a	n/a
1375	No	Crushing	n/a	n/a	n/a	n/a	n/a
1406	No	n/a	n/a	n/a	n/a	n/a	n/a
1411	No	n/a	n/a	n/a	n/a	n/a	n/a
1415	Yes	Com/Abra	1	Yes	60	4.8	1.5
1573	Yes	Sim/Abra	2	No	80	8.1	4.2
1623	Yes	Com/Abra	1	Yes	55	13.7	5.4
1673	No	n/a	n/a	n/a	n/a	n/a	n/a
1722	Yes	Com/Abra	2	Yes	40	8.3	3.4
1739	Yes	Complex	0	No	70	8.4	2.6
1751	Yes	Complex	0	Yes	85	6.1	1.4
1828	Yes	Sim/Abra	1	Yes	65	8.6	2.5
1998	No	n/a	n/a	n/a	n/a	n/a	n/a
2208	Yes	Complex	0	Yes	70	3.3	1.7
2408	Yes	Cor/Abra	1	Yes	55	13.1	4.1
2495	No	Crushing	n/a	n/a	n/a	n/a	n/a
2517	Yes	Com/Abra	1	Yes	60	9.9	3
2554	No	n/a	n/a	n/a	n/a	n/a	n/a
2803	No	n/a	n/a	n/a	n/a	n/a	n/a
2927	Yes	Sim/Abra	2	Yes	45	6	2
2946	No	n/a	n/a	n/a	n/a	n/a	n/a
2974	Yes	Sim/Abra	1	Yes	55	6.3	2.4
3001	No	n/a	n/a	n/a	n/a	n/a	n/a
3090	Yes	Com/Abra	1	Yes	55	12.6	3.4

Table A2: Continued

Striking Platform							
Artifact Number	Striking Platform Present (Y or N)	Platform Description	Platform Grinding	Lip on Platform	Platform Angle	Platform Length(mm)	Platform Width
3121	No	n/a	n/a	n/a	n/a	n/a	n/a
3129	No	n/a	n/a	n/a	n/a	n/a	n/a
3271	Yes	Com/Abra	2	Yes	50	8.9	3.4
3380	Yes	Com/Abra	2	Yes	50	8.3	2.7
3461	Yes	Simple	0	No	50	2.6	2.1
3692	Yes	Sim/Abra	1	Yes	55	4.5	2.2
3717	Yes	Sim/Abra	1	Yes	65	10.8	4.7
3720	Yes	Simple	0	Yes	45	6.8	2.3
3771	Yes	Cor/Abra	2	Yes	65	9.1	2.5
3794	No	n/a	n/a	n/a	n/a	n/a	n/a
3861	Yes	Com/Abra	1	Yes	45	10.4	3.3
3904	Yes	Com/Abra	1	Yes	55	5.7	1.8
3979	Yes	Com/Abra	1	Yes	55	12.1	3.4
3982	Yes	Com/Abra	2	Yes	50	7	3
4031	Yes	Simple	0	Yes	85	10.5	2.7
4036	Yes	Simple	0	No	65	6.6	2.8
4081	No	n/a	n/a	n/a	n/a	n/a	n/a
4097	Yes	Simple	0	Yes	65	3.9	2.2
4098	Yes	Com/Abra	2	Yes	45	8.3	2.5

Table A3: Debert Site Attribute Data: Spurs and Cortex

Spurs					Cortex Present		
Artifact Number	Spurs Present (Yes or No)	Number of Spurs	Position of Spurs	Flaking on Spur	Cortex Present (Yes or No)	Area of Cortex (%)	Location of Cortex
1	Yes	1	Bit/Left	Sides/Longitudinal	No	n/a	n/a
10	Yes	2	Bit/Left/Right	Along Sides	No	n/a	n/a
27	Yes	2	Bit/Left/Right	Snaped Lateral Edge	No	n/a	n/a
33	Yes	1	Bit/Left	Sides/Longitudinal	No	n/a	n/a
82	Yes	1	Bit/Left	Along Sides	No	n/a	n/a
91	Yes	2	Bit/Left/Right	Along Sides	No	n/a	n/a
170	Yes	1	Bit/Left	Along Sides	No	n/a	n/a
239	Yes	1	Bit/Right	Sides/Longitudinal	No	n/a	n/a
241	Yes	1	Bit/Left	Along Sides	No	n/a	n/a
252	Yes	1	Bit/Left	Sides/Longitudinal	No	n/a	n/a
267	Yes	2	Bit/Left/Right	Along Sides	No	n/a	n/a
268	Yes	1	Bit/Left	Sides/Longitudinal	No	n/a	n/a
308	Yes	2	Bit/Left/Right	Along Sides	No	n/a	n/a
318	Yes	1	Bit/Right	Along Sides	No	n/a	n/a
334	Yes	1	Bit/Left	Along Sides	No	n/a	n/a
355	Yes	2	Bit/Left/Right	Snaped Lateral Edge	No	n/a	n/a
357	Yes	2	Bit/Left/Right	Sides/Longitudinal	No	n/a	n/a
392	Yes	2	Bit/Left/Right	Sides/Longitudinal	No	n/a	n/a
402	Yes	2	Bit/Left/Right	Along Sides	No	n/a	n/a
545	Yes	1	Bit/Left	Longitudinal Flaking	No	n/a	n/a
629	Yes	1	Bit/Right	Sides/Longitudinal	No	n/a	n/a
648	Yes	1	Bit/Left	Along Sides	No	n/a	n/a
733	Yes	1	Bit/Left	Along Sides	No	n/a	n/a
734	Yes	1	Bit/Right	Along Sides	No	n/a	n/a
741	Yes	1	Bit/Left	Along Sides	No	n/a	n/a
746	Yes	2	Bit/Left/Right	Sides/Longitudinal	No	n/a	n/a
863	Yes	1	Bit/Left	Sides/Longitudinal	Yes	75	Dorsal
1065	Yes	1	Bit/Right	Sides/Longitudinal	Yes	5	Proximal

Table A3: Continued

Spurs					Cortex Present		
Artifact Number	Spurs Present (Yes or No)	Number of Spurs	Position of Spurs	Flaking on Spur	Cortex Present (Yes or No)	Area of Cortex (%)	Location of Cortex
1221	Yes	1	Bit/Left	Sides/Longitudinal	No	n/a	n/a
1260	Yes	1	Bit/Right	Sides/Longitudinal	No	n/a	n/a
1307	Yes	1	Bit/Left	Along Sides	No	n/a	n/a
1348	Yes	1	Bit/Left	Sides/Longitudinal	No	n/a	n/a
1375	Yes	1	Bit/Left	Sides/Longitudinal	No	n/a	n/a
1406	Yes	1	Bit/Left	Sides/Longitudinal	Yes	5	Proximal
1411	Yes	2	Bit/Left/Right	Sides/Longitudinal	No	n/a	n/a
1415	Yes	1	Bit/Right	Sides/Longitudinal	No	n/a	n/a
1573	Yes	2	Bit/Left/Right	Along Sides	Yes	5	Proximal
1623	Yes	1	Bit/Left	Sides/Longitudinal	Yes	1	Proximal
1673	Yes	1	Bit/Left	Along Sides	No	n/a	n/a
1722	Yes	2	Bit/Left/Right	Sides/Longitudinal	No	n/a	n/a
1739	Yes	1	Bit/Right	Sides/Longitudinal	No	n/a	n/a
1751	Yes	1	Bit/Right	Sides/Longitudinal	No	n/a	n/a
1828	Yes	1	Bit/Left	Sides/Longitudinal	No	n/a	n/a
1998	Yes	1	Bit/Right	Sides/Longitudinal	No	n/a	n/a
2208	Yes	1	Bit/Right	Sides/Longitudinal	No	n/a	n/a
2408	Yes	1	Bit/Left	Sides/Longitudinal	Yes	5	Proximal
2495	Yes	2	Bit/Left/Right	Sides/Longitudinal	No	n/a	n/a
2517	Yes	1	Bit/Left	Along Sides	No	n/a	n/a
2554	Yes	1	Bit/Right	Sides/Longitudinal	No	n/a	n/a
2803	Yes	2	Bit/Left/Right	Sides/Longitudinal	No	n/a	n/a
2927	Yes	2	Bit/Left/Right	Sides/Longitudinal	Yes	20	Left Lateral
2946	Yes	1	Bit/Right	Along Sides	No	n/a	n/a
2974	Yes	2	Bit/Left/Right	Along Sides	No	n/a	n/a
3001	Yes	1	Bit/Left	Sides/Longitudinal	No	n/a	n/a
3090	Yes	1	Bit/Right	Sides/Longitudinal	No	n/a	n/a

Table A3: Continued

Spurs					Cortex Present		
Artifact Number	Spurs Present (Yes or No)	Number of Spurs	Position of Spurs	Flaking on Spur	Cortex Present (Yes or No)	Area of Cortex (%)	Location of Cortex
3121	Yes	1	Bit/Left	Longitudinal Flaking	Yes	30	Prox./Left
3129	Yes	2	Bit/Left/Right	Sides/Longitudinal	No	n/a	n/a
3271	Yes	1	Bit/Left	Sides/Longitudinal	No	n/a	n/a
3380	Yes	2	Bit/Left/Right	Sides/Longitudinal	No	n/a	n/a
3461	Yes	2	Bit/Left/Right	Along Sides	No	n/a	n/a
3692	Yes	1	Bit/Right	Sides/Longitudinal	No	n/a	n/a
3717	Yes	2	Bit/Left/Right	Sides/Longitudinal	No	n/a	n/a
3720	Yes	1	Bit/Left	Along Sides	No	n/a	n/a
3771	Yes	1	Bit/Left	Along Sides	Yes	10	Proximal
3794	Yes	2	Bit/Left/Right	Sides/Longitudinal	No	n/a	n/a
3861	Yes	1	Bit/Right	Sides/Longitudinal	No	n/a	n/a
3904	Yes	2	Bit/Left/Right	Sides/Longitudinal	No	n/a	n/a
3979	Yes	1	Bit/Right	Along Sides	No	n/a	n/a
3982	Yes	1	Bit/Left	Along Sides	No	n/a	n/a
4031	No	n/a	n/a	n/a	Yes	20	Left Lateral
4036	Yes	2	Bit/Left/Right	Along Sides	No	n/a	n/a
4081	Yes	1	Bit/Right	Along Sides	No	n/a	n/a
4097	Yes	1	Bit/Left	Along Sides	No	n/a	n/a
4098	Yes	1	Bit/Left	Sides/Longitudinal	No	n/a	n/a

Table A4: Debert Site Attribute Data: Hafting, Ventral and Dorsal Finishing, and Dorsal Ridge

Hafting			Ventral Finishing		Dorsal Finishing		Ridge
Artifact Number	Presence of Hafting (Y or N)	Evidence of Hafting	Ventral Finishing Present (Y or N)	Area of Finishing (%)	Dorsal Finishing Present (Y or N)	Type of Finishing	Multi-Ridge Number
1	Yes	Ground Lat.	No	n/a	No	Single Ridge	n/a
10	Yes	Ret. Lat.	No	n/a	Yes	Multi-directional	n/a
27	Yes	Ret. Lat./ Notch Left	No	n/a	No	Single Ridge	n/a
33	Yes	Ret. Right/Notch Left Lat.	No	n/a	No	Single Ridge	n/a
82	Yes	Ret. Lat.	No	n/a	No	Flat	n/a
91	Yes	Ret. Lat./Proximal	No	n/a	No	Single Ridge	n/a
170	Yes	Ret. Lat./Notch Right	No	n/a	No	Flat	n/a
239	Yes	Ret. Lat.	No	n/a	Yes	Multi-directional	n/a
241	Yes	Ret. Left Lat./Ground Ridge	Yes	2	No	Single Ridge	n/a
252	Yes	Ret. Lat./Notch Right	No	n/a	No	Single Ridge	n/a
267	Yes	Ret. Lat.	No	n/a	No	Flat	n/a
268	Yes	Ret. Left Lat./Notch Right	No	n/a	No	Single Ridge	n/a
308	Yes	Ret. Lat./Notches	No	n/a	No	Flat	n/a
318	Yes	Ret. Right/Notch Left Lat.	No	n/a	No	Single Ridge	n/a
334	Yes	Ret. Right Lat.	No	n/a	Yes	Multi-directional	n/a
355	Yes	Ret. Lat./Notches	No	n/a	No	Single Ridge	n/a
357	Yes	Ret. Right Lat.	No	n/a	No	Single Ridge	n/a
392	Yes	Ret. Lat./ Notch Left	No	n/a	No	Single Ridge	n/a
402	Yes	Ret. Lat./Notches	No	n/a	No	Single Ridge	n/a
545	Yes	Ret. Lat./Notches	No	n/a	No	Single Ridge	n/a
629	Yes	Ret. Lat.	No	n/a	Yes	Multi-directional	n/a
648	Yes	Ret. Lat./Notch Right	No	n/a	No	Multi-ridge	2
733	Yes	Ret. Left Lat.	No	n/a	No	Flat	n/a
734	Yes	Ret. Right Lat./Notch Right	No	n/a	No	Flat	n/a
741	Yes	Ret. Lat.	No	n/a	No	Single Ridge	n/a
746	Yes	Ret. Lat.	No	n/a	No	Flat	n/a
863	Yes	Ground Lat.	No	n/a	No	Single Ridge	n/a
1065	Yes	Ret. Lat./Notch Right	No	n/a	No	Flat	n/a

Table A4: Continued

Hafting			Ventral Finishing		Dorsal Finishing		Ridge
Artifact Number	Presence of Hafting (Y or N)	Evidence of Hafting	Ventral Finishing Present (Y or N)	Area of Finishing (%)	Dorsal Finishing Present (Y or N)	Type of Finishing	Multi-Ridge Number
1221	Yes	Ret. Lat.	No	n/a	No	Flat	n/a
1260	Yes	Ret. Lat.	No	n/a	No	Flat	n/a
1307	Yes	Ground Lat.	No	n/a	No	Multi-ridge	2
1348	Yes	Gro. Lat./Notch Left	No	n/a	No	Single Ridge	n/a
1375	Yes	Ret. Lat.	No	n/a	No	Flat	n/a
1406	Yes	Ret. Lat./Notch Left	No	n/a	No	Flat	n/a
1411	Yes	Gro. Lat./Notches	No	n/a	No	Single Ridge	n/a
1415	Yes	Ret. Lat./Notch Right	No	n/a	No	Flat	n/a
1573	Yes	Ret. Lat.	No	n/a	No	Single Ridge	n/a
1623	Yes	Ret. Lat.	No	n/a	No	Flat	n/a
1673	Yes	Ret. Lat.	No	n/a	No	Flat	n/a
1722	Yes	Ret. Left Lat./ Notches	No	n/a	No	Single Ridge	n/a
1739	Yes	Ret. Lat./Notch Right	No	n/a	No	Flat	n/a
1751	Yes	Ret. Lat.	No	n/a	No	Flat	n/a
1828	Yes	Ret. Lat.	No	n/a	Yes	Multi-directional	n/a
1998	Yes	Ret. Lat./Notch Right	No	n/a	No	Flat	n/a
2208	Yes	Ret. Lat.	No	n/a	No	Single Ridge	n/a
2408	Yes	Ret.-Notch Right/Gro. Left	No	n/a	No	Single Ridge	n/a
2495	Yes	Notches	No	n/a	No	Single Ridge	n/a
2517	Yes	Ret. Left Lat./Notch Left	No	n/a	No	Multi-ridge	2
2554	Yes	Ret. Right/Gro. Left Lat.	No	n/a	No	Single Ridge	n/a
2803	Yes	Ground Lat.	No	n/a	No	Flat	n/a
2927	Yes	Ret. Left Lat.	No	n/a	No	Single Ridge	n/a
2946	Yes	Ret.-Notch Lat./Gro. Ridge	No	n/a	No	Single Ridge	n/a
2974	Yes	Ret. Lat./Notch Left	No	n/a	Yes	Multi-directional	n/a
3001	Yes	Gro. Lat.	No	n/a	Yes	Multi-directional	n/a
3090	Yes	Ret. Left/Gro. Right Lat.	No	n/a	No	Multi-ridge	2

Table A4: Continued

Hafting			Ventral Finishing		Dorsal Finishing		Ridge
Artifact Number	Presence of Hafting (Y or N)	Evidence of Hafting	Ventral Finishing Present (Y or N)	Area of Finishing (%)	Dorsal Finishing Present (Y or N)	Type of Finishing	Multi-Ridge Number
3121	Yes	Ret. Lat./Notch Right	No	n/a	Yes	Multi-directional	n/a
3129	Yes	Ret. Lat.	No	n/a	No	Single Ridge	n/a
3271	Yes	Ret. Left Lat./Notches	No	n/a	No	Single Ridge	n/a
3380	Yes	Ret. Lat.	No	n/a	No	Flat	n/a
3461	Yes	Ret. Lat.	No	n/a	No	Flat	n/a
3692	Yes	Ret. Lat./Notches	No	n/a	No	Single Ridge	n/a
3717	Yes	Ret. Lat./Notches	No	n/a	Yes	Multi-directional	n/a
3720	Yes	Ground Lat.	No	n/a	No	Multi-ridge	2
3771	Yes	Ret. Right Lat.	No	n/a	Yes	Multi-directional	n/a
3794	Yes	Ret. Lat./Notches	No	n/a	No	Single Ridge	n/a
3861	Yes	Ret. Right./Gro. Left Lat.	No	n/a	No	Multi-ridge	2
3904	Yes	Ret. Lat./Notches	No	n/a	No	Flat	n/a
3979	Yes	Ret. Right Lat.	No	n/a	No	Flat	n/a
3982	Yes	Ret. Left Lat./Gro. Right Lat.	No	n/a	No	Single Ridge	n/a
4031	Yes	Ret. Right Lat.	No	n/a	Yes	Multi-directional	n/a
4036	Yes	Ret. Lat./Notch Right	Yes	50	Yes	Multi-directional	n/a
4081	Yes	Ret. Right Lat.	No	n/a	No	Single Ridge	n/a
4097	Yes	Ret. Right Lat.	No	n/a	No	Single Ridge	n/a
4098	Yes	Ret. Lat.	No	n/a	No	Single Ridge	n/a

Table A5: Debert Site Attribute Data: Ventral Retouch

Ventral Retouch						
Artifact Number	Ventral Retouch Present (Y or N)	Location	Extent at Distal End	Extent at Proximal End	Extent at Right Lateral	Extent at Left Lateral
1	No	n/a	n/a	n/a	n/a	n/a
10	No	n/a	n/a	n/a	n/a	n/a
27	No	n/a	n/a	n/a	n/a	n/a
33	No	n/a	n/a	n/a	n/a	n/a
82	No	n/a	n/a	n/a	n/a	n/a
91	No	n/a	n/a	n/a	n/a	n/a
170	Yes	Right Lateral	n/a	n/a	Long	n/a
239	No	n/a	n/a	n/a	n/a	n/a
241	Yes	Left Lateral	n/a	n/a	n/a	Short/Long
252	No	n/a	n/a	n/a	n/a	n/a
267	No	n/a	n/a	n/a	n/a	n/a
268	No	n/a	n/a	n/a	n/a	n/a
308	No	n/a	n/a	n/a	n/a	n/a
318	No	n/a	n/a	n/a	n/a	n/a
334	No	n/a	n/a	n/a	n/a	n/a
355	Yes	Right Lateral	n/a	n/a	Short	n/a
357	No	n/a	n/a	n/a	n/a	n/a
392	Yes	Right/Left Lat.	n/a	n/a	Short	Short
402	No	n/a	n/a	n/a	n/a	n/a
545	No	n/a	n/a	n/a	n/a	n/a
629	No	n/a	n/a	n/a	n/a	n/a
648	No	n/a	n/a	n/a	n/a	n/a
733	No	n/a	n/a	n/a	n/a	n/a
734	No	n/a	n/a	n/a	n/a	n/a
741	Yes	Right/Left Lat.	n/a	n/a	Short	Short
746	No	n/a	n/a	n/a	n/a	n/a
863	No	n/a	n/a	n/a	n/a	n/a
1065	No	n/a	n/a	n/a	n/a	n/a

Table A5: Continued

Ventral Retouch						
Artifact Number	Ventral Retouch Present (Y or N)	Location	Extent at Distal End	Extent at Proximal End	Extent at Right Lateral	Extent at Left Lateral
1221	No	n/a	n/a	n/a	n/a	n/a
1260	No	n/a	n/a	n/a	n/a	n/a
1307	No	n/a	n/a	n/a	n/a	n/a
1348	No	n/a	n/a	n/a	n/a	n/a
1375	No	n/a	n/a	n/a	n/a	n/a
1406	No	n/a	n/a	n/a	n/a	n/a
1411	Yes	Distal/Right	Short	n/a	Short	n/a
1415	No	n/a	n/a	n/a	n/a	n/a
1573	No	n/a	n/a	n/a	n/a	n/a
1623	No	n/a	n/a	n/a	n/a	n/a
1673	No	n/a	n/a	n/a	n/a	n/a
1722	No	n/a	n/a	n/a	n/a	n/a
1739	No	n/a	n/a	n/a	n/a	n/a
1751	No	n/a	n/a	n/a	n/a	n/a
1828	No	n/a	n/a	n/a	n/a	n/a
1998	No	n/a	n/a	n/a	n/a	n/a
2208	No	n/a	n/a	n/a	n/a	n/a
2408	No	n/a	n/a	n/a	n/a	n/a
2495	Yes	Distal End	Short	n/a	n/a	n/a
2517	Yes	Left Lateral	n/a	n/a	n/a	Short
2554	No	n/a	n/a	n/a	n/a	n/a
2803	No	n/a	n/a	n/a	n/a	n/a
2927	No	n/a	n/a	n/a	n/a	n/a
2946	No	n/a	n/a	n/a	n/a	n/a
2974	No	n/a	n/a	n/a	n/a	n/a
3001	No	n/a	n/a	n/a	n/a	n/a
3090	No	n/a	n/a	n/a	n/a	n/a

Table A5: Continued

Ventral Retouch						
Artifact Number	Ventral Retouch Present (Y or N)	Location	Extent at Distal End	Extent at Proximal End	Extent at Right Lateral	Extent at Left Lateral
3121	No	n/a	n/a	n/a	n/a	n/a
3129	No	n/a	n/a	n/a	n/a	n/a
3271	No	n/a	n/a	n/a	n/a	n/a
3380	No	n/a	n/a	n/a	n/a	n/a
3461	No	n/a	n/a	n/a	n/a	n/a
3692	Yes	Left Lateral	n/a	n/a	n/a	Long
3717	No	n/a	n/a	n/a	n/a	n/a
3720	No	n/a	n/a	n/a	n/a	n/a
3771	No	n/a	n/a	n/a	n/a	n/a
3794	No	n/a	n/a	n/a	n/a	n/a
3861	Yes	Left Lateral	n/a	n/a	n/a	Short
3904	No	n/a	n/a	n/a	n/a	n/a
3979	No	n/a	n/a	n/a	n/a	n/a
3982	No	n/a	n/a	n/a	n/a	n/a
4031	No	n/a	n/a	n/a	n/a	n/a
4036	No	n/a	n/a	n/a	n/a	n/a
4081	No	n/a	n/a	n/a	n/a	n/a
4097	No	n/a	n/a	n/a	n/a	n/a
4098	No	n/a	n/a	n/a	n/a	n/a

Table A6: Debert Site Attribute Data: Dorsal Retouch

Dorsal Retouch						
Artifact Number	Dorsal Retouch Present (Y or N)	Location	Extent at Distal End	Extent at Proximal End	Extent at Right Lateral	Extent at Left Lateral
1	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short
10	Yes	Distal/Right/Left	Short/Long	n/a	Short/Invasive	Short/Invasive
27	Yes	Distal End	Short	n/a	n/a	n/a
33	Yes	Distal/Left	Short/Long	n/a	n/a	Short/Long
82	Yes	all sides	Short/Long	short/long	Short/Long	Short/Long
91	Yes	Distal/Right/Left	Short	n/a	Short	Short
170	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short
239	Yes	Distal/Right/Left	Short/Long	n/a	Short/Long	Short
241	Yes	Distal/Right/Left	Short/Long	n/a	Long	Short
252	Yes	Distal/Right/Left	Short/Long	n/a	Short/Long	Short
267	Yes	Distal/Right/Left	Short/Long	n/a	Short/Long	Short/Long
268	Yes	Distal/Left	Short/Long	n/a	n/a	Short
308	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short
318	Yes	Distal/Right	Short/Long	n/a	Short	n/a
334	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short/Long
355	Yes	Distal/Left	Short/Long	n/a	n/a	Short
357	Yes	Distal/Left	Short/Long	n/a	n/a	Short/Long
392	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short
402	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short
545	Yes	Distal/Right/Left	Short/Invasive	n/a	Short	Short
629	Yes	Distal/Right/Left	Short/Long	n/a	Short/Long	Short
648	Yes	Distal/Left	Short/Long	n/a	n/a	Short
733	Yes	Distal/Left	Short/Long	n/a	n/a	Short
734	Yes	Distal/Right	Short/Long	n/a	Long	n/a
741	Yes	all sides	Short/Long	Short	Short	Short
746	Yes	all sides	Short/Long	Short	Short/Long	Long
863	Yes	Distal End	Short/Long	n/a	n/a	n/a
1065	Yes	Distal/Right/Left	Short/Long	n/a	Short/Long	Short/Long

Table A6: Continued

Dorsal Retouch						
Artifact Number	Dorsal Retouch Present (Y or N)	Location	Extent at Distal End	Extent at Proximal End	Extent at Right Lateral	Extent at Left Lateral
1221	Yes	Distal/Right/Left	Short/Long	n/a	Short/Long	Short/Invasive
1260	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short
1307	Yes	Distal End	Short/Long	n/a	n/a	n/a
1348	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short
1375	Yes	Distal/Right	Short/Long	n/a	Long	n/a
1406	Yes	Distal/Right/Left	Short/Long	n/a	Short/Long	Short/Long
1411	Yes	Distal/Right	Short/Long	n/a	Short	n/a
1415	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short
1573	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short/Long
1623	Yes	Distal/Right	Short/Long	n/a	Long	n/a
1673	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short
1722	Yes	Distal End	Short/Long	n/a	n/a	n/a
1739	Yes	Distal/Right/Left	Short/Long	n/a	Short/Long	Short/Long
1751	Yes	Distal/Right/Left	Short/Long	n/a	Long	Short/Long
1828	Yes	Distal/Right/Left	Short/Invasive	n/a	Short/Long	Short/Long
1998	Yes	Distal/Right/Left	Short/Long	n/a	Long	Short/Long
2208	Yes	Distal/Right/Left	Short/Long	n/a	Short/Long	Short
2408	Yes	Distal/Left	Short/Long	n/a	n/a	Short
2495	Yes	Distal/Right/Left	Short/Long	n/a	Long	Short
2517	Yes	Distal End	Short/Long	n/a	n/a	n/a
2554	Yes	Distal/Right	Short/Long	n/a	Short	n/a
2803	Yes	Distal/Right/Left	Short/Long	n/a	Short/Long	Short/Long
2927	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short
2946	Yes	Distal/Right/Left	Short/Long	n/a	Long	Short
2974	Yes	Distal/Right/Left	Short/Long	n/a	Short/Long	Short/Long
3001	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short
3090	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short/Long

Table A6: Continued

			Dorsal Retouch			
Artifact Number	Dorsal Retouch Present (Y or N)	Location	Extent at Distal End	Extent at Proximal End	Extent at Right Lateral	Extent at Left Lateral
3121	Yes	Distal/Left	Short/Long	n/a	n/a	Short
3129	Yes	Distal/Right/Left	Short/Long	n/a	Short/Long	Short/Long
3271	Yes	Distal/Right/Left	Short/Long	n/a	Long	Short
3380	Yes	Distal/Right/Left	Short/Long	n/a	Short/Long	Short/Long
3461	Yes	Distal/Right/Left	Short/Long	n/a	Short/Long	Short/Long
3692	Yes	Distal/Right	Short/Long	n/a	Short/Long	n/a
3717	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short
3720	Yes	Distal/Left	Short/Long	n/a	n/a	Short
3771	Yes	Distal/Left	Short/Invasive	n/a	n/a	Short/Invasive
3794	Yes	Distal/Right/Left	Short/Long	n/a	Short/Long	Short
3861	Yes	Distal/Right	Short/Long	n/a	Short	n/a
3904	Yes	all sides	Short/Long	Short	Short/Long	Short/Long
3979	Yes	Distal/Right	Short/Long	n/a	Short	n/a
3982	Yes	Distal/Left	Short/Long	n/a	n/a	Short
4031	Yes	Distal/Right	Short/Invasive	n/a	Short/Invasive	n/a
4036	Yes	Distal/Right/Left	Short/Long	n/a	Short/Long	Short/Long
4081	Yes	Distal/Right	Short/Long	n/a	Short/Long	n/a
4097	Yes	Distal/Right	Short/Long	n/a	Short	n/a
4098	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short

Table A7: Debert Site Attribute Data: Bit End, Shape, Cross Section, Edge Angle and Weight

Bit End				Shape		Cross Section		Edge Angle		Weight
Artifact Number	Location of Bit End	Bit Edge Angle	Bit Edge Height	Planar Shape	Working Edge Shape	Longitudinal X-Section	Lateral X-Section	Edge Angle Right Lateral	Edge Angle Left Lateral	Weight (grams)
1	Distal End	70	5.1	Indeterminant	Convex	Planar/Convex	Concave/Convex	30	50	ind
10	Distal End	70	10.2	Indeterminant	Convex	Planar/Convex	Indeterminant	60	60	ind
27	Distal End	70	3.5	Triangloid	Convex	Convex/Convex	Concave/Convex	30	40	ind
33	Distal End	70	7.1	Square	Convex	Concave/Convex	Concave/Convex	ind	70	2.6
82	Distal End	80	6	Round	Convex	Concave/Convex	Convex/Convex	70	70	ind
91	Distal End	90L/50R	6.1	Square	Convex	Convex/Convex	Concave/Convex	70	70	8.7
170	Distal End	60L/80R	6.5	Triangloid	Convex	Convex/Convex	Concave/Convex	60	50	7.9
239	Distal End	80L/60R	5.7	Round	Convex	Planar/Convex	Planar/Convex	50	60	3.3
241	Distal End	70	11.1	Triangloid	Convex	Planar/Convex	Convex/Convex	60	70	6.7
252	Distal End	70	8	Triangloid	Convex	Planar/Convex	Planar/Convex	60	50	ind
267	Distal End	90L/70R	5.8	Square	Convex	Convex/Convex	Concave/Convex	60	60	5.7
268	Distal End	80	6	Indeterminant	Convex	Planar/Convex	Concave/Convex	ind	60	ind
308	Distal End	80	6.2	Indeterminant	Convex	Planar/Convex	Convex/Convex	70	70	ind
318	Distal End	50	9.2	Indeterminant	Convex	Planar/Convex	Concave/Convex	70	ind	ind
334	Distal End	70	7.9	Round	Convex	Convex/Convex	Convex/Convex	60	50	3.8
355	Distal End	70	4	Indeterminant	ind	Convex/Convex	Concave/Convex	40	40	ind
357	Distal End	60L/50R	6.6	Indeterminant	Convex	Planar/Convex	Planar/Convex	ind	70	ind
392	Distal End	70	9.9	Triangloid	Convex	Planar/Convex	Concave/Convex	70	60	ind
402	Distal End	50	7.8	Indeterminant	Convex	Convex/Convex	Concave/Convex	30	70	ind
545	Distal End	70lat./90c	12.5	Triangloid	Convex	Concave/Convex	Planar/Convex	70	90	4.9
629	Distal End	50L/70R	"6.5	Round	Convex	Planar/Convex	Planar/Convex	70	80	3.1
648	Distal End	70	7.5	Rectangular	Convex	Convex/Convex	Concave/Convex	70	50	ind
733	Distal End	80	7.4	Indeterminant	Convex	Planar/Convex	Concave/Convex	ind	70	ind
734	Distal End	70	4.7	Triangloid	Convex	Planar/Convex	Planar/Convex	50	80	ind
741	Distal End	90	6.3	Rectangular	Convex	Planar/Convex	Planar/Convex	50	50	4.4
746	Distal End	60	7	Triangloid	Convex	Convex/Convex	Planar/Convex	70	60	4.6
863	Distal End	60	6.2	Triangloid	Convex	Convex/Convex	Planar/Convex	50	50	2
1065	Distal End	50	6.7	Triangloid	Convex	Planar/Convex	Concave/Convex	60	80	2.9
1221	Distal End	ind	ind	Indeterminant	Convex	Convex/Convex	Convex/Convex	70	50	ind

Table A7: Continued

Bit End				Shape		Cross Section		Edge Angle		Weight
Artifact Number	Location of Bit End	Bit Edge Angle	Bit Edge Height	Planar Shape	Working Edge Shape	Longitudinal X-Section	Lateral X-Section	Edge Angle Right Lateral	Edge Angle Left Lateral	Weight (grams)
1260	Distal End	50	5.3	Indeterminant	Convex	Planar/Convex	Concave/Convex	60	60	ind
1307	Distal End	70	8.3	Rectangular	Convex	Convex/Convex	Concave/Convex	50	30	ind
1348	Distal End	70L/80R	4.8	Indeterminant	Convex	Convex/Convex	Indeterminant	60	30	ind
1375	Distal End	60	7.7	Triangloid	Convex	Convex/Convex	Planar/Convex	60	60	2.5
1406	Distal End	60	6.6	Triangloid	Convex	Planar/Convex	Planar/Convex	60	50	2.6
1411	Distal End	30	30	Indeterminant	Convex	Planar/Convex	Concave/Convex	30	30	ind
1415	Distal End	50L/70R	4.7	Triangloid	Convex	Convex/Convex	Concave/Convex	50	50	2
1573	Distal End	80	5.8	Round	Convex	Convex/Convex	Concave/Convex	40	40	7
1623	Distal End	90L/40R	6.3	Square	Convex	Convex/Convex	Concave/Convex	60	70	5.9
1673	Distal End	70	3.4	Triangloid	Convex	Planar/Convex	Indeterminant	60	50	ind
1722	Distal End	50	5.3	Triangloid	Convex	Convex/Convex	Concave/Convex	40	40	1.9
1739	Distal End	60	5.9	Square	Convex	Convex/Convex	Concave/Convex	60	40	3.2
1751	Distal End	50	5.3	Triangloid	Convex	Convex/Convex	Planar/Convex	60	50	1.9
1828	Distal End	60	7.6	Oval	Convex	Planar/Convex	Planar/Convex	60	60	4.7
1998	Distal End	50	6.5	Triangloid	Convex	Planar/Convex	Concave/Convex	50	50	ind
2208	Distal End	60	5.9	Triangloid	Convex	Planar/Convex	Concave/Convex	30	30	2
2408	Distal End	80	5.8	Rectangular	Convex	Convex/Convex	Concave/Convex	30	60	ind
2495	Distal End	90	8.2	Square	Convex	Convex/Convex	Concave/Convex	50	60	ind
2517	Distal End	90	7.1	Rectangular	Convex	Planar/Convex	Planar/Convex	70	40	7.4
2554	Distal End	60	6.6	Indeterminant	Convex	Planar/Convex	Concave/Convex	70	30	ind
2803	Distal End	60	4.8	Triangloid	Convex	Indeterminant	Indeterminant	70	70	ind
2927	Distal End	70	8.5	Triangloid	Convex	Convex/Convex	Concave/Convex	60	70	4.2
2946	Distal End	80	5.1	Triangloid	Convex	Planar/Convex	Concave/Convex	60	50	3.1
2974	Distal End	70	8.7	Triangloid	Convex	Planar/Convex	Convex/Convex	80	80	7.2
3001	Distal End	70	11.8	Indeterminant	Convex	Planar/Convex	Planar/Convex	80	60	ind
3090	Distal End	60L/90R	7.4	Triangloid	Convex	Convex/Convex	Planar/Convex	50	80	4.7
3121	Distal End	80	6.8	Triangloid	Convex	Convex/Convex	Concave/Convex	80	60	2.9
3129	Distal End	60	3.7	Indeterminant	Convex	Planar/Convex	Concave/Convex	60	60	ind
3271	Distal End	50L/70R	8.4	Square	Convex	Planar/Convex	Concave/Convex	ind	50	ind

Table A7: Continued

Bit End				Shape		Cross Section		Edge Angle		Weight
Artifact Number	Location of Bit End	Bit Edge Angle	Bit Edge Height	Planar Shape	Working Edge Shape	Longitudinal X-Section	Lateral X-Section	Edge Angle Right Lateral	Edge Angle Left Lateral	Weight (grams)
3380	Distal End	50	5.4	Triangloid	Convex	Convex/Convex	Concave/Convex	60	60	3.9
3461	Distal End	70	5.8	Triangloid	Convex	Convex/Convex	Planar/Convex	70	60	2
3692	Distal End	60	11	Triangloid	Convex	Planar/Convex	Planar/Convex	50	50	3.2
3717	Distal End	60	9	Round	Convex	Planar/Convex	Planar/Convex	60	60	5.2
3720	Distal End	80	3.7	Triangloid	Convex	Convex/Convex	Concave/Convex	40	30	ind
3771	Distal End	70	8.4	Indeterminant	Convex	Planar/Convex	Planar/Convex	ind	40	ind
3794	Distal End	70	12.2	Triangloid	Convex	Planar/Convex	Concave/Convex	70	70	4.3
3861	Distal End	70	9.6	Triangloid	Convex	Convex/Convex	Convex/Convex	60	40	3.9
3904	Distal End	70	5.4	Triangloid	Convex	Planar/Convex	Concave/Convex	60	70	2.9
3979	Distal End	80	4.5	Triangloid	Convex	Convex/Convex	Planar/Convex	60	30	ind
3982	Distal End	70	12.2	Triangloid	Convex	Convex/Convex	Planar/Convex	60	50	3.9
4031	Distal End	60	13.4	Triangloid	Convex	Convex/Convex	Concave/Convex	70	70	5.4
4036	Distal End	80L/60R	9.7	Triangloid	Convex	Planar/Convex	Planar/Convex	60	80	4.4
4081	Distal End	90L/80R	5.4	Indeterminant	Convex	Planar/Convex	Planar/Convex	80	ind	ind
4097	Distal End	80	6.5	Triangloid	Convex	Planar/Convex	Planar/Convex	70	80	ind
4098	Distal End	70	4.5	Triangloid	Convex	Planar/Convex	Concave/Convex	70	70	2.2

Table A8: Debert Site Attribute Data: Condition and Metrics

Condition			Metrics							
Artifact Number	Complete (Yes or No)	Breakage Pattern	Maximum Length	Maximum Width	Maximum Thickness	Span Width	Right Lateral	Left Lateral	Proximal End	Distal End
1	No	Lat./Distal Missing	ind	23.3	7.1	ind	ind	ind	ind	ind
10	No	Proximal/Lat. Missing	ind	26.8	8.6	25.4	ind	ind	ind	26.5
27	No	Lat./Distal Missing	24.3	22.8	4.5	22.2	n/a	n/a	n/a	21.1
33	Yes	n/a	21.3	19.9	5.4	22.5	n/a	15.4	n/a	19.6
82	No	portion left lat. Missing	24.3	22.4	7.4	24	19.9	ind	7.8	21.5
91	Yes	n/a	28.5	32.5	7.7	33.5	17.7	22	n/a	22.6
170	Yes	n/a	29.4	34.4	8	39.7	16.6	21.9	n/a	34.1
239	Yes	n/a	21	22.6	6.5	25.6	16.1	8.7	n/a	20.2
241	Yes	n/a	29	22.6	12.1	23.8	7.7	17.5	n/a	21.3
252	No	Lat./Distal Missing	30	ind	7.3	ind	ind	n/a	n/a	ind
267	Yes	n/a	23	27.4	7.6	32.9	11.9	16.1	n/a	26.9
268	No	Proximal/Lat. Missing	31.8	ind	6	33.9	ind	ind	ind	30.7
308	No	Proximal/Lat. Missing	ind	25.6	6	21.2	ind	ind	ind	19.7
318	No	Lat./Distal Missing	28.1	ind	7.5	ind	18.1	ind	n/a	ind
334	Yes	n/a	22.7	23.7	6.5	27.9	2.2	13.8	n/a	23
355	No	Lat./Distal Missing	28.1	ind	5.8	ind	ind	ind	n/a	ind
357	No	prox./lat./dist. Missing	ind	ind	5.7	ind	ind	ind	ind	ind
392	No	Proximal/Lat. Missing	ind	17.1	10.4	21.4	ind	ind	ind	17
402	No	Lat./Distal Missing	26	ind	7	ind	ind	9.8	n/a	ind
545	Yes	n/a	22	23.9	10.2	26.1	19.8	16.6	n/a	23.4
629	Yes	n/a	21.4	22	5.5	24.5	13	12.3	n/a	21.8
648	No	prox./lat./dist. Missing	ind	ind	6.3	ind	ind	7.5	ind	ind
733	No	Proximal/Lat. Missing	ind	ind	8.5	27	ind	ind	ind	23.1
734	No	prox./lat./dist. Missing	ind	ind	6.3	ind	ind	ind	ind	ind
741	Yes	n/a	32.2	21.2	6.3	21.7	25.4	24.4	9.9	20.4
746	Yes	n/a	25.5	28	6.4	32.2	21	7.6	13	28
863	Yes	n/a	20	18.5	7	19.8	n/a	n/a	n/a	18.5
1065	Yes	n/a	22.5	20.9	6.3	22	16	13.9	n/a	20.7

Table A8: Continued

Condition			Metrics							
Artifact Number	Complete (Yes or No)	Breakage Pattern	Maximum Length	Maximum Width	Maximum Thickness	Span Width	Right Lateral	Left Lateral	Proximal End	Distal End
1221	No	Lat./Distal Missing	ind	ind	7.4	ind	ind	17.6	n/a	ind
1260	No	prox./lat./dist. Missing	ind	ind	3.4	ind	ind	ind	ind	ind
1307	No	Proximal/Lat. Missing	ind	17.2	5.1	20.6	ind	ind	ind	16.4
1348	No	Proximal/Lat. Missing	ind	25.2	5.5	28.7	ind	ind	ind	24.5
1375	Yes	n/a	18.3	22.2	6	22.5	15.5	n/a	n/a	22
1406	Yes	n/a	20.6	20.8	5.9	24	11.9	14.7	n/a	20.5
1411	No	Proximal/Lat. Missing	ind	17.3	5.8	18.3	ind	ind	ind	16.3
1415	Yes	n/a	19.7	22.4	4	24	12.9	12.3	n/a	22
1573	Yes	n/a	32.8	31.3	5.6	40	25.1	14.7	n/a	31.8
1623	Yes	n/a	26.5	27	8.7	29.9	14.4	n/a	n/a	26.8
1673	No	Proximal/Lat. Missing	ind	22.6	3.7	22.5	ind	ind	ind	22.6
1722	Yes	n/a	19.3	21.7	3.5	n/a	n/a	n/a	n/a	21.4
1739	Yes	n/a	22.8	22.3	5	23.8	16.8	14.7	n/a	11.8
1751	Yes	n/a	19.5	23.3	4.1	24.7	9.7	14.4	n/a	23
1828	Yes	n/a	29.7	22.6	6.1	26	16.2	20.1	27.2	22.4
1998	No	Proximal/Lat. Missing	ind	25.7	4.9	28.8	ind	ind	ind	25.7
2208	Yes	n/a	22.6	20.4	5.4	22.7	21.5	13.2	n/a	20
2408	No	Lat./Distal Missing	25.6	ind	4.7	ind	ind	18.8	n/a	ind
2495	No	Proximal/Lat. Missing	ind	26	10.1	27.3	ind	ind	ind	25.8
2517	Yes	n/a	32.7	27.4	7.3	30.2	n/a	n/a	n/a	27.1
2554	No	prox./lat./dist. Missing	ind	ind	5.6	ind	ind	ind	ind	ind
2803	No	Proximal/Lat. Missing	ind	22.3	5	22.5	ind	ind	ind	22.1
2927	Yes	n/a	20.5	25.6	7.4	25.4	6.5	7.4	n/a	25.4
2946	Yes	n/a	28.8	25.1	8	27.8	16.9	10.5	n/a	15.7
2974	Yes	n/a	32.2	24.8	9	27.8	27	22.1	n/a	24.5
3001	No	Proximal/Lat. Missing	ind	31.4	9.5	35.2	ind	ind	ind	31.2
3090	Yes	n/a	22.7	26.6	8.1	28.2	5.8	17.4	n/a	26.2

Table A8: Continued

Condition			Metrics							
Artifact Number	Complete (Yes or No)	Breakage Pattern	Maximum Length	Maximum Width	Maximum Thickness	Span Width	Right Lateral	Left Lateral	Proximal End	Distal End
3121	Yes	n/a	19.5	23.6	7	24.5	n/a	11.7	n/a	23
3129	No	Proximal/Lat. Missing	ind	22.5	4.8	25	ind	ind	ind	22.3
3271	No	Right Lat. Missing	21.9	24.4	7.5	25.9	ind	5.2	n/a	24
3380	Yes	n/a	25.2	31.3	4.4	32.8	8.8	16.2	n/a	31.1
3461	Yes	n/a	16.9	22	5.2	22.6	16.6	16.1	n/a	21.8
3692	Yes	n/a	26.2	21.1	7.7	26.3	22.3	n/a	n/a	20.9
3717	Yes	n/a	24	24	8.2	33.8	10.1	17.9	n/a	23.9
3720	No	Lat./Distal Missing	25.3	ind	4.3	ind	n/a	15	n/a	ind
3771	No	Lat./Distal Missing	20.5	ind	7	ind	ind	19.7	n/a	ind
3794	Yes	n/a	24.9	21	9.2	21.6	19.1	4	n/a	2.9
3861	Yes	n/a	21.3	26.5	7.6	28.6	13.9	n/a	n/a	25.3
3904	Yes	n/a	22.7	21.6	5.2	28.2	16.8	18.6	8.5	21.1
3979	No	Lat./Distal Missing	26.2	ind	4.8	ind	19.2	n/a	n/a	ind
3982	Yes	n/a	30	21.6	7.8	23.4	n/a	17.3	n/a	21.2
4031	Yes	n/a	22.7	28	8.8	30.1	21	n/a	n/a	27.5
4036	Yes	n/a	24.4	22.3	7.7	24.2	18.9	19.9	n/a	21.9
4081	No	Proximal/Lat. Missing	ind	ind	8.6	ind	ind	ind	ind	ind
4097	No	Lat./Distal Missing	30.6	ind	6.2	ind	ind	ind	n/a	ind
4098	Yes	n/a	24.1	19.1	5	25.9	14	16.8	n/a	18.9

Table A9: Belmont Site Attribute Data: Provenience Information and Lithic Material

Provenience Information			Information on Lithic Material		
Artifact Number	Unit	Layer	Raw Material Lithology	Raw Material Name	JCAP Type Number
1	n/a	surface	Chert	Minas Basin	n/a
25	n/a	n/a	Chert	Chalcedony	n/a
41	n/a	surface	Chert	Chalcedony	n/a
75	n/a	n/a	Chert	Brecciated	n/a
155	n/a	n/a	Chert	Brecciated	n/a
265	n/a	n/a	Chert	Chalcedony	n/a
363	n/a	n/a	Chert	Chalcedony	n/a
M13	1a	surface	Chert	Chalcedony	n/a

Table A10: Belmont Site Attribute Data: Striking Platform

Striking Platform							
Artifact Number	Striking Platform Present (Y or N)	Platform Description	Platform Grinding	Lip on Platform	Platform Angle	Platform Length(mm)	Platform Width
1	No	n/a	n/a	n/a	n/a	n/a	n/a
25	No	n/a	n/a	n/a	n/a	n/a	n/a
41	Yes	Sim/Abra	2	Yes	55	8.3	2.7
75	Yes	Complex	0	Yes	70	6.1	2.6
155	No	n/a	n/a	n/a	n/a	n/a	n/a
265	Yes	Com/Abra	2	Yes	35	9.9	3.3
363	Yes	Complex	0	Yes	70	4.2	2.3
M13	No	n/a	n/a	n/a	n/a	n/a	n/a

Table A11:Belmont Site Attribute Data: Spurs and Cortex

Spurs					Cortex Present		
Artifact Number	Spurs Present (Yes or No)	Number of Spurs	Position of Spurs	Flaking on Spur	Cortex Present (Yes or No)	Area of Cortex (%)	Location of Cortex
1	Yes	1	Bit/Left	Along Sides	No	n/a	n/a
25	Yes	1	Bit/Left	Along Sides	No	n/a	n/a
41	Yes	2	Bit/Left/Right	Sides/Longitudinal	No	n/a	n/a
75	Yes	1	Bit/Right	Sides/Longitudinal	No	n/a	n/a
155	Yes	1	Bit/Left	Sides/Longitudinal	No	n/a	n/a
265	Yes	1	Bit/Right	Sides/Longitudinal	No	n/a	n/a
363	Yes	1	Bit/Right	Sides/Longitudinal	No	n/a	n/a
M13	Yes	1	Bit/Right	Along Sides	Yes	25	Prox./Left Lat

Table A12: Belmont Site Attribute Data: Hafting, Ventral and Dorsal Finishing, and Dorsal Ridge

Hafting			Ventral Finishing		Dorsal Finishing		Ridge
Artifact Number	Presence of Hafting (Y or N)	Evidence of Hafting	Ventral Finishing Present (Y or N)	Area of Finishing (%)	Dorsal Finishing Present (Y or N)	Type of Finishing	Multi-Ridge Number
1	Yes	Ret. Right Lat.	No	n/a	No	Single Ridge	n/a
25	Yes	Ret. Lat.	No	n/a	No	Flat	n/a
41	Yes	Ret.-Notch right/Gro. Left	No	n/a	No	Multi-ridge	2
75	Yes	Ret. Lat.	No	n/a	No	Single Ridge	n/a
155	Yes	Ret. Left Lat.	No	n/a	No	Flat	n/a
265	Yes	Ret. Right Lat.	No	n/a	Yes	Multi-directional	n/a
363	Yes	Ret. Lat./Notches	No	n/a	No	Single Ridge	n/a
M13	Yes	Ground Lat.	No	n/a	No	Flat	n/a

Table A13: Belmont Site Attribute Data: Ventral Retouch

Ventral Retouch						
Artifact Number	Ventral Retouch Present (Y or N)	Location	Extent at Distal End	Extent at Proximal End	Extent at Right Lateral	Extent at Left Lateral
1	No	n/a	n/a	n/a	n/a	n/a
25	No	n/a	n/a	n/a	n/a	n/a
41	No	n/a	n/a	n/a	n/a	n/a
75	No	n/a	n/a	n/a	n/a	n/a
155	No	n/a	n/a	n/a	n/a	n/a
265	No	n/a	n/a	n/a	n/a	n/a
363	No	n/a	n/a	n/a	n/a	n/a
M13	No	n/a	n/a	n/a	n/a	n/a

Table A14: Belmont Site Attribute Data: Dorsal Retouch

Dorsal Retouch						
Artifact Number	Dorsal Retouch Present (Y or N)	Location	Extent at Distal End	Extent at Proximal End	Extent at Right Lateral	Extent at Left Lateral
1	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short
25	Yes	Distal/Right/Left	Short/Invasive	n/a	Short/Long	Short/Long
41	Yes	Distal/Right/Left	Short/Long	n/a	Short/Long	Short
75	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short
155	Yes	Distal/Left	Short/Long	n/a	n/a	Short
265	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short
363	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short
M13	Yes	Distal/Right	Short/Long	n/a	Short/Long	n/a

Table A15: Belmont Site Attribute Data: Bit End, Shape, Cross Section, Edge Angle and Weight

Bit End				Shape		Cross Section		Edge Angle		Weight
Artifact Number	Location of Bit End	Bit Edge Angle	Bit Edge Height	Planar Shape	Working Edge Shape	Longitudianl X-Section	Lateral X-Section	Edge Angle Right Lateral	Edge Angle Left Lateral	Weight (grams)
1	Distal End	70	5.7	Triangloid	Convex	Convex/Convex	Indeterminant	50	80	ind
25	Distal End	50	9.5	Triangloid	Convex	Concave/Convex	Planar/Convex	80	70	3.2
41	Distal End	60	7.4	Triangloid	Convex	Convex/Convex	Concave/Convex	70	60	2.2
75	Distal End	80	6.2	Triangloid	Convex	Planar/Convex	Convex/Convex	80	70	3.8
155	Distal End	70	6.3	Indeterminant	Convex	Planar/Convex	Concave/Convex	70	60	ind
265	Distal End	70lat./90c	6.6	Triangloid	Convex	Planar/Convex	Planar/Convex	70	80	4.9
363	Distal End	70	7	Triangloid	Convex	Planar/Convex	Planar/Convex	70	80	2.6
M13	Distal End	70	5.6	Triangloid	Convex	Planar/Convex	Planar/Convex	70	60	3.9

Table A16: Belmont Site Attribute Data: Condition and Metrics

Condition			Metrics							
Artifact Number	Complete (Yes or No)	Breakage Pattern	Maximum Length	Maximum Width	Maximum Thickness	Span Width	Right Lateral	Left Lateral	Proximal End	Distal End
1	No	Proximal/Lat. Missing	ind	22.5	6.1	22.4	ind	ind	ind	22.1
25	Yes	n/a	24.3	18.6	6.8	19.6	19	21.4	n/a	18.2
41	Yes	n/a	21.2	18.7	4.9	19.2	17.9	11.4	n/a	18.5
75	Yes	n/a	29	19.7	8	23	26.5	19.8	n/a	29.3
155	No	Proximal/Lat. Missing	ind	23.5	5.9	28.5	ind	15.5	ind	22.7
265	Yes	n/a	24.8	24.3	8	25.1	20.2	1.7	n/a	24.1
363	Yes	n/a	23.4	18	5.8	20.4	19.7	9.4	n/a	17.8
M13	Yes	n/a	23.9	22.8	6.2	22.6	6	n/a	n/a	21.9

Table A17: Shubenacadie 3 Site Attribute Data: Provenience Information and Lithic Material

Provenience Information			Information on Lithic Material		
Artifact Number	Unit	Layer	Raw Material Lithology	Raw Material Name	JCAP Type Number
344	n/a	n/a	Chert	Questionable	n/a
345	n/a	n/a	Chert	Questionable	n/a
348	n/a	n/a	Chert	Minas Basin	n/a
379	n/a	n/a	Chert	Minas Basin	n/a
397	n/a	n/a	Chert	Questionable	n/a
403	n/a	n/a	Chert	Minas Basin	n/a
460	n/a	n/a	Chert	Minas Basin	n/a
471	n/a	n/a	Chert	Minas Basin	n/a
536	n/a	n/a	Chert	Minas Basin	n/a
633	n/a	n/a	Chert	Chalcedony	n/a
682	n/a	n/a	Chert	Minas Basin	n/a
906	N21/E30	0-3"	Chert	Minas Basin	n/a
929	N27/E0	3-6"	Chert	Minas Basin	n/a
930	N27/E0	3-6"	Chert	Minas Basin	n/a
953	N15/E30	3-6"	Chert	Questionable	n/a
968	N15/E27	0-3"	Chert	Questionable	n/a
1767	A2	9-12"	Chert	Minas Basin	n/a
1790	C1	6-9"	Chert	Questionable	n/a
1841	G1	3'11"-9'11"	Chert	Questionable	n/a
1972	n/a	n/a	Chert	Minas Basin	n/a
1994	K2	0-3"	Chert	Questionable	n/a
2124	B4	6-9"	Chert	Chalcedony	n/a
2186	D2	6-9"	Chert	Questionable	n/a
2229	D1	3-6"	Chert	Minas Basin	n/a

Table A18: Shubenacadie 3 Site Attribute Data: Striking Platform

Striking Platform							
Artifact Number	Striking Platform Present (Y or N)	Platform Description	Platform Grinding	Lip on Platform	Platform Angle	Platform Length(mm)	Platform Width
344	Yes	Sim/Abra	1	Yes	70	4.8	1.2
345	Yes	Sim/Crush	n/a	n/a	75	6.4	2
348	Yes	Complex	0	Yes	70	6.4	1.7
379	Yes	Simple	0	Yes	50	11.9	5.6
397	Yes	Complex	0	Yes	80	3.9	2.3
403	No	n/a	n/a	n/a	n/a	n/a	n/a
460	Yes	Simple	0	Yes	75	6.7	3
471	No	n/a	n/a	n/a	n/a	n/a	n/a
536	Yes	Sim/Abra	1	Yes	70	7.2	2.5
633	No	n/a	n/a	n/a	n/a	n/a	n/a
682	Yes	Simple	0	Yes	60	9	4.8
906	Yes	Com/Abra	1	Yes	50	9.8	3.2
929	Yes	Simple	0	Yes	90	10.3	3.3
930	No	n/a	n/a	n/a	n/a	n/a	n/a
953	Yes	Simple	0	Yes	80	8.4	1.8
968	Yes	Sim/Abra	1	Yes	80	8.1	1.5
1767	Yes	Complex	0	Yes	70	8	2.5
1790	Yes	Simple	0	No	80	2.4	3
1841	Yes	Com/Abra	1	Yes	55	7	2.8
1972	Yes	Sim/Abra	1	Yes	55	6	2.3
1994	No	n/a	n/a	n/a	n/a	n/a	n/a
2124	Yes	Sim/Abra	2	Yes	80	4.5	1.4
2186	No	n/a	n/a	n/a	n/a	n/a	n/a
2229	Yes	Sim/Crush	n/a	n/a	65	5	2.1

Table A19: Shubenacadie 3 Site Attribute Data: Spurs and Cortex

Spurs					Cortex Present		
Artifact Number	Spurs Present (Yes or No)	Number of Spurs	Position of Spurs	Flaking on Spur	Cortex Present (Yes or No)	Area of Cortex (%)	Location of Cortex
344	Yes	1	Bit/Left	Along Sides	No	n/a	n/a
345	Yes	1	Bit/Left	Along Sides	No	n/a	n/a
348	Yes	2	Bit/Left/Right	Snaped Lateral Edge	No	n/a	n/a
379	Yes	1	Bit/Right	Along Sides	No	n/a	n/a
397	Yes	1	Bit/Right	Along Sides	Yes	30	Dorsal
403	Yes	2	Bit/Left/Right	Along Sides	No	n/a	n/a
460	No	n/a	n/a	n/a	No	n/a	n/a
471	Yes	1	Bit/Right	Along Sides	No	n/a	n/a
536	Yes	2	Bit/Left/Right	Along Sides	Yes	30	Dorsal
633	Yes	1	Bit/Left	Along Sides	No	n/a	n/a
682	No	n/a	n/a	n/a	No	n/a	n/a
906	No	n/a	n/a	n/a	No	n/a	n/a
929	Yes	1	Bit/Left	Snaped Lateral Edge	No	n/a	n/a
930	Yes	1	Bit/Right	Along Sides	No	n/a	n/a
953	Yes	1	Bit/Left	Along Sides	Yes	25	Dorsal
968	No	n/a	n/a	n/a	No	n/a	n/a
1767	Yes	1	Bit/Left	Along Sides	No	n/a	n/a
1790	Yes	1	Bit/Left	Sides/Longitudinal	No	n/a	n/a
1841	Yes	1	Bit/Left	Along Sides	No	n/a	n/a
1972	No	n/a	n/a	n/a	No	n/a	n/a
1994	No	n/a	n/a	n/a	No	n/a	n/a
2124	Yes	1	Bit/Right	Along Sides	No	n/a	n/a
2186	Yes	1	Bit/Left	Along Sides	Yes	20	Dorsal
2229	Yes	1	Bit/Left	Along Sides	No	n/a	n/a

Table A20: Shubenacadie 3 Site Attribute Data: Hafting, Ventral and Dorsal Finishing, and Dorsal Ridge

Hafting			Ventral Finishing		Dorsal Finishing		Ridge
Artifact Number	Presence of Hafting (Y or N)	Evidence of Hafting	Ventral Finishing Present (Y or N)	Area of Finishing (%)	Dorsal Finishing Present (Y or N)	Type of Finishing	Multi-Ridge Number
344	Yes	Ret.-Notch Right/Gro. Left	No	n/a	No	Flat	n/a
345	Yes	Ground Lat.	No	n/a	No	Single Ridge	n/a
348	Yes	Notches	No	n/a	Yes	Multi-directional	n/a
379	Yes	Ret. Lat./Notch Right	No	n/a	No	Multi-ridge	2
397	Yes	Ground Lat.	No	n/a	No	Single Ridge	n/a
403	Yes	Ground Lat.	No	n/a	No	Multi-ridge	2
460	Yes	Ground Lat.	No	n/a	No	Single Ridge	n/a
471	Yes	Gro. Lat./Proximal	No	n/a	No	Multi-ridge	2
536	Yes	Ground Lat.	No	n/a	No	Single Ridge	n/a
633	No	n/a	No	n/a	No	Single Ridge	n/a
682	No	n/a	No	n/a	No	Single Ridge	n/a
906	Yes	Ground Lat.	No	n/a	No	Flat	n/a
929	Yes	Ground Lat.	No	n/a	No	Flat	n/a
930	Yes	Gro. Lat./Notch Right	No	n/a	No	Single Ridge	n/a
953	Yes	Ground Lat.	No	n/a	Yes	Multi-directional	n/a
968	No	n/a	No	n/a	No	Single Ridge	n/a
1767	Yes	Ret. Lat.	No	n/a	No	Single Ridge	n/a
1790	Yes	Ret. Right Lat./Gro. Ridge	No	n/a	No	Single Ridge	n/a
1841	Yes	Ret. Lat.	No	n/a	Yes	Multi-directional	n/a
1972	Yes	Ret. Left Lat./Notch Right	No	n/a	No	Single Ridge	n/a
1994	Yes	Gro. Lat./Proximal	No	n/a	No	Single Ridge	n/a
2124	Yes	Ret. Right/Gro Left Lat.	No	n/a	No	Single Ridge	n/a
2186	Yes	Ret. Lat.	No	n/a	Yes	Multi-directional	n/a
2229	Yes	Ret. Lat.	No	n/a	No	Single Ridge	n/a

Table A21: Shubenacadie 3 Site Attribute Data: Ventral Retouch

Ventral Retouch						
Artifact Number	Ventral Retouch Present (Y or N)	Location	Extent at Distal End	Extent at Proximal End	Extent at Right Lateral	Extent at Left Lateral
344	No	n/a	n/a	n/a	n/a	n/a
345	No	n/a	n/a	n/a	n/a	n/a
348	No	n/a	n/a	n/a	n/a	n/a
379	No	n/a	n/a	n/a	n/a	n/a
397	No	n/a	n/a	n/a	n/a	n/a
403	Yes	Left Lateral	n/a	n/a	n/a	Short
460	No	n/a	n/a	n/a	n/a	n/a
471	No	n/a	n/a	n/a	n/a	n/a
536	No	n/a	n/a	n/a	n/a	n/a
633	No	n/a	n/a	n/a	n/a	n/a
682	No	n/a	n/a	n/a	n/a	n/a
906	No	n/a	n/a	n/a	n/a	n/a
929	Yes	n/a	n/a	n/a	n/a	n/a
930	No	n/a	n/a	n/a	n/a	n/a
953	No	n/a	n/a	n/a	n/a	n/a
968	Yes	Left Lateral	n/a	n/a	n/a	Short
1767	No	n/a	n/a	n/a	n/a	n/a
1790	No	n/a	n/a	n/a	n/a	n/a
1841	No	n/a	n/a	n/a	n/a	n/a
1972	Yes	Right Lateral	n/a	n/a	Short	n/a
1994	No	n/a	n/a	n/a	n/a	n/a
2124	No	n/a	n/a	n/a	n/a	n/a
2186	No	n/a	n/a	n/a	n/a	n/a
2229	Yes	Left Lateral	n/a	n/a	n/a	Short

Table A22: Shubenacadie 3 Site Attribute Data: Dorsal Retouch

Dorsal Retouch						
Artifact Number	Dorsal Retouch Present (Y or N)	Location	Extent at Distal End	Extent at Proximal End	Extent at Right Lateral	Extent at Left Lateral
344	Yes	Distal/Right	Short/Long	n/a	Short	n/a
345	Yes	Distal End	Short/Long	n/a	n/a	n/a
348	Yes	Distal End	Short/Long	n/a	n/a	n/a
379	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short
397	Yes	Distal/Right	Short/Long	n/a	Short	n/a
403	Yes	Distal/Left	Short/Long	n/a	n/a	Short
460	Yes	Distal End	Short/Long	n/a	n/a	n/a
471	Yes	Distal/Right	Short/Long	n/a	Short	n/a
536	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short
633	Yes	Distal End	Short/Long	n/a	n/a	n/a
682	Yes	Distal End	Short/Long	n/a	n/a	n/a
906	Yes	Distal End	Short/Long	n/a	n/a	n/a
929	Yes	Distal End	Short/Long	n/a	n/a	n/a
930	Yes	Distal/Right	Short/Long	n/a	Short	n/a
953	Yes	Distal/Left	Short/Long	n/a	n/a	Short
968	Yes	Distal End	Short/Long	n/a	n/a	n/a
1767	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short
1790	Yes	Distal/Left	Short/Long	n/a	n/a	Short
1841	Yes	Distal/Right/Left	Short/Long	n/a	Short/Long	Short/Long
1972	Yes	Distal/Right	Short/Long	n/a	Short	n/a
1994	Yes	Distal/Proximal	Short/Long	Short	n/a	n/a
2124	Yes	Distal/Right	Short/Long	n/a	Short	n/a
2186	Yes	Distal/Right/Left	Short/Long	n/a	Short/Long	Short/Long
2229	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short

Table A23: Shubenacadie 3 Site Attribute Data: Bit End, Shape, Cross Section, Edge Angle and Weight

Bit End				Shape		Cross Section		Edge Angle		Weight
Artifact Number	Location of Bit End	Bit Edge Angle	Bit Edge Height	Planar Shape	Working Edge Shape	Longitudinal X-Section	Lateral X-Section	Edge Angle Right Lateral	Edge Angle Left Lateral	Weight (grams)
344	Distal End	80	4.2	Indeterminant	Convex	Convex/Convex	Concave/Convex	30	30	2.7
345	Distal End	70	5.5	Indeterminant	Convex	Convex/Convex	Planar/Convex	40	30	2.1
·348	Distal End	70	4.2	Square	Convex	Convex/Convex	Planar/Convex	ind	70	2.7
379	Distal End	90	4.6	Rectangular	Convex	Planar/Convex	Concave/Convex	70	50	2.5
397	Distal End	80	5.4	Triangloid	Convex	Planar/Convex	Planar/Convex	60	50	2.1
403	Distal End	80	6	Rectangular	Convex	Planar/Convex	Concave/Convex	50	50	ind
460	Distal End	70	5.3	Triangloid	Convex	Convex/Convex	Planar/Convex	40	30	1.7
471	Distal End	70	5.6	Round	Convex	Convex/Convex	Planar/Convex	30	30	1.7
536	Distal End	90	7.1	Rectangular	Convex	Planar/Convex	Concave/Convex	40	40	2.4
633	Distal End	70	5.1	Square	Convex	Convex/Convex	Indeterminant	90(irreg.)	40	ind
682	Distal End	80	4.1	Oval	Convex	Planar/Convex	Planar/Convex	ind	40	3.5
906	Distal End	80	4.2	Square	Convex	Convex/Convex	Planar/Convex	30	50	2
929	Distal End	90	5.1	Indeterminant	Convex	Planar/Convex	Planar/Convex	40	50	ind
930	Distal End	80	5.1	Square	Convex	Convex/Convex	Planar/Convex	30	40	ind
953	Distal End	80	5.4	Oval	Convex	Convex/Convex	Planar/Convex	50	30	2.5
968	Distal End	80	4.5	Round	Convex	Convex/Convex	Planar/Convex	ind	less 20	ind
1767	Distal End	80	3.6	Triangloid	Convex	Convex/Convex	Planar/Convex	30	30	2.8
1790	Distal End	80	9.5	Triangloid	Convex	Planar/Convex	Planar/Convex	80	50	4.2
1841	Distal End	70	7	Triangloid	Convex	Planar/Convex	Concave/Convex	60	50	4
1972	Distal End	80	5.9	Oval	Convex	Planar/Convex	Planar/Convex	30	30	2
1994	Distal End	80	3.8	Rectangular	Convex	Planar/Convex	Planar/Convex	30	50	2.1
2124	Distal End	80	5.1	Square	Convex	Planar/Convex	Planar/Convex	70	30	2.5
2186	Distal End	80	7.5	Indeterminant	Convex	Planar/Convex	Planar/Convex	60	60	ind
2229	Distal End	80	7.6	Oval	Convex	Planar/Convex	Concave/Convex	30	30	5.4

Table A24: Shubenacadie 3 Site Attribute Data: Condition and Metrics

Condition			Metrics							
Artifact Number	Complete (Yes or No)	Breakage Pattern	Maximum Length	Maximum Width	Maximum Thickness	Span Width	Right Lateral	Left Lateral	Proximal End	Distal End
344	Yes	n/a	22.9	27.8	4.2	30.7	16.8	n/a	n/a	27.5
345	Yes	n/a	19.2	25.4	4.8	24.3	n/a	n/a	n/a	25.2
348	Yes	n/a	20.7	22.7	5.7	24.5	n/a	n/a	n/a	22.3
379	Yes	n/a	23.1	21.5	5	20.3	13.4	13.3	n/a	20.6
397	Yes	n/a	22.8	18.6	5.7	23.2	7.4	n/a	n/a	18.4
403	No	Proximal/Lat. Missing	ind	17.3	5.7	18.9	ind	ind	ind	17
460	Yes	n/a	19.3	18.7	4.6	20.2	n/a	n/a	n/a	18.5
471	Yes	n/a	17.6	20.2	4.9	23.2	6.9	n/a	n/a	20
536	Yes	n/a	24.9	17.6	7	17.7	4.2	5.8	n/a	17
633	No	Proximal/Lat. Missing	ind	18.5	6	18.4	ind	ind	ind	18.2
682	Yes	n/a	23.3	19.5	7.4	16.8	n/a	n/a	n/a	15.1
906	Yes	n/a	18.8	20.3	4.7	20.2	n/a	n/a	n/a	20.2
929	No	Lat./Distal Missing	24	ind	5.7	ind	n/a	n/a	n/a	ind
930	No	Proximal/Lat. Missing	ind	26.2	5.3	9.8	ind	ind	ind	25.9
953	Yes	n/a	24.1	18.7	6.9	18	n/a	7.8	n/a	17.4
968	No	Portion Left Lat. Missing	18	21	4.8	23.8	ind	n/a	n/a	19.1
1767	Yes	n/a	24.3	24	4.6	26.5	12.1	22.2	n/a	23.8
1790	Yes	n/a	28.8	19.5	9	20.4	n/a	10.8	n/a	19.5
1841	Yes	n/a	34	19.3	5.5	19.8	30	30.3	n/a	18.7
1972	Yes	n/a	20.7	17.2	5.4	16	6.4	n/a	n/a	15.8
1994	Yes	n/a	25.9	20.8	5.1	23	n/a	n/a	13.1	20.3
2124	Yes	n/a	22.6	22.6	4.8	23.3	11.1	n/a	n/a	22.1
2186	No	Proximal/Lat. Missing	ind	21.4	7.1	22.1	ind	ind	ind	21.4
2229	Yes	n/a	29	25.1	7.3	3.7	20.9	16.5	n/a	24.9

Table A25: Shubenacadie 5 Site Attribute Data: Provenience Information and Lithic Material

Provenience Information			Information on Lithic Material		
Artifact Number	Unit	Layer	Raw Material Lithology	Raw Material Name	JCAP Type Number
22	n/a	n/a	Chert	Minas Basin	n/a
183	n/a	n/a	Chert	Chalcedony	n/a
299	n/a	n/a	Chert	Brecciated	n/a
433	n/a	n/a	Quartz	n/a	n/a
1053	N24/W12	n/a	Chert	Minas Basin	n/a
1138	N18/E0	n/a	Chert	Minas Basin	n/a
1156	N15/E0	n/a	Chert	Munsungun	n/a

Table A26: Shubenacadie 5 Site Attribute Data: Striking Platform

Striking Platform							
Artifact Number	Striking Platform Present (Y or N)	Platform Description	Platform Grinding	Lip on Platform	Platform Angle	Platform Length(mm)	Platform Width
22	No	n/a	n/a	n/a	n/a	n/a	n/a
183	Yes	Simple	0	No	80	5	2.3
299	Yes	Simple	0	Yes	65	4.8	2
433	Yes	Com/Abra	2	Yes	55	7.1	1.3
1053	Yes	Sim/Abra	2	Yes	50	5	2.2
1138	Yes	Simple	0	Yes	75	2.5	1.2
1156	No	n/a	n/a	n/a	n/a	n/a	n/a

Table A27: Shubenacadie 5 Site Attribute Data: Spurs and Cortex

Spurs					Cortex Present		
Artifact Number	Spurs Present (Yes or No)	Number of Spurs	Position of Spurs	Flaking on Spur	Cortex Present (Yes or No)	Area of Cortex (%)	Location of Cortex
22	Yes	1	Bit/Left	Longitudinal Flaking	No	n/a	n/a
183	No	n/a	n/a	n/a	No	n/a	n/a
299	Yes	2	Bit/Left/Right	Along Sides	No	n/a	n/a
433	Yes	2	Bit/Left/Right	Along Sides	No	n/a	n/a
1053	Yes	1	Bit/Right	Along Sides	No	n/a	n/a
1138	Yes	1	Bit/Left	Along Sides	No	n/a	n/a
1156	Yes	1	Bit/Right	Sides/Longitudinal	No	n/a	n/a

Table A28: Shubenacadie 5 Site Attribute Data: Hafting, Ventral and Dorsal Finishing, and Dorsal Ridge

Hafting			Ventral Finishing		Dorsal Finishing		Ridge
Artifact Number	Presence of Hafting (Y or N)	Evidence of Hafting	Ventral Finishing Present (Y or N)	Area of Finishing (%)	Dorsal Finishing Present (Y or N)	Type of Finishing	Multi-Ridge Number
22	Yes	Gro. Lat./Notch Left	No	n/a	No	Multi-ridge	2
183	Yes	Ground Lat.	No	n/a	No	Single Ridge	n/a
299	Yes	Gro. Lat./Ret. Proximal	No	n/a	No	Single Ridge	n/a
433	Yes	Ret. Lat./Notch Right	No	n/a	No	Flat	n/a
1053	Yes	Gro. Lat./Gro. Ridge	No	n/a	No	Multi-ridge	2
1138	Yes	Ground Lat.	No	n/a	No	Single Ridge	n/a
1156	Yes	Ground Lat.	No	n/a	No	Single Ridge	n/a

Table A29: Shubenacadie 5 Site Attribute Data: Ventral Retouch

Ventral Retouch						
Artifact Number	Ventral Retouch Present (Y or N)	Location	Extent at Distal End	Extent at Proximal End	Extent at Right Lateral	Extent at Left Lateral
22	No	n/a	n/a	n/a	n/a	n/a
183	No	n/a	n/a	n/a	n/a	n/a
299	No	n/a	n/a	n/a	n/a	n/a
433	No	n/a	n/a	n/a	n/a	n/a
1053	No	n/a	n/a	n/a	n/a	n/a
1138	No	n/a	n/a	n/a	n/a	n/a
1156	No	n/a	n/a	n/a	n/a	n/a

Table A30: Shubenacadie 5 Site Attribute Data: Dorsal Retouch

Dorsal Retouch						
Artifact Number	Dorsal Retouch Present (Y or N)	Location	Extent at Distal End	Extent at Proximal End	Extent at Right Lateral	Extent at Left Lateral
22	Yes	Distal End	Short/Long	n/a	n/a	n/a
183	Yes	Distal End	Short/Long	n/a	n/a	n/a
299	Yes	Dist./Prox./L.Lat	Short/Long	Long	n/a	Short
433	Yes	Distal/Left	Short/Long	n/a	n/a	Short
1053	Yes	Distal End	Short/Long	n/a	n/a	n/a
1138	Yes	Distal End	Short/Long	n/a	n/a	n/a
1156	Yes	Distal/Right/Left	Short/Long	n/a	Short	Long

Table A31: Shubenacadie 5 Site Attribute Data: Bit End, Shape, Cross Section, Edge Angle and Weight

Bit End				Shape		Cross Section		Edge Angle		Weight
Artifact Number	Location of Bit End	Bit Edge Angle	Bit Edge Height	Planar Shape	Working Edge Shape	Longitudinal X-Section	Lateral X-Section	Edge Angle Right Lateral	Edge Angle Left Lateral	Weight (grams)
22	Distal End	90	7.1	Indeterminant	Convex	Planar/Convex	Concave/Convex	30	30	ind
183	Distal End	80	4.2	Square	Convex	Convex/Convex	Planar/Convex	30	40	1.5
299	Distal End	70	4	Triangloid	Convex	Convex/Convex	Planar/Convex	30	40	2.2
433	Distal End	80	5	Triangloid	Convex	Convex/Convex	Planar/Convex	ind. (notch)	60	3.4
1053	Distal End	70	5.8	Square	Convex	Planar/Convex	Concave/Convex	30	70	1.9
1138	Distal End	90	7	Triangloid	Convex	Convex/Convex	Planar/Convex	30	40	2.4
1156	Distal End	70	6.2	Triangloid	Convex	Planar/Convex	Concave/Convex	30	30	2.1

Table A32: Shubenacadie 5 Site Attribute Data: Condition and Metrics

Condition			Metrics							
Artifact Number	Complete (Yes or No)	Breakage Pattern	Maximum Length	Maximum Width	Maximum Thickness	Span Width	Right Lateral	Left Lateral	Proximal End	Distal End
22	No	Proximal/Lat. Missing	ind	23.1	7	25.6	ind	ind	ind	23
183	Yes	n/a	19.1	18.2	4.2	18.7	n/a	n/a	n/a	16.8
299	Yes	n/a	27.6	20.7	5.2	22.9	n/a	16.7	9.1	20.4
433	Yes	n/a	22.2	28.2	5	32.2	n/a	17.6	n/a	27.9
1053	Yes	n/a	18.5	19.3	5	19	n/a	n/a	n/a	18.9
1138	Yes	n/a	23.9	20.2	6.5	24	n/a	n/a	n/a	19.5
1156	Yes	n/a	25.8	21.8	5	22.8	2.2	3.4	n/a	20.3

Table A33: Jemseg Site Attribute Data: Provenience Information and Lithic Material

Provenience Information			Information on Lithic Material		
Artifact Number	Unit	Layer	Raw Material Lithology	Raw Material Name	JCAP Type Number
4776	D39	1	Chert	Munsungun	JC14
7413	L36	2	Chert	Washade.	JC11
8569	D35	2	Chert	Minas Basin	JC30
9581	B59	2	Chert	Washade.	JC11
10175	J35	2	Chert	Washade.	JC11
10659	C39	2	Chert	Minas Basin	JC30
14305	B41	ind	Chert	Washade.	JC11
14527	C41	3	Chert	Munsungun	JC14
17068	C42	2	Chert	blu/brow mott	JC32
24391	B41	start 25cm	Chert	Minas Basin	JC30
26234	L44	2	Chert	Minas Basin	JC30
26117	A44	2	Chert	Washade.	JC11
27956	D44	1	Chert	Questionable	JC53
28434	K41	2	Chert	Minas Basin	JC30

Table A34: Jemseg Site Attribute Data: Striking Platform

Striking Platform							
Artifact Number	Striking Platform Present (Y or N)	Platform Description	Platform Grinding	Lip on Platform	Platform Angle	Platform Lenght (mm)	Platform Width (mm)
4776	Yes	Com/Abra	1	Yes	50	4	1.6
7413	Yes	Cortex	0	No	75	3.5	2.8
8569	Yes	Sim/Abra	1	Yes	70	7.8	4.9
9581	No	n/a	n/a	n/a	n/a	n/a	n/a
10175	Yes	n/a	n/a	n/a	n/a	5.8	2.9
10659	No	n/a	n/a	n/a	n/a	n/a	n/a
14305	No	n/a	n/a	n/a	n/a	n/a	n/a
14527	No	n/a	n/a	n/a	n/a	n/a	n/a
17068	No	n/a	n/a	n/a	n/a	n/a	n/a
24391	Yes	Com/Abra	1	Yes	80	8.8	4.1
26234	Yes	Com/Abra	1	Yes	60	8.4	2
26117	Yes	Simple	0	Yes	55	7.3	1.5
27956	Yes	Com/Abra	1	Yes	50	4.2	2.1
28434	No	Com/Abra	1	Yes	90	n/a	n/a

Table A35: Jemseg Site Attribute Data: Spurs and Cortex

Spurs					Cortex Present		
Artifact Number	Spurs Present (Yes or No)	Number of Spurs	Position of Spurs	Flaking on Spur	Cortex Present (Yes or No)	Area of Cortex (%)	Location of Cortex
4776	No	n/a	n/a	n/a	No	n/a	n/a
7413	Yes	1	Bit/Left	Along Sides	No	n/a	n/a
8569	No	n/a	n/a	n/a	No	n/a	n/a
9581	Yes	1	Bit/Right	Along Sides	No	n/a	n/a
10175	Yes	1	Bit/Right	Snaped Lateral Edge	No	n/a	n/a
10659	Yes	1	Bit/Left	Sides/Longitudinal	No	n/a	n/a
14305	No	n/a	n/a	n/a	No	n/a	n/a
14527	Yes	1	Bit/Left	Along Sides	No	n/a	n/a
17068	Yes	1	Bit/Left	Sides/Longitudinal	No	n/a	n/a
24391	Yes	1	Bit/Left	Along Sides	No	n/a	n/a
26234	Yes	1	Bit/Left	Along Sides	No	n/a	n/a
26117	Yes	1	Bit End/Left	Along Sides	No	n/a	n/a
27956	Yes	1	Bit/Left	Sides/Longitudinal	No	n/a	n/a
28434	ind	ind	Bit/Right	Snaped Lateral Edge	No	n/a	n/a

Table A36: Jemseg Site Attribute Data: Hafting, Ventral and Dorsal Finishing, and Dorsal Ridge

Hafting			Ventral Finishing		Dorsal Finishing		Ridge
Artifact Number	Presence of Hafting (Y or N)	Evidence of Hafting	Ventral Finishing Present (Y or N)	Area of Finishing (%)	Dorsal Finishing Present (Y or N)	Type of Finishing	Multi-Ridge Number
4776	Yes	Ret. Lat.	No	n/a	Yes	Multi-directional	n/a
7413	No	n/a	No	n/a	Yes	Multi-directional	n/a
8569	Yes	Ret. Lat./Notches	No	n/a	No	Single Ridge	n/a
9581	Yes	Ret. Lat.	Yes	50	Yes	Multi-directional	n/a
10175	Yes	Ret. Lat./Notch Right	No	n/a	No	Single Ridge	n/a
10659	No	n/a	No	n/a	No	Single Ridge	n/a
14305	Yes	Snapped Notches/Gro. Ridge	No	n/a	No	Single Ridge	n/a
14527	Yes	Ret. Left/Gro. Right-Ridge	No	n/a	No	Single Ridge	n/a
17068	Yes	Ret. Lat./Notch Right	No	n/a	No	Single Ridge	n/a
24391	Yes	Ret. Lat./Notches	No	n/a	No	Single Ridge	n/a
26234	Yes	Ground Lat.	No	n/a	Yes	Multi-directional	n/a
26117	Yes	Gro. Left Lat.	No	n/a	No	Single Ridge	n/a
27956	Yes	Ret. Lat.	No	n/a	No	Single Ridge	n/a
28434	Yes	Ret. Lat.	No	n/a	No	Single Ridge	n/a

Table A37: Jemseg Site Attribute Data: Ventral Retouch

Ventral Retouch						
Artifact Number	Ventral Retouch Present (Y or N)	Location	Extent at Distal End	Extent at Proximal End	Extent at Right Lateral	Extent at Left Lateral
4776	No	n/a	n/a	n/a	n/a	n/a
7413	No	n/a	n/a	n/a	n/a	n/a
8569	No	n/a	n/a	n/a	n/a	n/a
9581	No	n/a	n/a	n/a	n/a	n/a
10175	Yes	spur/ventral side	Short	n/a	Short	n/a
10659	No	n/a	n/a	n/a	n/a	n/a
14305	No	n/a	n/a	n/a	n/a	n/a
14527	No	n/a	n/a	n/a	n/a	n/a
17068	Yes	Right Lateral	n/a	n/a	Short	n/a
24391	No	n/a	n/a	n/a	n/a	n/a
26234	No	n/a	n/a	n/a	n/a	n/a
26117	No	n/a	n/a	n/a	n/a	n/a
27956	No	n/a	n/a	n/a	n/a	n/a
28434	Yes	Right Lateral	n/a	n/a	Short	n/a

Table A38: Jemseg Site Attribute Data: Dorsal Retouch

Dorsal Retouch						
Artifact Number	Dorsal Retouch Present (Y or N)	Location	Extent at Distal End	Extent at Proximal End	Extent at Right Lateral	Extent at Left Lateral
4776	Yes	Distal/Right/Left	Short/Long	n/a	Short	Long
7413	Yes	Distal/Left	Short/Long	n/a	n/a	Short/Long
8569	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short
9581	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short/Long
10175	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short/Long
10659	Yes	Distal End	Short/Long	n/a	n/a	n/a
14305	Yes	Distal/Right	Short/Long	n/a	Long	n/a
14527	Yes	All	Short/Long	Short	Short	Short
17068	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short
24391	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short
26234	Yes	Distal/Right/Left	Short/Long	n/a	Short/Long	Short
26117	Yes	Distal End	Short/Long	n/a	n/a	n/a
27956	Yes	Distal/Right/Left	Short/Long	n/a	Short/Long	Short
28434	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short/Long

Table A39: Jemseg Site Attribute Data: Bit End, Shape, Cross Section, Edge Angle and Weight

Bit End				Shape		Cross Section		Edge Angle		Weight
Artifact Number	Location of Bit End	Bit Edge Angle	Bit Edge Height	Planar Shape	Working Edge Shape	Longitudinal X-Section	Lateral X-Section	Edge Angle Right Lateral	Edge Angle Left Lateral	Weight (grams)
4776	Distal End	80	5.3	Triangloid	Convex	Planar/Convex	Concave/Convex	50	50	3.6
7413	Distal End	90	4.8	Triangloid	Convex	Planar/Convex	Concave/Convex	ind	ind	ind
8569	Distal End	60	5.4	Triangloid	Convex	Planar/Convex	Planar/Convex	60	30	5.7
9581	Distal End	70	8.9	Triangloid	Convex	Planar/Convex	Concave/Convex	50	70	ind
10175	Distal End	70	7.8	Triangloid	Convex	Convex/Convex	Concave/Convex	40	30	4.3
10659	Distal End	80	7.2	Indeterminant	Convex	Planar/Convex	Concave/Convex	70	50	ind
14305	Distal End	70	7	Triangloid	Convex	Concave/Convex	Convex/Convex	80	ind	ind
14527	Distal End	70	6.8	Triangloid	Convex	Concave/Convex	Concave/Convex	80	40	4
17068	Distal End	80	10.3	Triangloid	Convex	Concave/Convex	Concave/Convex	40	60	2.8
24391	Distal End	70	6.9	Oval	Convex	Planar/Convex	Concave/Convex	50	40	ind
26234	Distal End	70	3.9	Oval	Convex	Planar/Convex	Concave/Convex	30	30	2
26117	Distal End	70	13	Triangloid	Convex	Planar/Convex	Concave/Convex	50	ind	ind
27956	Distal End	80	7.1	Triangloid	Convex	Planar/Convex	Planar/Convex	50	70	4.1
28434	Distal End	90	6.4	Rectangular	Convex	Planar/Convex	Concave/Convex	40	50	ind

Table A40: Jemseg Site Attribute Data: Condition and Metrics

Condition			Metrics							
Artifact Number	Complete (Yes or No)	Breakage Pattern	Maximum Length	Maximum Width	Maximum Thickness	Span Width	Right Lateral	Left Lateral	Proximal End	Distal End
4776	Yes	n/a	29.8	19.3	5.5	16.3	18.8	24.1	n/a	16.2
7413	No	Distal/Lat. Missing	21.3	ind	6.8	ind	ind	ind	n/a	ind
8569	Yes	n/a	36.1	24.4	6.9	23.3	31.2	30.2	n/a	21.4
9581	No	Proximal/Lat. Missing	ind	19.5	6.7	18.9	ind	ind	ind	18.8
10175	Yes	n/a	32.4	20.9	6.6	25.1	29.2	26.4	n/a	20.7
10659	No	Proximal/Lat. Missing	ind	17.1	7.4	20	ind	ind	ind	16.9
14305	No	Proximal/Lat. Missing	ind	ind	9.4	ind	7.8	ind	ind	ind
14527	Yes	n/a	29.2	20.3	7.7	25	8	22.1	8.2	20
17068	Yes	n/a	26	19.8	9	24.7	21.1	12	n/a	20
24391	No	Lat./Distal Missing	32.8	23.3	7.7	ind	ind	20.8	n/a	ind
26234	Yes	n/a	26.4	17.4	3.3	19.6	20.4	20.9	n/a	17.5
26117	No	Proximal/Lat. Missing	29.4	ind	9.1	ind	n/a	ind	ind	ind
27956	Yes	n/a	29	21	6.5	25.3	22.3	18.3	n/a	20.6
28434	No	Striking Platform	ind	19.6	6.3	21	24.8	13.5	ind	19.4

Table A41: Bentley Street Site Attribute Data: Provenience Information and Lithic Material

Provenience Information			Information on Lithic Material		
Artifact Number	Unit	Layer	Raw Material Lithology	Raw Material Name	JCAP Type Number
197	A6	2	Chert	Washade.	JC11
230	n/a	n/a	Chert	R.Munsungun	JC14

Table A42: Bentley Street Site Attribute Data: Striking Platform

Striking Platform							
Artifact Number	Striking Platform Present (Y or N)	Platform Description	Platform Grinding	Lip on Platform	Platform Angle	Platform Length (mm)	Platform Width (mm)
197	No	n/a	n/a	n/a	n/a	n/a	n/a
230	No	n/a	0	n/a	n/a	n/a	n/a

Table A43: Bentley Street Site Attribute Data: Spurs and Cortex

Spurs					Cortex Present		
Artifact Number	Spurs Present (Yes or No)	Number of Spurs	Position of Spurs	Flaking on Spur	Cortex Present (Yes or No)	Area of Cortex (%)	Location of Cortex
197	Yes	1	Bit/Left	Sides/Longitudinal	No	n/a	n/a
230	No	n/a	n/a	n/a	No	n/a	n/a

Table A44: Bentley Street Site Attribute Data: Hafting, Ventral and Dorsal Finishing, and Dorsal Ridge

Hafting			Ventral Finishing		Dorsal Finishing		Ridge
Artifact Number	Presence of Hafting (Y or N)	Evidence of Hafting	Ventral Finishing Present (Y or N)	Area of Finishing (%)	Dorsal Finishing Present (Y or N)	Type of Finishing	Multi-Ridge Number
197	Yes	Ret. Lat./Notches/Ret. Prox	No	n/a	Yes	Multi-directional	n/a
230	Yes	Ret. Lat.	No	n/a	No	Single Ridge	n/a

Table A45: Bentley Street Site Attribute Data: Ventral Retouch

Ventral Retouch						
Artifact Number	Ventral Retouch Present (Y or N)	Location	Extent at Distal End	Extent at Proximal End	Extent at Right Lateral	Extent at Left Lateral
197	No	n/a	n/a	n/a	n/a	n/a
230	No	n/a	n/a	n/a	n/a	n/a

Table A46: Bentley Street Site Attribute Data: Dorsal Retouch

Dorsal Retouch						
Artifact Number	Dorsal Retouch Present (Y or N)	Location	Extent at Distal End	Extent at Proximal End	Extent at Right Lateral	Extent at Left Lateral
197	Yes	All Sides	Short/Invasive	Short	Short/Invasive	Short
230	Yes	Distal/Right/Left	Short/Long	n/a	Short	Short

Table A47: Bentley Street Site Attribute Data: Bit End, Shape, Cross Section, Edge Angle and Weight

Bit End				Shape		Cross Section		Edge Angle		Weight
Artifact Number	Location of Bit End	Bit Edge Angle	Bit Edge Height	Planar Shape	Working Edge Shape	Longitudinal X-Section	Lateral X-Section	Edge Angle Right Lateral	Edge Angle Left Lateral	Weight (grams)
197	Distal End	50	10.7	Irregular	Convex	Planar/Convex	Concave/Convex	ind	60	ind
230	Distal End	60	5.9	Rectangular	Convex	Planar/Convex	Concave/Convex	40	80	ind

Table A48: Bentley Street Site Attribute Data: Condition and Metrics

Condition			Metrics							
Artifact Number	Complete (Yes or No)	Breakage Pattern	Maximum Length	Maximum Width	Maximum Thickness	Span Width	Right Lateral	Left Lateral	Proximal End	Distal End
197	No	Right Lat. Missing	29	25.7	8.7	27.3	ind	2.7	4.5	25.6
230	No	Proximal/Lat. Missing	ind	25.8	6.1	15.9	40.7	ind	ind	15.3

Notes:

Tables 1, 9, 17, 25, 33, 41

Unit	n/a – not applicable
Layer	n/a – not applicable
Raw Material Name	n/a – not applicable
JCAP Type Number	n/a – not applicable

Tables 2, 10, 18, 26, 34, 42

Platform Description	n/a – not applicable
	Sim/Abra – simple/abraded
	Com/Abra – complex abraded
	Cor/Abra – cortex abraded
Platform Grinding	n/a – not applicable
Lip on Platform	n/a – not applicable
Platform Angle	n/a – not applicable
Platform Length	n/a – not applicable
Platform Width	n/a – not applicable

Tables 3, 11, 19, 27, 35, 43

Number of Spurs	n/a – not applicable
Position of Spurs	n/a – not applicable
Flaking on Spur	n/a – not applicable
Area of Cortex	n/a – not applicable
Location of Cortex	n/a – not applicable

Tables 4, 12, 20, 28, 36, 44

Evidence of Hafting	Lat. – lateral margin
	Ret. – retouched
	Gro. – ground
Area of Finishing	n/a – not applicable
Multi-Ridge Number	n/a – not applicable

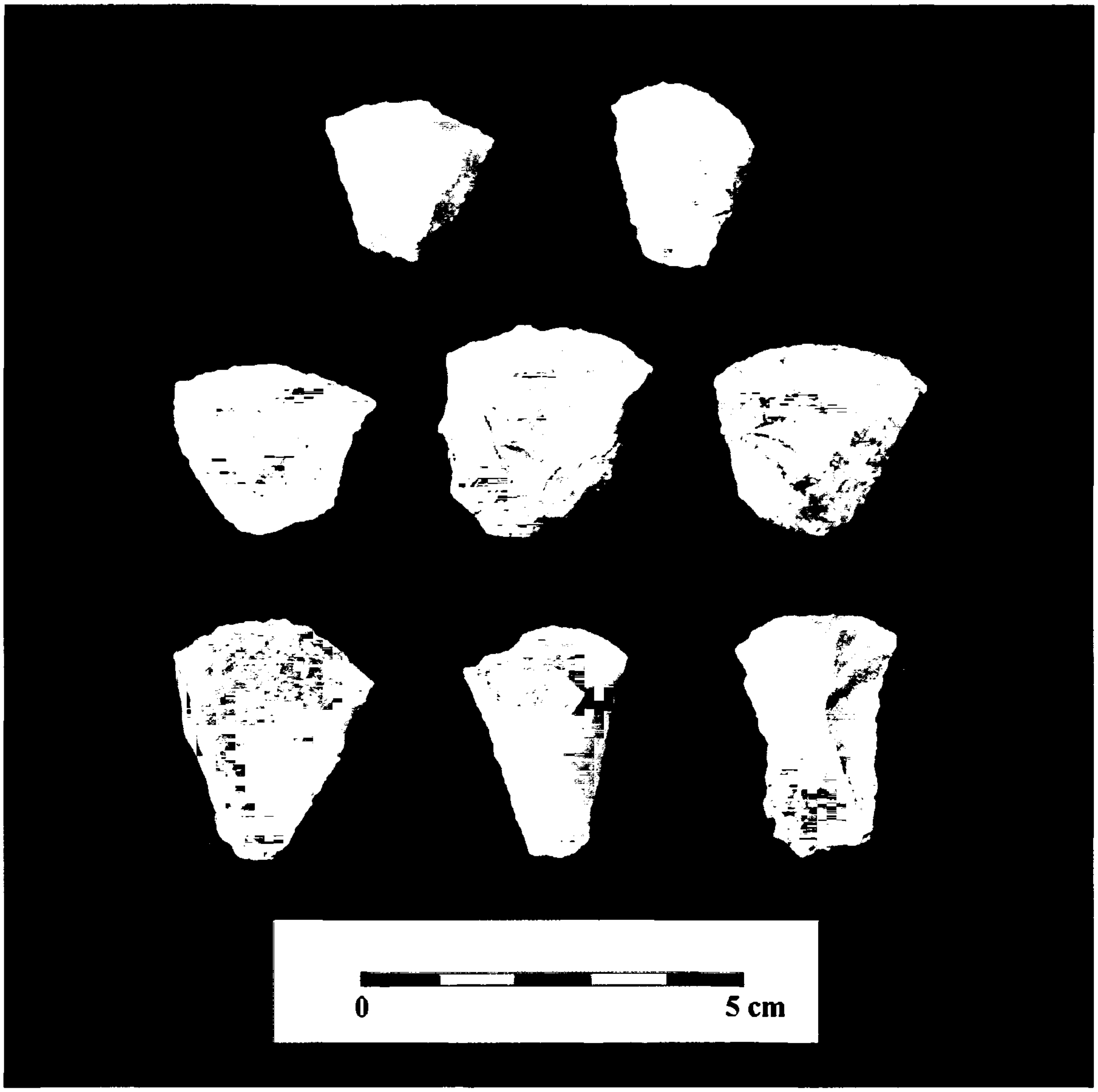
Tables 5, 13, 21, 29, 37, 45

Location	n/a – not applicable
Extent at Distal End	n/a – not applicable
Extent at Proximal End	n/a – not applicable
Extent at Right Lateral	n/a – not applicable
Extent at Left Lateral	n/a – not applicable

Tables 6, 14, 22, 30, 38, 46	
Extent at Proximal End	n/a – not applicable
Extent at Right Lateral	n/a – not applicable
Extent at Left Lateral	n/a – not applicable
Tables 7, 15, 23, 31, 39, 47	
Bit Edge Angle	L – left portion of bit end
	R – right portion of bit end
	ind. – indeterminate
Bit Edge Height	ind. – indeterminate
Edge Angle Right Lateral	ind. – indeterminate
Edge Angle Left Lateral	ind. – indeterminate
Weight	ind. – indeterminate
Tables 8, 16, 24, 32, 40, 48	
Breakage Pattern	n/a – not applicable
	Lat. – lateral
	dist. – distal end
	prox. – proximal end
Maximum Length	ind. – indeterminate
Maximum Width	ind. – indeterminate
Maximum Thickness	ind. – indeterminate
Span Width	ind. – indeterminate
	n/a – not applicable
Right Lateral	ind. – indeterminate
	n/a – not applicable
Left Lateral	ind. – indeterminate
	n/a – not applicable
Proximal end	ind. – indeterminate
	n/a – not applicable
Distal	ind. – indeterminate

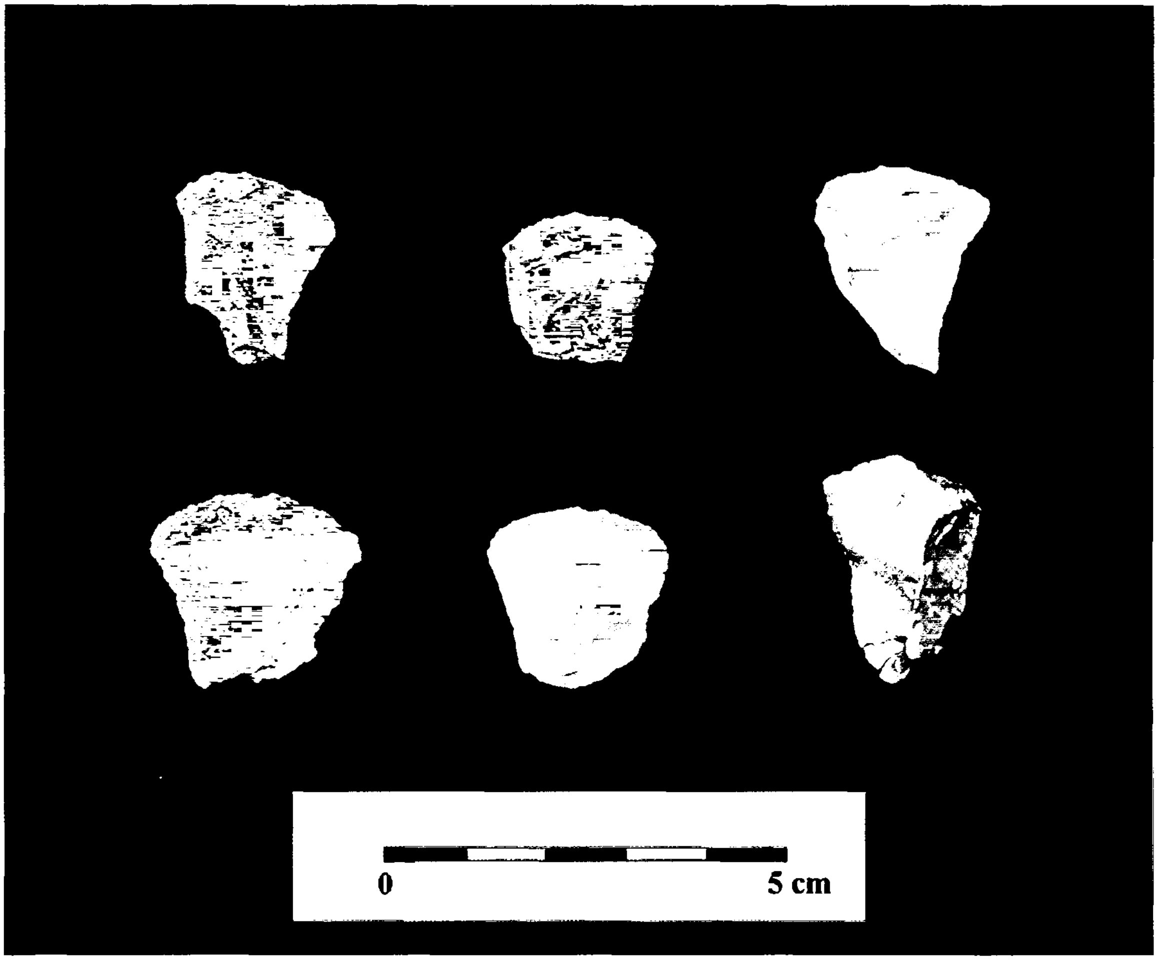
APPENDIX C

PHOTOGRAPHS



Debert (BiCu-1) Spurred End Scrapers
Upper from left: BiCu-1: 2803, BiCu-1: 4098
Middle from left: BiCu-1: 3090, BiCu-1: 318, BiCu-1: 746
Lower from left: BiCu-1: 734, BiCu-1: 3982, BiCu-1: 741

Belmont II (BiCu-7) Spurred End Scrapers
Upper from left: BiCu-7: 363, BiCu-7: 25
Lower from left: BiCu-7: M13, BiCu-7: 155



Shubenacadie 3 (BfCv-3) and Shubenacadie 5 (BfCv-5) Spurred End Scrapers
Upper from left: BfCv-5: 1138, BfCv-5: 1053, BfCv-5: 1156
Lower from left: BfCv-3: 930, BfCv-3: 2124, BfCv-3: 1790

Jemseg (BkDm-14) and Bentley Street (BhDm-2) Spurred End Scrapers
Upper from left: BkDm-14: 27956, BhDm-2: 197, BhDm-2: 230 (not spurred)
Lower from left: BkDm-14: 28434, BkDm-14, 10659, BkDm-14: 14527

BIOGRAPHY OF THE AUTHOR

Pamela J. Dickinson was born in Fredericton, New Brunswick, Canada on November 10, 1968. She was raised in Temperance Vale, New Brunswick and graduated from Nackawic High School in 1987. She attended the University of New Brunswick and graduated in 1993 with a Bachelor of Arts degree. She entered the Quaternary Studies program at the University of Maine in the fall of 1999.

Pamela has started her professional career as co-owner of Heritage Technologies Inc., a cultural resource management company based in the Canadian Maritime Provinces. Pamela is a candidate for the Master of Science degree in Quaternary Studies from The University of Maine in December, 2001.