Projectile Point Assemblage Variability at the Paleoindian Mackenzie 1 Site, near Thunder Bay, Ontario

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ABSTRACT

The Mackenzie Sites appear to form part of the Late Paleoindian Lakehead Complex that occupied the unglaciated peninsula between Glacial Lakes Agassiz and Minong at the end of the Pleistocene. While a number of archaeological sites and isolated Plano finds have been made throughout the region, most excavated collections are from large-scale quarry workshops, and have yielded vast assemblages of lithic debitage with comparatively few diagnostic tools. In contrast, the Mackenzie 1 (DdJf-9) site appears to be an extensive and repeatedly used stream mouth habitation place exhibiting a range of stylistic influences represented in the projectile point assemblage. Contrary to conventional wisdom, this thesis will utilize an attribute analysis approach to typological analysis that will permit identification of significant patterned variation of the 380 projectile points recovered, which will challenge or support the definition of the Lakehead Complex and Interlakes Composite. The assemblage consists of 53 complete points, 116 basal fragments, 80 midsections, 116 tips, 5 points that were reworked into scrapers, 5 chisel shaped specimens, and 5 that appear pseudo-notched.

The assemblage is made up of a wide range of materials, but the majority of projectile points are created from the locally available Gunflint Formation (taconite). Hixton Silicified Sandstone, Knife Lake Siltstone, and Hudson's Bay Lowland Chert are also present in minor capacities. The surprisingly large assemblage of 380 projectile points will in turn enable more credible comparison to late Paleoindian projectile point typologies developed in other regions.

The attributes that were chosen for the analysis were focused on the projectile point basal configuration, specifically the bottom third of the specimen. While the functional requirements associated with arming a spear with a sharp stone tip are rather generic, most projectile points exhibit a comparatively narrow range of culturally mediated attributes that reflects both

'functional' considerations coupled with 'stylistic' choice. The combinations of attributes, therefore, are thought to reflect the cultural 'rules' or parameters of what archaeologists suggest the artisan imagined to constitute a suitable tool form. Taxonomically recognized variability in tool form sometimes represents temporally and geographically defined variation that is thought to be diagnostic of the various cultural sequences reported across North America. As a result of this rationale, the primary traits chosen to taxonomically characterize the projectile points centred on the morphological shape of the basal configuration; lateral edge shape and basal concavity. Secondary traits on the projectile points include attribute states associated with flaking pattern, cross section and the frequency/degree of lateral and basal grinding. These are considered secondary traits in this analysis because they do not directly influence the morphological variability of the projectile points, but add another layer of detail suggestive of the original decision-making process. Particularly compelling is the strong numeric dominance of projectile points exhibiting the parallel oblique flaking pattern (99%). This challenging flaking technique is undertaken upon very challenging raw material, but it does not appear to have any clear 'functional' purpose. Nonetheless, its numeric dominance demonstrates that it represents an important culturally conditioned 'rule' evident at Mackenzie 1.

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It is because of all of you mentioned above (and a little hard work from me) that I was able to accomplish this, so thank you for everything!

Cheers!

DEDICATION

I would like to dedicate this thesis to the Mackenzie 1 site and all it comes to represent in uniting past and present people. As a gathering place of importance then, for those who came before us, and now for those completing the circle 9,000 years later. That connection will remain forever and is experienced everyday in the stories told of the past through research, and in the bonds made during the discovery of those stories at Mackenzie.

Here's to uniting people for thousands of years.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

This thesis addresses the morphological variation evident in projectile points recovered during salvage excavation of the Mackenzie 1 (DdJf-9) site near Thunder Bay, Ontario. It was conducted in anticipation of construction of new highway infrastructure along an ancient shoreline overlooking the current shores of Lake Superior. The occupation has been assigned to the Lakehead Complex, the regional manifestation of the Late Paleoindian culture that may represent the first human occupation of the region shortly after deglaciation. While confounded by poor organic preservation and taphonomic transformation, Lakehead Complex sites are generally thought to date over a 1,500 to 2,000 year interval shortly after the Marquette Advance, dating to 9,900 to 9,500 years ago (Fox, 1975; Julig, 1984, 1991, 1994; Ross, 1995) (see Chapter 2).

Other Late Paleoindian sites have been encountered in the Thunder Bay area, often along ancient beaches deriving from Glacial Lake Minong. The best known of these sites are noted for their large yield of core fragments, debitage, and failed biface preforms reflecting quarrying and lithic reduction activities (see Julig, 1994 and Hinshelwood, 1990; 1994). In keeping with these functions, comparatively few projectile points are generally found, resulting in problems defining the characteristics of diagnostic tools associated with this local expression of Late Paleoindian culture.

The Mackenzie 1 site is a notable exception to this generalization, and while yielding large quantities of the by-products of lithic reduction, the collection also includes a large number of projectile points combined with other formal and informal tools. This suggests a repeatedly used encampment along the Lake Minong strandline, and offers a unique opportunity to develop a locally relevant typology to address the morphological variability apparent in projectile points, and offer insight to its technological relationships with other Late Paleoindian tool forms.

1.2 THE MACKENZIE 1 SITE

The Mackenzie 1 site (DdJf-9) is located approximately 40 km east northeast of Thunder Bay, Ontario on Highway 11/17, occupying an ancient strandline of glacial Lake Minong. When lake levels in the Superior basin were controlled by the elevation of the morainal sill at Nadoway Point, near Sault Ste. Marie, frequent fluctuations in the lake level occurred throughout this phase in response to meltwater influx, differential isostatic rebound, and other factors (Boyd et al, 2012; Farrand & Drexler, 1985; Teller and Mahnic, 1988; Yu et al., 2010). Given this complexity, the Minong phase remains incompletely understood (Chapter 3).

The site was discovered during the environmental assessment prior to the proposed lane twinning of Highway 11/17. Mackenzie 1 is only one site in a series of eight Paleoindian sites investigated during this environmental assessment; other sites include (heading east from Thunder Bay) Naomi (DcJh-42), Hodder (DcJh-44), Electric Woodpecker 1 (DdJf-11), Electric Woodpecker 2 (DdJf-12), Electric Woodpecker 3 (DdJf-14), RLF (DdJf-13), Mackenzie 1 (DdJf-9), and Mackenzie 2 (DdJf-10). The sites were excavated by Western Heritage during the 2010 to 2012 field seasons (Figure 1.1).

The Mackenzie 1 site was initially investigated by Archaeological Services Inc. (ASI) who conducted the preliminary Stage 2 and 3 assessments in 2009. This framed preliminary planning of the subsequent salvage excavation conducted by Western Heritage. The

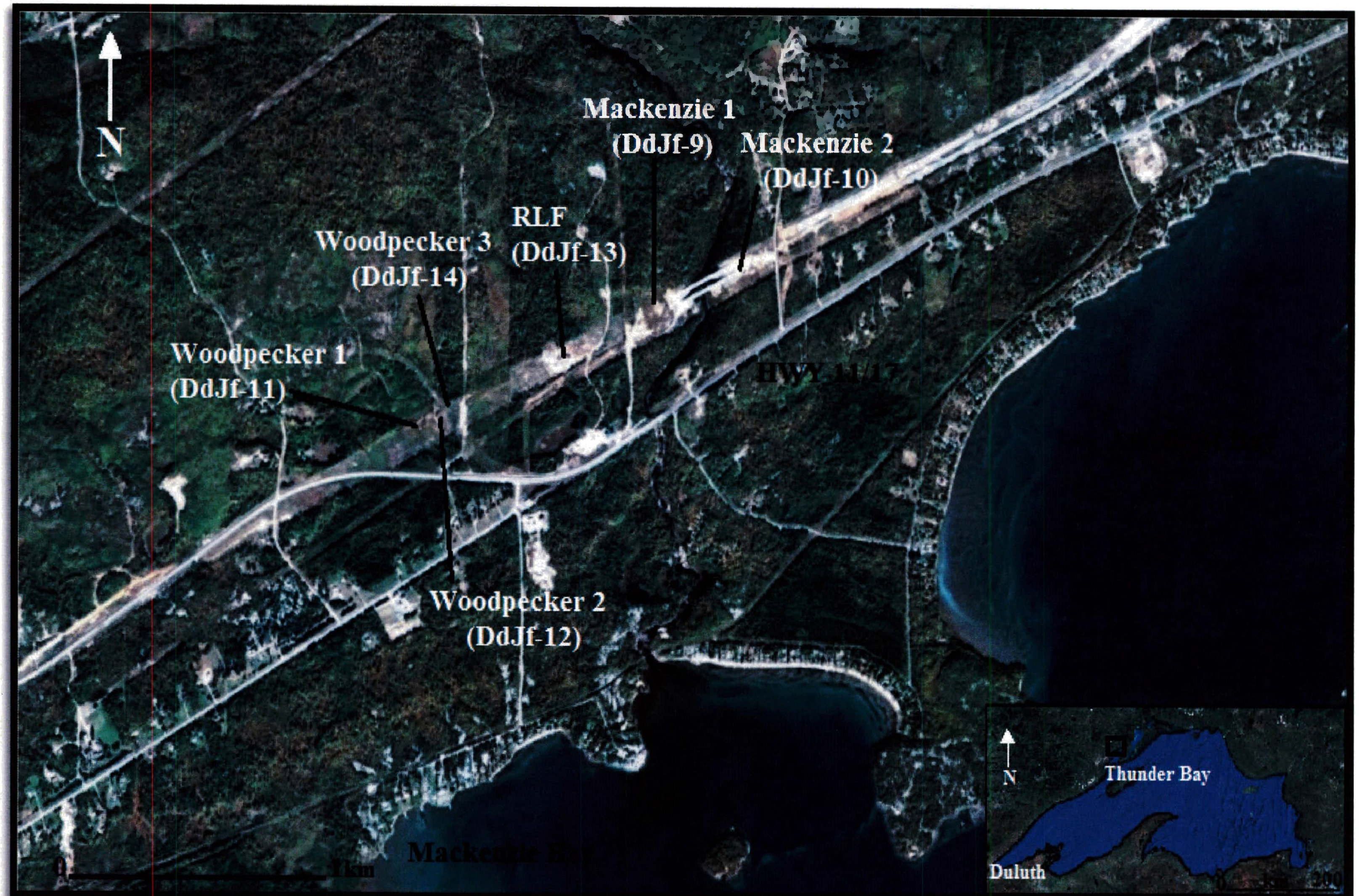

Figure 1.1: Image illustrating the Mackenzie 1 site and the surrounding Paleoindian sites discovered by Western Heritage during the twinning of Highway 11/17. The new highway and bridge construction can be seen in this photo, represented by the cleared area surrounding all of the archaeological sites impacted. The bridge over the Mackenzie River is also present, between Mackenzie 1 and 2. Image modified from Google Earth, 2013.

latter involved excavation of 2,539 m^2 units, yielding a variety of tools that included projectile points, scrapers, drill, perforators, knives, bifaces and adzes. A large amount of debitage was also recovered, representing each stage of the manufacture process, from core fragments to the finishing/retouch flakes. The dominant lithic material identified at Mackenzie 1 is taconite, a silica-rich material found locally in the Gunflint Formation. Gunflint Silica, also from the Gunflint Formation is well represented in the assemblage. The site also yielded Knife Lake Siltstone, Hixton Silicified Sandstone, Hudson's Bay Lowland Chert, Dog Lake Mudstone and various rhyolite pieces.

1.3 PREVIOUS ARCHAEOLOGICAL WORK WITHIN THE STUDY AREA

Late Paleoindian occupation has been long known in the Thunder Bay area beginning with the efforts of local avocational archaeologists coupled with that of R.S. MacNeish who investigated the Brohm site in 1950 and 1951 (1952). Bill Fox (1975; 1980) initially defined the Lakehead Complex primarily on the basis of Plano-like assemblages recovered from the Brohm and Cummins sites (see Chapter 3 and 7). It is often characterized by an association with ancient strandlines of glacial Lake Minong, the predominant use of taconite raw material, and the production of generally lanceolate projectile points. Early material culture analysis relied heavily upon projectile points that demonstrate significant morphological variability, but the small sample size precluded any sense of the relative importance of the various forms observed.

Despite this small sample size, Bill Ross (1995) proposed a higher conceptual framework that he called the Interlakes Composite to represent regional expressions of Late Paleoindian recoveries found throughout Lake Superior basin and westward throughout the lands that were deglaciated shortly after 9,000 B.P. (see Chapter 7: Discussion). The Interlakes Composite includes four regional complexes that are linked by general commonalities in raw material use, flaking technology (specifically lateral edge grinding), and a variety of lanceolate and stemmed projectile point forms (Ross, 1995). The four complexes included in the composite are Lake of the Woods/Rainy River, Quetico/Superior, Lakehead, and Reservoir Lakes.

1.4 RESEARCH CONTEXT AND PROJECTILE POINT ANALYSIS

Projectile points are often the focus of attention when considering Paleoindian sites because they are generally thought to be diagnostic from both functional and cultural-historical perspectives (see Chapter 4). This is true especially in the boreal forest environment because of the poor preservation of organic artifacts (rendering absolute dating and economic inference difficult) and the severe taphonomic processes that further limit interpretive resolution. This often forces archaeologists to focus upon projectile point form to offer interpretations based upon similarities to those observed in other (sometime quite distant) regions. The generally small sample size and diverse forms usually associated with Lakehead Complex has resulted in a tendency to 'force' specimens, on the basis of their general similarity to specific named types reported in the literature. These comparisons led to un-tested assumptions about the temporal duration of the Lakehead Complex, extra-regional cultural relationships and economic orientation. The problems associated with this approach led the author to take advantage of the uniquely large projectile point assemblage from Mackenzie 1, and undertake a more inductive approach to typology (Willey and Sabloff, 1993).

Archaeologists frequently undertake typological classification in order to understand variation. That is, to define groups of artifacts that are thought to represent and measure temporal and cultural differences (Lyman and O'Brien, 2006). Types are defined and organized based on recurring attributes that seem to vary relative to temporal or geographic context, and are thought to represent some sort of cultural reality (Justice, 2002). These diagnostic types are often defined in their idealized form, suggesting a 'modal' type, but often not explicitly addressing the range of variation subsumed within that modal type.

Much of the pioneering work in classification and typological analysis of Paleoindian materials originates in the High Plains and the Rocky Mountains in the southwestern United States. Justice (1986; 2002) and Kornfeld et al. (2010) provide general overviews of the archaeology and typological analyses pertaining to different areas of the continent. These compilations of data provide a baseline for comparison to other archaeological assemblages across the continent. Such syntheses, while very valuable, often are used without due consideration of the range of acceptable variation subsumed within each type, and that projectile point form can be the result of many processes or behaviors, such as the manufacturing methods, the raw material chosen, tool maintenance, use-life of particular tools, use, breakage and resharpening (Howard, 1990). The literature addressing these possible behavioural explanations for tool variation is conducted by experimental archaeologists working to reconstruct past stone tools and hunting practices (Flenniken and Raymond, 1986; Frison, 1989; Towner and Warburton, 1990).

Over the last decade, there has been a growing realization that the classic Paleoindian typologies developed in the Great Plains may have limited utility in contributing to the cultural chronologies of other regions (Holiday, 1997; Morrow and Morrow, 1999; Pitblado, 2003; Sellet, 2001). Some authors have attempted to understand and correct the process of artifact classification (Adams and Adams, 1991; Dunnell, 1971; Lyman and O'Brien, 2006; Read, 2007). It has become evident that the problems with the classic typological classification are perpetuated by the continuing tendency to use the defined names in the literature. This can be demonstrated by examining two main discrepancies in chronological sequences in the High

Plains area. One described by Sellet (2001) addressed ambiguity in the Goshen-Midland-Plainview definitions, and the second is by Pitblado (2003) and demonstrated similar issues revolving around the Jimmy Allen/Frederick-Angostura debate (Chapter 2). Though the types overlap geographically and temporally, both examples are defined as distinct cultural markers based on minor morphological differences of the projectile points. Types can be used as broad chronological references, but become controversial as cultural markers extrapolated across geographical space. The confusion in this case, is a result of the complex relationship between the 'cultural diversity' demonstrated in the points combined with the geographical overlap (Sellet, 2001). It is possible that the projectile points were made and used contemporaneously, which would render the chronological distinction misleading (Pitblado, 2003; Sellet, 2001) (Chapter 2).

This is the context in which this thesis research is relevant. Three sites excavated by Western Heritage yielded projectile points: Electric Woodpecker 2, Mackenzie 2 and Mackenzie 1. Consistent with the general pattern of Lakehead Complex sites, Electric Woodpecker 2 yielded four projectile points, and Mackenzie 2 yielded one projectile point. However, the Mackenzie 1 site yielded 380 points and point fragments. This consisted of 53 complete points (16 of those consist of two or more pieces that refit together to make them complete), 116 base fragments, 80 midsection fragments, 116 tip portions, and 15 projectile points in different stages of use-life (five points that were reworked into scrapers, five that are chisel shaped, and five that appear pseudo-notched). While other Lakehead Complex sites have been subjected to large-scale salvage excavation, none have yielded a similarly high number of projectile points. This renders the Mackenzie 1 site very important for fully understanding the typological variability within the

Lakehead Complex while consciously avoiding reference to the 'named types' representing the Late Paleoindian classical taxonomic scheme.

1.5 OBJECTIVES

The primary goal of this thesis is to document the variability observed in the Mackenzie 1 projectile point assemblage utilizing an alternative approach to classifying assemblage components. This analysis inductively considers the morphological variability apparent in the collection without reference to the named types in the classical typological literature. While guided by the literature describing important technological and morphological traits, the analyst sought to identify patterned variation in attribute expression within the collection in order to define types that are represented in the Mackenzie 1 assemblage. Given the large sample size, these types could then be ranked on the basis of the number of specimens so classified in order to suggest general technological trends characteristic of the site. Upon characterization of the morphological variability apparent at the Mackenzie 1 site, the identified types are then compared to specimens recovered at other Lakehead Complex (and also Interlakes Composite) sites to assess whether this typology has regional analytic utility. Finally, the Mackenzie 1 collection is compared to the classic types that are reported in the primary literature to address just how well the local Late Paleoindian technological expression conforms to it. An element of this latter exercise also involves offering perspective which of the well-published point types (if any) offer a sense of stylistic or technological similarities to the Mackenzie 1 collection, and more broadly to the Lakehead Complex.

The subsequent chapters within this thesis contribute to the thesis discussion and further set the context for this specific attribute analysis. Chapter 2 provides a general overview of the prehistory of North America, including a summary of deglaciation and human migration and settlement within the continent.

Chapter 3 offers a more detailed summary of the prehistory of northwestern Ontario. This includes a discussion of the trends observed regarding archaeological discovery within the Thunder Bay region. This culminated in the definition of the Lakehead Complex by Fox (1975; 1980) and the Interlakes Composite by Ross (1995). This discussion is complimented by speculation about the initial peopling of northwestern Ontario and the lake history of the Superior Basin.

The theoretical framework of classic typological analysis that yielded the named types in the literature is outlined in Chapter 4. The challenges presented by the culture-historical approach to archaeological analysis within this region become apparent, and justification as to why this is not possible in this area is discussed.

The methodological framework for the analysis conducted for this thesis is presented in Chapter 5. This chapter outlines the way in which the author conducted the inductive approach to projectile point analysis. The attributes and the attribute states that were recorded within the projectile point assemblage are illustrated. The significance of avoiding the classic typological analysis for this assemblage becomes apparent.

The results of this analysis are presented in Chapter 6, which includes a metric and non-metric summary. Observed trends apparent within the assemblage demonstrate the narrow range of variability present. Each group created by the specific types defined through the attribute analysis approach by employing the methodology is outlined.

The results of the analysis are discussed further in Chapter 7 to demonstrate the range of variability within the Mackenzie 1 projectile point assemblage, summarize the trends observed, and offer speculations about the broader influences contributing to attribute expression. A discussion of why this attribute analysis presents significant data concerning the occupation of the Mackenzie 1 site is outlined.

In order to demonstrate the similarities in the regional stylistic expressions observed on projectile point assemblages is discussed in Chapter 8. The approach utilized to analyse the Mackenzie 1 projectile point assemblage is applied to collections comprising the Lakehead Complex and the Interlakes Composite. This comparison allows for the analysis of spatially co-occurring attribute states that may indicate the stylistic influences from surrounding regions.

Chapter 9 provides a clear and concise summary and conclusion of the research conducted throughout this thesis analysis. A comparison of the attribute states to the classic typological chronology is presented to demonstrate the challenges when attempting to apply named types to projectile point assemblages. An attempt is made to provide classic type names to illustrate these complications.

CHAPTER 2

NORTH AMERICAN DEGLACIATION AND PREHISTORY

2.1 INTRODUCTION

This chapter offers an overview of the North American Paleoindian cultural sequence, defined primarily by stylistic variability in projectile point types. This variability is thought to indicate either cultural/stylistic or functional preferences, and has very broad chronological and geographic meaning. The projectile point types are sometimes associated with absolute date ranges, but more often we currently only understand their relative temporal sequence. These people were sparsely distributed across Late Pleistocene North America, and are generally thought to have been mobile hunter-gatherers who exploited large-bodied animals that were adapted to glacial conditions (Kornfeld et al., 2010). As deglaciation proceeded and environments changed, the arctic-adapted animals and their predators were drawn northwards over huge territories. This thesis describes the Late Paleoindian projectile point technology making up one regional expression of this northward expansion, and critically addresses how the spear tips recovered from the Mackenzie 1 site fit into the conventional typological syntheses found in the literature.

2.2 LATE QUATERNARY DEGLACIATION OF NORTH AMERICA

In order to provide context to the early culture history of the study area, it is important to summarize both the deglaciation sequence and our current understanding of Paleoindian culture history to help frame our current archaeological understanding of the initial peopling of Northwestern Ontario.

The ice sheet complex of the Last Glacial Maximum (LGM) was made up of two main glacial ice sheets; the Laurentide (LIS) covering the Canadian Shield, and the Cordilleran to the west (Dyke, 2004) (Figure 2.1). The LGM lasted from approximately 21,000 to 18,000 ^{14}C (~24,500 to 21,900 cal) years B.P. characterized by relatively stable climate and a period of low global sea levels (Dyke et al., 2002). After approximately 18,000 ^{14}C years B.P. the LIS began to waste away and retreat northward, creating proglacial lakes to the south of the ice sheets. The large glacial lakes had very complex histories of changing water levels as glacial water outlets opened and closed in response to isostatic rebound and fluctuations in ice margin positions

Figure 2.1: Image demonstrating the two main glaciers covering North America, the Laurentian and Cordilleran Ice Sheets. The ice free corridor (IFC) refers to the open space between the two ice sheets. This is the representation of the glaciers at 12,500 years B.P. (14,400-15,200 cal B.P.), modified after Dyke (2004).

(Teller, 1995). The four major glacial lakes in Canada and United States were Lakes Agassiz, Minong, Barlow-Ojibway, and Algonquian. These lakes will be discussed in more detail in the following chapter.

Deglaciation and associated climatic changes in North America likely allowed for the migration of people from northeastern Asia to the Americas at some point in the Late Pleistocene. Precisely when this occurred and especially the route of migration is still the subject of debate, but it is generally agreed that anatomically modern humans have occupied much of the unglaciated Western Hemisphere for at least the past 15,000 years (Dixon, 1999; Meltzer, 1995; 2003). With the significant climatic changes associated with the Holocene, these people repeatedly adapted and adjusted to the changing biotic and climatic circumstances.

After a period of climatic warming and deglaciation after ca. 15,000 ^{14}C (~18,300 cal) years B.P. (Bølling-Allerød), the Younger Dryas occurred (a period of colder climate, and glacial re-advance) ca. 11,000 ^{14}C (~12,900 cal) years B.P. (Dyke, 2004; Dyke et al., 2002; Fiedel, 1999; Teller, 1995). Following this cooling trend, warming conditions and deglaciation resumed after ca. 10,000 ^{14}C (~11,500 cal) years B.P., and culminated in mid-Holocene times (ca. 8,000 to 4,500 ^{14}C (~8,900 to 5,100 cal) years B.P.) with the Altithermal, or the Hypsithermal. This period of extended drought is thought to have allowed the grassland/parkland boundary to expand north beginning ca. 14,000 ^{14}C (~17,000 cal) years B.P. (Strong and Hills, 2003; Webb et al., 1993; Williams et al. 2010). It is hypothesized that this warming trend diminished the carrying capacity of the grasslands, resulting in reduction of bison populations in the short grass plains, forcing the inhabitants of that area to move to fringe regions in pursuit of bison and other animals who sought permanent water sources (Buchner, 1980; Cyr et al, 2011; Frison, 1975).

This desiccation on the Plains combined with the opening of new northern lands through deglaciation, might have contributed to the northward migration of the Late Paleoindian groups.

These fluctuations in temperatures were time-transgressive; conditions originally felt on the Southern Plains were experienced much later and differently in the north (and also east to west) because the proximity to the ice front kept summer temperatures low within a narrow zone adjacent to the glacier (Cyr et al., 2011; Liu, 1990; Meltzer, 1999; Williams et al., 2010). However, because the LIS blocked the arctic air flow into the region, the expansion of warm/moist air from the south (i.e., the Gulf) caused a steeper climatic gradient than seen today (Cyr et al., 2011; Liu, 1990; Meltzer, 1999; Williams et al., 2010). In the north, the warm, dry temperatures encouraged the northward advance of the boreal forest on the Canadian Shield after 10,000 ^{14}C (~11,500 cal) years B.P. (Liu, 1990). The hardwood dominated Great Lakes-St. Lawrence forest shifted north, reaching the northern limits of the Canadian Shield uplands, 140 km north of its present boundary ca. 7,000 to 3,000 ^{14}C (~7,800 to 5,700 cal) years B.P. (Liu, 1990).

2.3 THE PEOPLING OF THE NEW WORLD

The initial peopling debates are complex and ongoing, but share a general agreement of derivation from northeast Siberia sometime in the last 18,000 to 15,000 years. The archaeological evidence between Siberia and Alaska is sparse because the majority of the area once free of water is now inundated below the Bering Strait (Figure 2.2). There are similarities between the two areas; both areas present evidence of the Arctic-adapted Upper Paleolithic microblade technology (Stanford and Bradley, 2012). The technological difference apparent between Siberian/Alaskan and Clovis sites suggests there was some other primary influence on technological development throughout North America (Bradley and Stanford, 2004; Stanford and Bradley, 2012). Archaeological sites in Siberia/Alaska date to approximately 14,000 to 8,500 14C (17,000 to 9,300 cal) years B.P. (Bever, 2001; 2006; Dixon, 1985; 1999; Dumond, 2001; Hoffecker, 2002; Melzer, 2009; Stanford and Bradley, 2012).

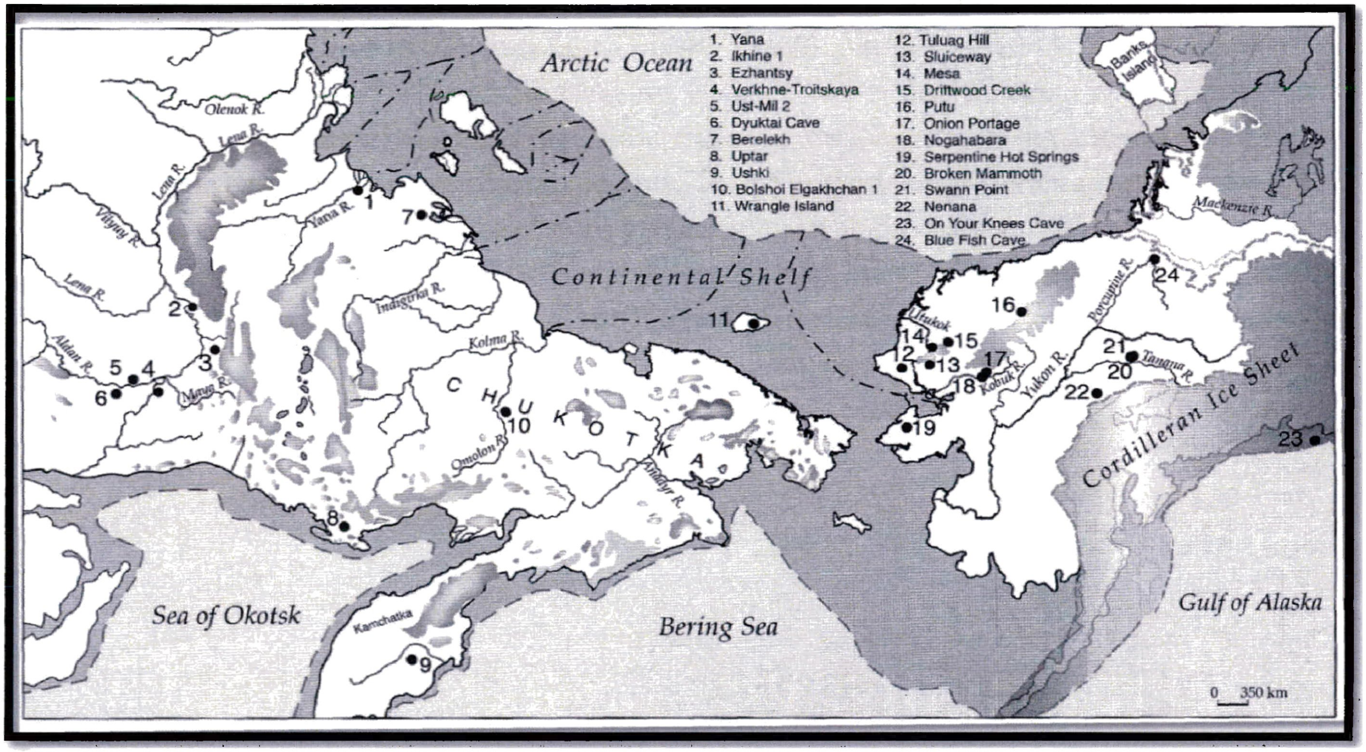

Figure 2.2: Map depicting the extent of Beringia at the height of the LGM when the Beringia Land Bridge connected Siberia to Alaska, creating a plausible migration route into North America. Also illustrated are the significant archaeological sites of Beringia, some of which are mentioned in the text (Stanford and Bradley, 2012: 68).

The complexity of the peopling debate is demonstrated in the four hypotheses concerning the initial colonization of North America (Figure 2.3) (Hamilton and Buchanan; 2007; Whitley and Dorn, 1993). The first is the traditionally accepted view of the "Clovis first" model where by humans migrated into North America from the north over the Beringia Land Bridge, and colonized the south through the ice-free corridor (IFC) between the Laurentide and Cordilleran ice sheets (Bradley and Stanford, 2004; Bryan, 1969; Jackson et al., 2000; Dyke, 2004; Dyke et al., 2002; Mandryk, 1990; Reeves, 1973; Reeves, 1971).

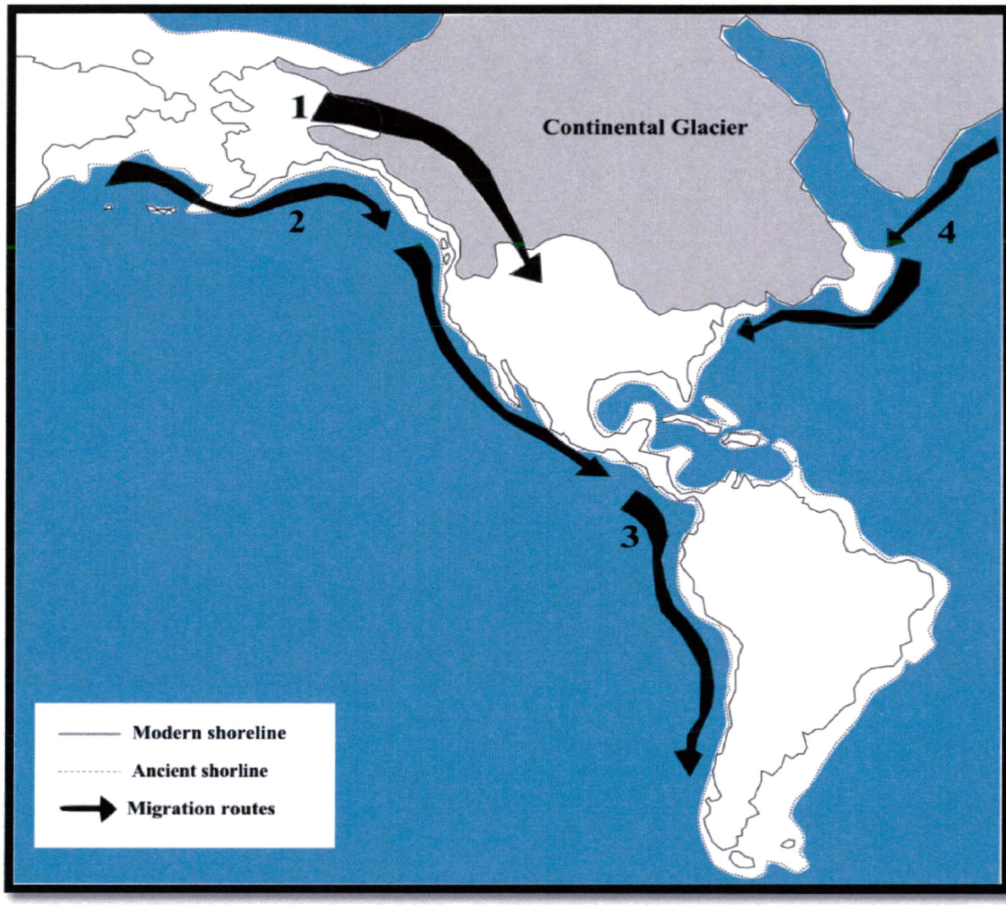

Figure 2.3: The hypothetical migration routes mentioned: 1) IFC route, 2) NWC model, 3) pre-Clovis, and 4) Eastern coast model (modified after Dixon, 1999 (Figure 2.5; Stanford and Bradley, 2012).

The second hypothesis that directly challenged the "Clovis first" theory has been the proposed Northwest Coast migration route (Dixon, 1999; Fedje and Christensen, 1999; Fladmark, 1979; Mandryk et al., 2001; Whitley and Dorn, 1993). The Northwest Coast Model (NWC) is represented by sites along the coast of Alaska, British Columbia and Washington State, suggesting a maritime-adapted group could have utilized watercraft to traverse the ice-free western coast, then penetrate the interior of the continent some time later (Dixon, 1999;

Erlandson, 2002; Erlandson et al., 1999; Mandryk et al., 2001; Rick et al., 2005; Ward et al., 2003). The archaeological evidence is sparse and largely obscured by the rising sea levels as the glaciers melted and effectively drowned any archaeological evidence to support this theory.

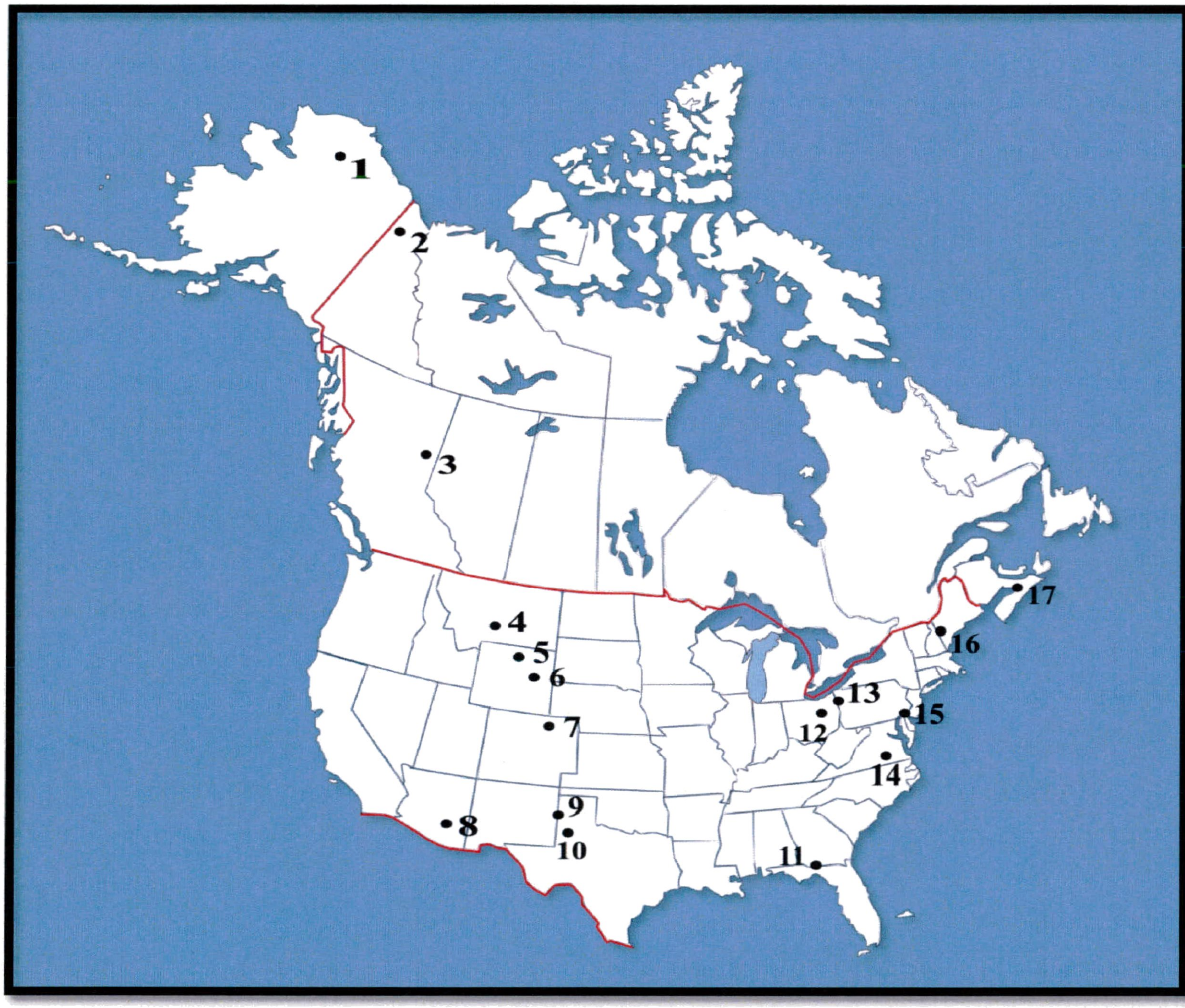

Figure 2.4: Earliest archaeological sites in North America. The numbers correspond to Table 1.

The third hypothesis acknowledges sites in South America that may represent a cultural group dating before the appearance of Clovis, and migrated north into North America resulting in early sites in the southern United States (Dillehay et al., 1982; Waters et al., 2011). This theory proposes humans moved north through the Isthmus of Panama and colonized North

America from the south (Anderson and Gillam, 2000; Hamilton and Buchanan, 2007). This theory would account for the discovery of archaeological materials recovered from sites such as Meadowcroft Rockshelter in Pennsylvania (Adovasio et al., 1978) and Monte Verde in Chile (Dillehay et al., 1982; Fiedel, 1999; Waters et al., 2011) that have yielded dates earlier than the conventionally accepted dates for the Clovis complex (Figure 2.4; Table 2.1). Recent discoveries of the Buttermilk Complex at the Debra L. Friedkin Site in Texas that stratigraphically underlies a Clovis assemblage also provides further evidence to suggest a Pre-Clovis occupation

Site Number	Site Name	Radiocarbon Years B.P.	Calibrated Years B.P.	Reference
1	Mesa	10,040	11,847	Kunz and Reanier, 1995; Bever, 2006
2	Blue Fish Cave	13,580	14,752	Morlan, 2003; Cinq-Mars, 1979; Cinq-Mars & Morlan, 1999
3	Charlie Lake Cave	10,770	12,782	Driver et al., 1996; Fladmark et al., 1988
4	Anzick	11,040	13,030	Waters & Stafford, 2007
5	Colby	10,870	12,908	Frison, 1986
6	Casper	11,190	13,106	Frison, 1974
7	Dent	10,990	12,965	Waters & Stafford, 2007
8	Murray Springs	10,855	12,945	Haynes et al., 1984
9	Blackwater Draw	11,170	13,275	Haynes et al., 1987
10	Lubbock Lake	11,100	13,010	Waters & Stafford, 2007
11	Sloth Hole	11,050	12,969	Waters & Stafford, 2007
12	Paleo Crossing	10,980	13,000	Brose, 1994
13	Meadowcroft Rockshelter	14,500	17,637	Adovasio et al., 1978; Goldberg et al., 1999
14	Cactus Hill	10,800	12,800	McAvoy & McAvoy, 1997
15	Shawnee Minisink	10,935	12,935	Waters & Stafford, 2007
16	Vail	10,530	12,255	Gramly, 1982
17	Debert	10,590	12,429	MacDonald, 1968; Levine, 1990

Table 2.1: Early archaeological sites in North America shown in Figure 2.4, with associated references.

approximately 13,200 to 15,500 ^{14}C years B.P. (Waters et al., 2011). It is possible that Clovis technology spread widely via stimulus diffusion, or cultural transmission, through an already established pre-Clovis population (Waters and Stafford, 2007).

The final hypothesis for the human migration into North America has been offered recently, and involves the diffusion of humans from Europe, colonizing North American from the east (Bradley and Stanford, 2004; Hamilton and Buchanan, 2007). This model arose because of the proposed technological similarities of the Clovis culture to the Solutrean culture in Europe (Bradley and Stanford, 2004). There are a large number of fluted projectile points present in the southeast of North America, leading researchers to hypothesize people may have been initially occupying the continent from the east (Stanford and Bradley, 2012; Mason, 1962). Early sites are

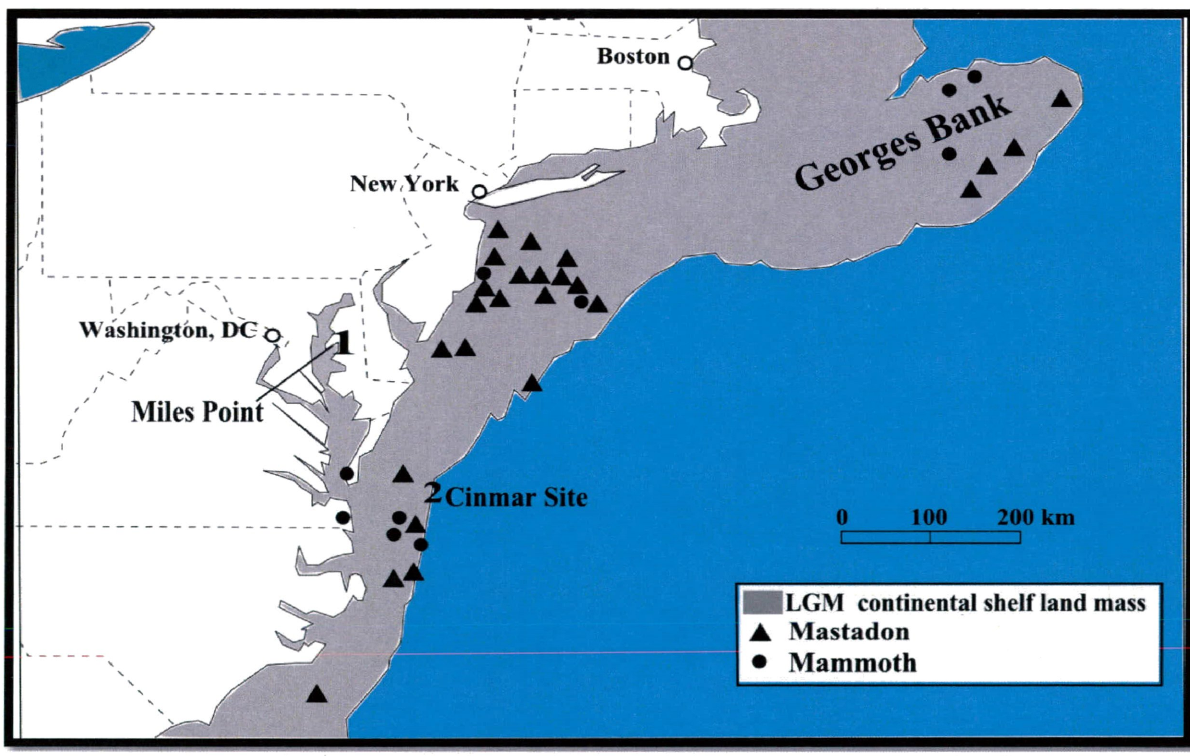

Figure 2.5: The Mid-Atlantic Coast at the Last Glacial Maximum (LGM) demonstrating submerged sites where late Pleistocene mastodon and mammoth remains have been recovered. Two archaeological sites, Miles Point and the Cinmar Site locations are identified also (modified after Whitmore et al., 1967: 1479; Stanford & Bradley, 2012: 213).

found along the eastern edge of the continent, indicating not only a significantly early occupation but also in an area removed from the IFC or the Northwest coast described in the first two hypotheses above (Figure 2.5). Sites with substantially old radiocarbon dates with associated lithic materials include Cactus Hill in Virginia (McAvoy and McAvoy, 1997 as cited in Stanford and Bradley, 2012), the Page-Ladson site in Florida (Dunbar and Hemmings, 2004) and Meadowcroft Rockshelter in Pennsylvania (Adovasio et al., 1978).

Current archaeological research involving these hypotheses is exploring coast lines underwater to prove the presence of humans when the water level was lower (Faught, 2004; Fedje and Josenhans, 2000). The slowly accumulating archaeological evidence addressing the migration of humans into North America is suggesting a complex cultural sequence, leading to the consideration that several migration processes may be at work. Likely, these hypotheses suggest there were many migration episodes into North America via different routes, producing many archaeological sites with varying technological evidence and questionable radiocarbon dates. Generally, this discussion indicates it is likely that a pre-Clovis culture occupied North America that was followed by the abrupt appearance of Clovis culture as a distinctive style widespread across the continent.

2.4 PALEOINDIAN SUBSISTENCE

2.4.1 Animal Procurement

Paleoindian people lived in small, mobile hunting groups that were economically self-sufficient (Mason, 1997). Archaeological discussion of animal procurement generally stem from sites in the southern Plains and perpetuate the assumption that big game hunting was preeminent for Paleoindians and derived from exploitation of the Pleistocene megafauna (Grayson and

Meltzer, 2002; Hill, 2007; Kornfeld et al., 2010; Mason, 1997; Peers, 1985; Pettipas and Buchner, 1983). However, humans likely also consumed plant resources to compliment the heavy protein diet (Kornfeld et al., 2010; Haynes, 1980).

With the extinction of the mammoths in North America, the bison became the most exploited mammal on the Plains. Kornfeld et al. (2010) suggest this is evident in the change in tool technology, from large Clovis projectile points, to smaller, more specialized projectile points, such as Folsom, Goshen/Plainview, Agate Basin and Hell Gap types. These specialized projectile points were developed to effectively and efficiently penetrate the hide of the bison. This required the adjustment of projectile point design from the large, heavy Clovis projectile points utilized to kill mammoth and mastodon, to smaller and lighter projectile points that would sufficiently penetrate the bison hide to provide a lethal blow (Kornfeld et al., 2010). Multiple bison bone beds have been discovered across the Plains, such as the Mill Iron site (Frison, 1996; Kornfeld et al., 2010), the Agate Basin site (Frison and Stanford, 1982) and the Casper site (Frison, 1974).

Evidence from other sites reveals that the theory suggesting Paleoindian subsistence was focused heavily upon large mammals was a misconception. Meadowcroft Rockshelter offers evidence of terrestrial and aquatic mollusk shells, feathers, claws, insect carapaces, egg shells, and fish scales (Adovasio et al., 1978). This evidence may or may not indicate consumption of such species and could simply represent a natural component of soil fauna. Mammal remains are also present, and include caribou, wapiti, and smaller game, as well as birds. There is also a high representation of floral remains, including sections of tree trunks and limbs, with and without bark, and minute seeds and seed coats; the most common being charred and uncharred (that could potentially represent contaminants) hackberry (*Celtis occidentalis*) or dwarf hackberry

(*Celtis tenuifolia*) seeds, while walnut (*Juglans spp.*) and hickory (*Carya spp.*) are also present (Adovasio et al., 1978: 648). This indicates that Paleoindians were exploiting a wide variety of plant and animal resources. The Blue Fish Cave sites demonstrates the diversity of animals utilized for subsistence, yielding remains of mammoth, caribou, sheep, lemur and vole (Dixon, 1999; Morlan, 2003; Wilson and Burns, 1999).

In summary, considerable debate revolves around patterns of Paleoindian subsistence. Site localities with better organic preservation are observed are more frequently found on the Great Plains. These sites imply a specialized economy focused upon large mammal species (Hill, 2007; Kornfeld and Larson, 2008). This data may have been used inappropriately to extrapolate to other Paleoindian sites found in other Late Pleistocene biomes that are characterized by much poorer organic preservation. The few sites not located on the Great Plains where organic preservation is present suggest a much broader spectrum subsistence economy. Instead of a specialized economy focused on large mammal species (i.e., mammoth and mastodon), Paleoindians most likely adopted a broad spectrum hunting and gathering strategy surrounding not only the acquisition of large game (e.g., caribou, elk, and deer), but also smaller game (e.g., hare, bird, and fish) and plants (Adovasio et al., 1978; Hill, 2007; Kornfeld et al., 2010; Kornfeld and Larson, 2008; Peers, 1985).

2.4.2 Paleoindian Weaponry

Prehistoric hunting operations required specialized weapons that were sufficiently strong and effective in killing large and small animals while also minimizing energy and manufacturing costs. Throughout much of the Paleoindian period this involved attaching stone projectile points to a foreshaft or directly onto the main spear shaft using sinew (Figure 2.6). These weapons were then launched at prey using three different techniques, a thrusting action, a direct throw, or thrown using an apparatus called an atlatl (Frison, 1986; 1998; Kornfeld et al., 2010) (Figure 2.6). The atlatl provided the hunter with greater effective range, velocity and accuracy, resulting in deeper projectile penetration and wound severity (Fagan, 2005).

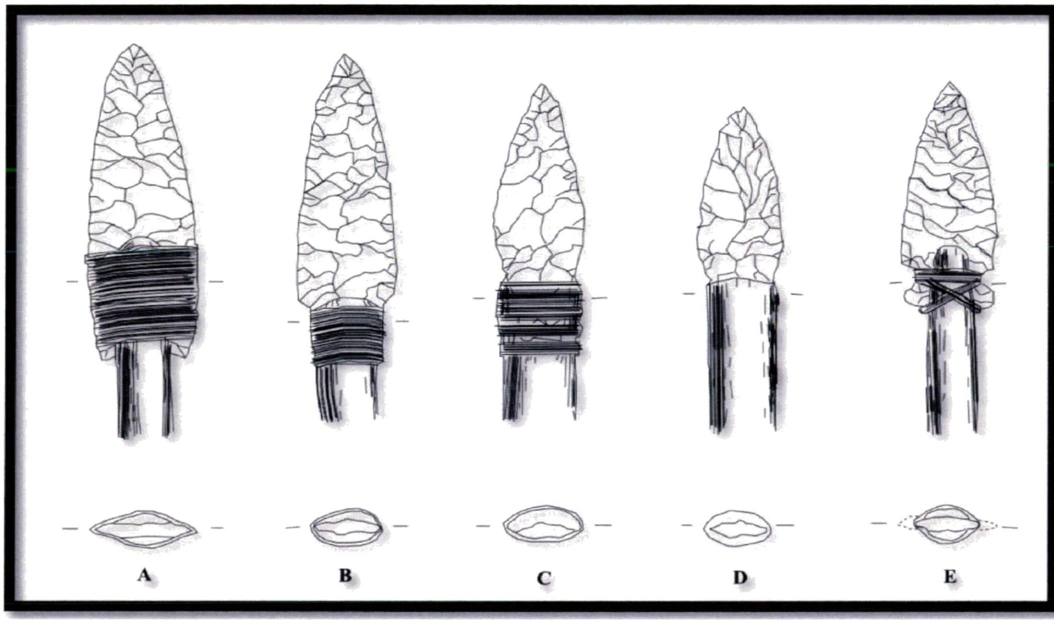

Figure 2.6: Illustration of hafting techniques. A) split shaft; B) parallel sided stem inserted into a socket; C) constricting stem hafted open; D) socket haft; and E) split shaft for a notched specimen. Below are the cross-sections of how the projectile points look when hafted (modified from Dixon, 1999: 156; Musil 1988: 373).

To be effective as hunting weapons, projectile points were designed and maintained to withstand the shock of penetrating the prey's hide, creating a lethal wound (Frison, 1989; 1998; Kornfeld et al., 2010). To be effective, the projectile point required specific attributes: a tip sharp enough to penetrate the hide, blade edges sharp enough to widen the wound, and a base that could be bound to a foreshaft or mainshaft with sinew. These considerations were coupled with the need for a projectile tip that was strong enough to absorb the impact, but not so bulky to impede flight of the weapon or to hinder penetration (Frison, 1989; 1998; Kornfeld et al., 2010).

It is not clear whether Paleoindian hunters routinely used spear foreshafts, due to generally poor organic preservation conditions.

These objects offered some advantages that were tempered by other considerations. Such bone or antler objects would require considerable time and skill to manufacture, and would have to be produced to precise design specifications in order to fit the main spear shaft (Dixon, 1999; Frison, 1989; 1998; Kornfeld et al., 2010). Foreshafts also offered advantages in that hunters could easily carry a number for re-arming and therefore reducing the number of spear shafts that would be required. This would reduce the number (and weight) of relatively cumbersome weapons that would have to be carried, and the hunter was provided with the option of recovering and re-arming the main shaft while the foreshaft and projectile point remained lodged in wounded animals. Projectile points require less energy and time to produce, maintain, store, and monitor compared to spear shafts, thereby offering advantages of a few spear shafts being re-armed with a succession of projectile point and foreshaft assemblies (Kornfeld et al., 2010). The spears need to be straight, the foreshaft must fit flawlessly and the atlatl spur must engage properly with the proximal end of the main shaft for effective throwing paths and subsequently the efficiency in killing the animal (Bleed, 1986; Cheshier and Kelly, 2006; Flenniken and Raymond, 1986; Frison, 1989; 1998; Kornfeld et al., 2010).

The durability of a projectile point is significant also, as it is required to pierce the hide and remain lodged (Cheshier and Kelly, 2006; Hughes, 1998; Towner and Warburton, 1990). The action of hafting a projectile point to a spear or foreshaft requires a specific set of characteristic morphological features. Projectile points are designed with a specific function in mind (to kill an animal), but some morphological features present on the projectile points are considered non-mechanical, or have no functional purpose. These non-mechanical attributes come to define projectile point assemblages and provide a way to identify similarities and differences between and among projectile point assemblages.

2.5 THE PALEOINDIAN TRADITION: PROJECTILE POINT TYPES

Projectile point typologies are categorized into two groups based on specific morphological characteristics that seem to have some temporal meaning; Fluted Point Tradition (Early Paleoindian) and Lanceolate Point Tradition (Late Paleoindian). Types are discussed below in an attempt to demonstrate the different morphological characteristics that define projectile points found in different geographical locations. The summaries only focus on major Paleoindian point types from the Plains and Eastern Woodlands/Great Lakes regions because there are some similarities in attributes observed on the Mackenzie 1 collection. By outlining the morphological characteristics that define the previously established types in the literature, it may be possible to build interpretations of the transmission of ideas and/or people through examining shared traits within the material culture. This discussion will provide a foundation for the later discussion of the inclusion of the Mackenzie 1 assemblage and the Lakehead Complex in the broader chronological context of projectile point typologies of North America.

2.5.1 Early Paleoindian: Western Fluted Point Tradition

The first formalized discussion of lithic materials associated the Clovis culture and its distinctive projectile point morphology was defined by Sellards (1952) at the Paleoindian type site near Clovis, New Mexico. Subsequent studies formalized the definition of the stylistic attributes associated with this projectile point type that featured 'fluting', a basal thinning technique whereby one or more flakes are removed from each face that extend to at least half the length of the point, with parallel or slightly convex sides, concave bases, lateral and basal grinding (Figure 2.7) (Wormington, 1957, 1977; Bradley, 1982; Callahan, 1979; Witthoft, 1952;

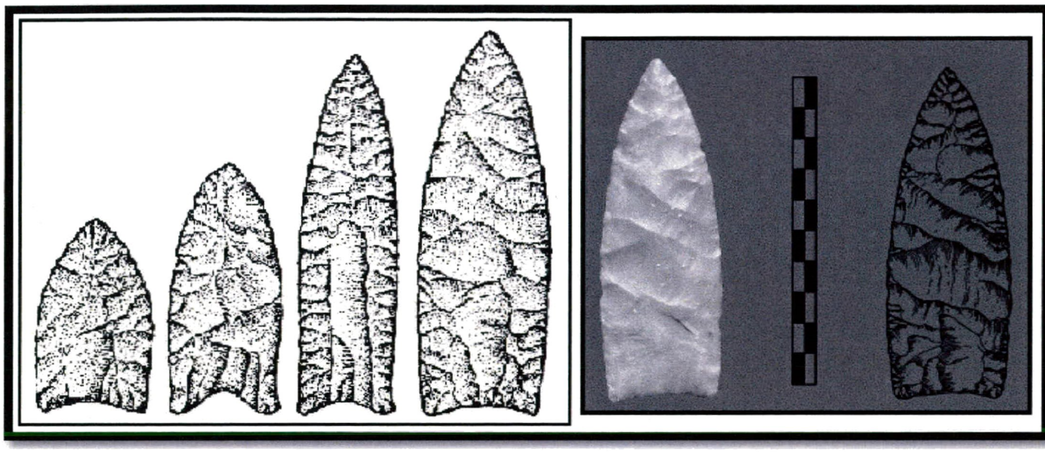

Figure 2.7: Clovis projectile points demonstrating the characteristic fluting of the basal portion. Clovis projectile points demonstrate a wide range of variability (Bradford, 1976: 10). The right is an image of a specimen made from a locale chert (No. A186) from the type site of the Clovis projectile points, (Blackwater Draw Site, New Mexico) and was found in association with mammoth (No. 4) vertebrae and ribs (line drawing by F. Sellet, photo by D. Meltzer (Meltzer, 2003: Figure 3).

Fitting, 1963; Storck, 1983; Justice, 1987; Fagan, 2005; Irwin and Wormington, 1970; Kornfeld et al., 2010; Kooyman, 2000; Howard, 1990). Clovis points have been found distributed across North America, but with geographical constraints imposed by the glacial ice sheets (Justice, 1987). Clovis archaeological sites date from as early as 11,050 to 10,800 ^{14}C (~13,125 to 12,925 cal) years B.P. in the Great Lakes region and into the northeast (Waters and Stafford, 2007). The Clovis lithic manufacture process is quite distinct, exhibiting a percussion bifacial thinning technique resulting in flake scars that extend all the way across the face of the blade (transverse) with pressure finishing flakes along the edges (Bradley, 1982; 1991; Justice, 1987).

The other tool tradition that appears during the Early Paleoindian time period in the west is Folsom, with well-documented radiocarbon date range between approximately 10,900-10,000 ^{14}C (~12,800-11,500 cal) years B.P. obtained from a variety of sites located mainly in the western United States (Figure 2.8) (Fagan, 2005; Figgins, 1934; Frison, 1991; Justice, 1987; Kooyman, 2000; Kornfeld et al., 2010; Roosa, 1965; Wormington, 1957). The Folsom points are characterized by the presence of a flute that extends over the length of the blade on one or both

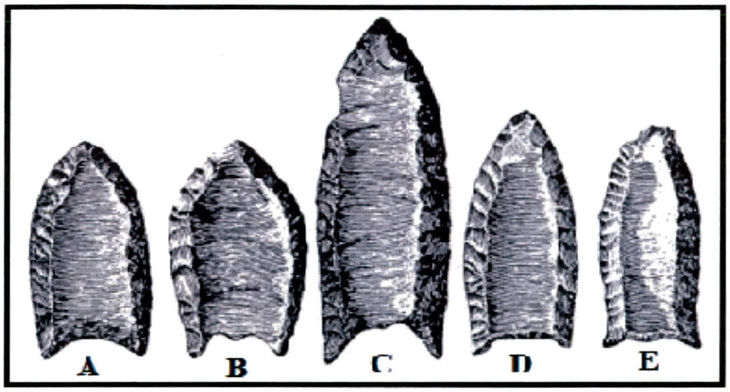

Figure 2.8: Folsom projectile points demonstrating the characteristic fluting over the entire face of the blade. These are examples of points found at the Lindenmeier Site in northern Colorado. The image illustrates five examples from Area 1; B (2130), C (447), E (1601) and Area 2; A (G385), D (G458), modified from Wilmsen & Roberts Jr., 1979: 114, 115.

faces, usually demonstrating a concave base with a central nipple protrusion, indicating the manufacture technique (Crabtree, 1966). The points are thin, small with straight edges that may or may not appear to have flared ear-like projections, and a snub-nosed appearance of the tip (Fagan, 2005; Irwin-Williams et al., 1973; Irwin and Wormington, 1970; Justice, 1987; Kornfeld et al., 2010; Wormington, 1957). It is also significant to note that Folsom points are a regional cultural expression, found primarily throughout the Southwest, Plains and parts of the Central to upper Mississippi Valley, while the Clovis culture has a very large geographical and temporal expression across the continent (Frison, 1991; Justice, 1987; Kornfeld et al., 2010).

These two Early Paleoindian technologies share one major stylistic attribute, namely fluting (Frison, 1991; Kooyman, 2000; Reeves, 1983; Wormington, 1957). Clovis and Folsom projectile points are the best known of the fluted points, but eastern variants include Cumberland and Barnes points (discussed below). This fluting technique is used to thin the medial potion of the point by removing a large channel flake from both the ventral and dorsal surfaces of the point. This may have facilitated hafting the point to a shaft, and possibly might have been favoured for its aesthetic effect (Wormington, 1957; Reeves, 1983; Justice, 1987; Howard, 1990; Frison, 1991; Mason, 1997; Kooyman, 2000; Kornfeld et al., 2010). These types are rarely confused with other types, however the projectile point types making up the Plano Tradition are classified into several different (competing) typologies or traditions.

2.5.2 Paleoindian Traditions: Lanceolate Points

The Paleoindian sequence following Clovis and Folsom is more complex and consists of geographically and temporally overlapping point types. The cultural sequence is further convoluted with the naming of regionally distinct varieties that show similarities to already established types found in other areas and published in the literature (Figure 2.9). Large multi-component sites such as Agate Basin and Hell Gap yielded intact stratigraphic sequences with associated projectile point types. Where stratigraphically intact sites do not exist, the stratigraphic/temporal context is extrapolated from the sequence identified at these multi-component sites. The problem is that temporal (stratigraphic) relationships observed at the large multi-component sites have been used (perhaps inappropriately) to estimate antiquity of recoveries from other widely dispersed geographic locations. In many cases, these assumptions of antiquity have never been verified with absolute dates and projectile point sequences discovered in locations removed from multi-component sites are not consistently defined nor are

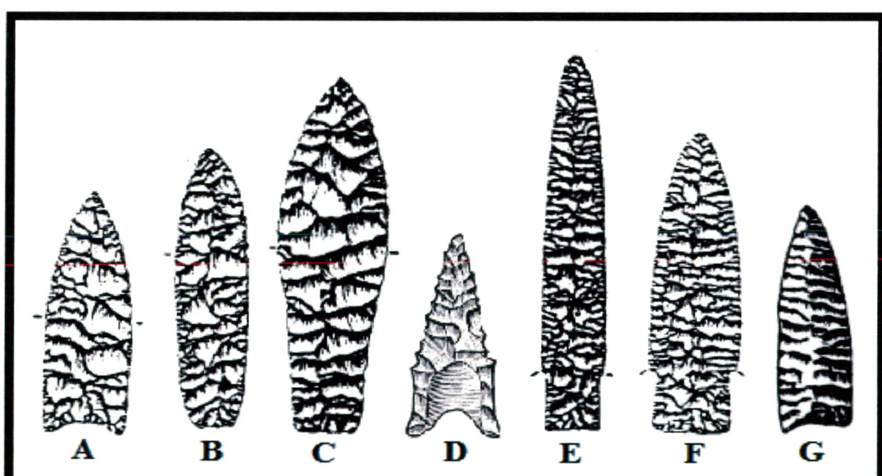

Figure 2.9: Late Paleoindian projectile point types. A) Goshen, B) Agate Basin, C) Hell Gap, D) Dalton, E) Eden, F) Scottsbluff, G) Frederick. Note the general morphological shape that is characteristic of each type (modified after Frison, 1998; Sellet, 2001).

perfect typological matches for those from the type sites (Frison and Stanford, 1982; Irwin-Williams et al., 1973).

Depending on the geographical location being considered, the Late Paleoindian cultural sequence is generally defined in the western to Midcontinent North America to include Plainview/Goshen, Agate Basin, Hell Gap, Dalton, Cody (Scottsbluff/Eden), and Frederick (Figure 2.9) (Frison and Stanford, 1982; Irwin-Williams et al., 1973; Wormington, 1957; Reeves, 1983; Justice, 1987; Howard, 1990; Frison, 1991; Mason, 1997; Kooyman, 2000; Kornfeld et al., 2010).

Plainview/Goshen represents two names for the same cultural horizon occurring in the southern and the northern Plains, respectively (Kornfeld et al., 2010; Sellet, 2001; Holliday et al., 1999). They are characterized by parallel or slightly convex sides, concave bases, basal thinning, lateral and basal grinding, and finishing scars uniformly directed at right angles to the long axis (Figure 2.9) (Kornfeld et al., 2010; Frison, 1996; Irwin-Williams et al., 1973; Justice, 1987; Julig, 1991; Sellet, 2001; Holliday et al., 1999). The Plainview type dates from ca. 10,170 to ca. 10,660 ^{14}C years B.P. (radiocarbon dates from the type site) (Holliday et al., 1999), while Goshen 10,900 to 10,000 ^{14}C years B.P. (from the Hell Gap site) (Sellet, 2001). At the Hell Gap site, this type co-occurs with fluted points in the same horizon (Sellet, 2001).

Agate Basin projectile points are defined by the elongated lanceolate shape of the point that tapers at the tip and base, a straight or convex base, and often with lateral edge grinding, but rarely with basal grinding. Such points also generally exhibit little to no basal thinning, and perfect bilateral symmetry of the edges (Figure 2.9) (Wormington, 1957; Irwin and Wormington, 1970; Irwin-Williams et al., 1973; Frison and Stanford, 1982; Shelley and Agogino, 1983; Justice, 1987; Mason, 1997; Morrow and Morrow, 1999; Kornfeld et al., 2010; Kooyman, 2000;

Fagan, 2000). These long, thin, slender projectile points are thought to be designed to specifically fit into a notched or socketed fore shaft and were meant for deep penetration into the target. They are also thought to date to approximately 10,500 to 9,400 ^{14}C years B.P. (Kornfeld et al., 2010; Justice, 1987; Fagan, 2000; Wormington, 1957). The Agate Basin Site is a bison kill site in Wyoming and represents one of the well-stratified archaeological sites that provide a cultural chronology that can be applied to other sites across North America (Frison and Stanford, 1982).

The typological variation of Hell Gap projectile points, demonstrate a slight shoulder where the blade meets the haft portion that drastically constricts to the base. This lateral constriction typically comprises half the length of the point (Figure 2.9) (Justice, 1987; Agogino, 1961; Larson et al., 2009). Hell Gap projectile points also characteristically display collateral to random flaking patterns, straight to slightly convex basal configurations, lateral grinding comprising half of the overall length of the point, and an oval to diamond cross section (Justice, 1987; Agogino, 1961; Larson et al., 2009; Irwin-Williams et al., 1973; Irwin and Wormington, 1970). The Hell Gap Site is located in Wyoming and represents the type site for this projectile point style. It is the second example of a stratigraphically defined site producing multiple cultural horizons consecutively, similar to the Agate Basin Site (Larson et al., 2009).

The Dalton projectile points are primarily distributed in the southeastern United States; conventionally this variation may be referred to as Meserve in the west, but has since been discarded as a complex with temporal and cultural meaning because of the rarity on the Plains and lack of stratigraphic context (Justice, 1987; Goodyear, 1982). The suite of traits observed on Dalton projectile points originally resulted in them being considered to be Late Paleoindian to early Archaic (Figure 2.9) (Mason, 1962) because of their stratigraphic context between the

Quad and Archaic notched points in the east (Goodyear, 1982). However, some archaeologists have questioned this later date range, noting similarities to early fluted cultures based on the technological and stylistic choices of the non-projectile point tool kit (Wormington, 1957; Goodyear, 1982). Characteristic traits of the Dalton projectile points include parallel to slightly incurvate lateral edges (initially), a deep basal concavity, basal and lateral grinding, presence of a well thinned base by the removal of 'flute-like' flakes, basal ears produced by the incurvate lateral edge, and emphasis on lateral edge re-sharpening of the blade through repeated applications of serrations (Goodyear, 1982; Justice, 1987). The Dalton people show a preference for cave dwellings where radiocarbon dates have been obtained. As a result of the generally weak association with hearth features, Dalton projectile points are dated based on stratigraphic location where they are found between the levels yielding evidence of fluted cultures and the levels yielding evidence of Archaic cultures; approximately 10,500-9,900 ^{14}C years B.P., respectively (Goodyear, 1982).

The Cody Complex is designated as such because of the cultural association of Scottsbluff and Eden projectile points with Cody knives (hafted knife) in the Plains (Wormington, 1957; Justice, 1987). Scottsbluff projectile points are defined by a triangular to parallel lateral blade edges, lenticular to symmetrically biconvex to diamond cross section, straight to slightly convex basal configuration, and most noticeably, the presence of a stem where the blade meets the haft portion (Wormington, 1957; Mason and Irwin, 1960; Justice, 1987; Kooyman, 2000; Kornfeld et al., 2010). Eden projectile points are also included in the Cody Complex because they also exhibit the appearance of a stem, although they are considerably narrower with slight shoulders where the blade meets the haft portion. In both types, slight basal ears may be present but are rarely seen on the Plains (Wormington, 1957; Kornfeld et al., 2010;

Justice, 1987; Kooyman, 2000); slight basal ears on Eden points are observed in Wisconsin and referred to as 'Eared Eden' (Ritzenthaler, 1967; 1972). Scottsbluff and Eden projectile points have been found in association with *Bison antiquus* remains (Schultz and Eiseley, 1935; Todd et al., 1990), and have an approximate date range of approximately 9,000 to 8,000 ^{14}C (~10,000 to 8,900 cal) years B.P. (Wormington, 1957; Mason and Irwin, 1960; Irwin and Wormington, 1970; Justice, 1987; Kornfeld et al., 2009; Kooyman, 2000).

2.5.3 Regional Variants

The general typological sequence of Late Paleoindian projectile points was defined and developed using conventional morphological analysis. In theory, this cultural sequence appears to be a relatively effective means of interpreting archaeological assemblages. However, these cultural sequences are based primarily on the recoveries from the Great Plains, with subsequent typological extrapolation to recoveries distributed over a broad geographic area far removed from the type sites where the projectile points were first defined. When new discoveries are made in different geographical locations it may be inappropriate to utilize the original cultural-temporal classification system, without having a local absolute chronology for validation relative to the original distant site (Anfinson, 1997). However, problems arise when projectile point assemblages are discovered that do not readily fit into the established projectile point typological schemes, or perhaps exhibit traits associated with more than one of the classic 'types'. Variations within the literature are evident when the temporal context associated with type names is extrapolated from other geographical locations and applied to define regional assemblages demonstrating similar attributes. An outline of some regional variants that have perpetuated this consistent problem in the literature of "catch all" categories is provided below.

The Cumberland projectile points are characterized by their distinctive fishtailed appearance, concave basal configuration displaying basal ears, and flutes often extending along the entire length of the point (Figure 2.10) (Justice, 1987; Roosa, 1965). The Cumberland points occur across eastern North America, and variations of the Cumberland point types include Simpson projectile points found in southeastern United States (also considered a Dalton variant; Justice, 1987) and the Barnes projectile points from Michigan and southern Ontario (Roosa, 1965; Deller, 1979; Roosa and Deller, 1982).

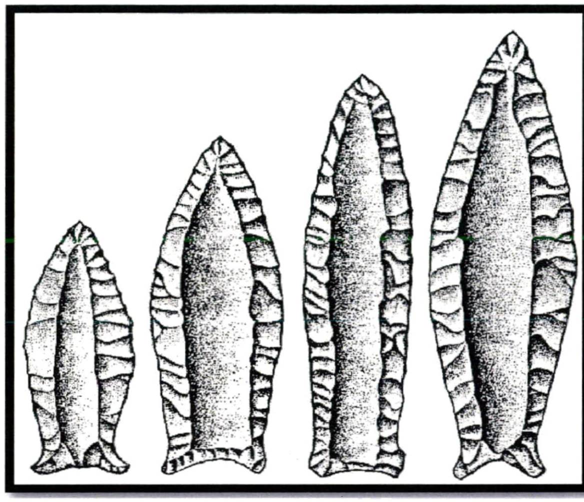

Figure 2.10: Examples demonstrating the characteristics of the Cumberland projectile points (Bradford, 1976).

The Holcombe Beach site located in Michigan is the type site for the Holcombe tradition (Fitting et al., 1966). Holcombe projectile points are defined by markedly convex lateral edges, sharp basal ears, narrow basal width, and may exhibit fluting (Figure 2.11) (Mason, 1963; MacNeish, 1952; Deller, 1983; Storck, 1984; Justice, 1987). There are some morphological similarities with the Clovis tool types, so the chronological placement of this typology is debated (Van Buren, 1974; Justice, 1987).

The Debert site is located in Nova Scotia and represents the most north-easterly expression of the Clovis culture (MacDonald, 1968). The site was discovered in 1948 and excavated in 1963 and1964 by George MacDonald (1968). It

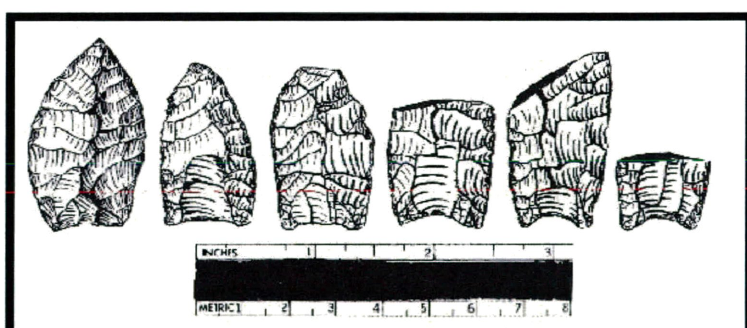

Figure 2.11: Examples of Holcombe projectile points from the Holcombe Beach site in Michigan (modified from Fitting et al., 1966: 42).

is located on a low sandy ridge of a gently sloping plain that flanks the north shore of Cobequid Bay, an extension of the Minas Basin. Fourteen radiocarbon samples were obtained that dated ten different hearth features that ranged from 11,026 to 10,466 ^{14}C years B.P. (MacDonald, 1968). In total, 9,155 artifacts were recovered from the twenty features at the site, including scrapers, knives, drills, and 140 projectile points and fragments (ten of which are complete). The projectile points demonstrate the characteristic Clovis and Folsom fluting attribute, but display a deeper basal concavity than is normally associated with Clovis or Folsom (Figure 2.12). This mix of attributes is thought to represent a combination of the Clovis culture with Cumberland and Dalton types occurring soon after deglaciation in the area (MacDonald, 1968).

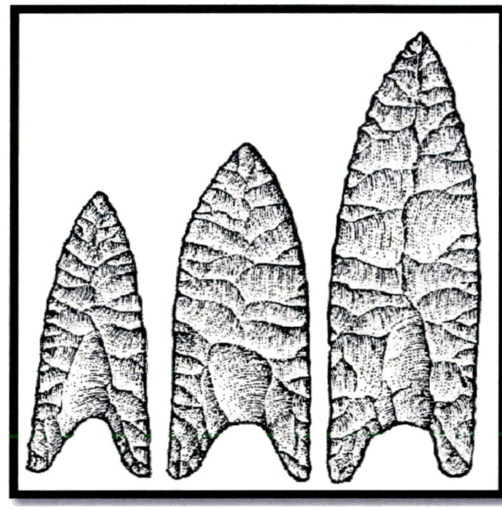

Figure 2.12: Examples of fluted projectile points from Debert, Nova Scotia (modified from Bradford, 1976; Justice, 1986; MacDonald, 1966).

Hi-Lo projectile points are defined from the type site in Michigan (Fitting, 1966) and characteristic traits of the assemblage include a relatively short lanceolate shape and concave basal configuration. Basal modification varies from small thinning flakes to fluting; the lateral haft margins can be incurvate, expanding or weakly side notched (Figure 2.13) (Justice, 1987; Fitting, 1966; Ellis and Deller, 1982). These points are generally heavily resharpened by using a specific bevelling technique that retains the original haft portion shape which creates a high degree of variability, leading archaeologists to refer to this assemblage as a "loosely defined type" (Ellis, 2004: 62; Ellis and Deller, 1982). The Hi-Lo projectile points are generally found throughout the lower Great Lakes region, but are not yet associated with radiocarbon dates.

Instead, these points are stylistically dated, based on their typological similarities to the Cheshrow complex (Overstreet, 1993) and Dalton (Goodyear, 1982) point types, and are estimated to have been produced between 10,500 and 10,000 ^{14}C (~12,000 and 11,500 cal) years B.P (Ellis, 2004; Ellis and Deller, 1982; Justice, 1987).

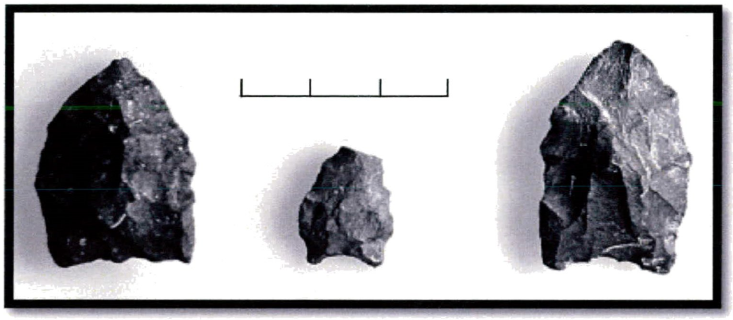

Figure 2.13: Hi-Lo examples from the Eaton Site in New York. Hi-Lo points demonstrate similarities to the Holcombe points (Figure 13). Both of these types are widespread in the Great Lakes Region. Modified from Smith et al., 2010.

The Late Paleoindian projectile point types found in southern Ontario consist of three different morphological types; Gainey, Barnes and Crowfield (Figure 2.16) (Deller, 1979; 1983; Ellis and Deller, 1982; 1997; 2000; Ellis et al, 1998; Storck, 1972; 1978; 1983; 1984; Roosa and Deller, 1982; Wright and Roosa, 1966; Roberts, 1984; Simons et al., 1984). Gainey points (representing the Gainey Phase) are more closely resemble Folsom points because of the longer, better executed fluting than the classic Clovis flutes. Gainey points are generally wide and thick with parallel lateral edges, deep basal concavities, with a thick, short single flute, and may present in a fishtail form (Simons et al., 1984; Roosa and Deller, 1982; Storck, 1984). The Barnes points are diagnostic of the Parkhill Phase and characteristic traits are a fishtailed lateral shape, intermediate basal concavities, narrow base, and exhibit a single, long flute (Wright and Roosa, 1966; Roosa and Deller, 1982; Storck, 1984). The Parkhill phase consists of four subtypes of the Barnes points, demonstrating the high degree of variability (Roosa and Deller, 1982). Finally, the Crowfield points (representing the Crowfield Phase) are characteristically thin and wide, and expand markedly from the narrow base to the midsection. The basal concavity is characteristically shallow with rounded basal corners, and the projectile points exhibit multiple small basal thinning flakes/flutes (Storck, 1984; Deller, 1983; Ellis and Deller, 1997; 2000). A distinctive aspect of Crowfield is the resharpening of tip ends resulting in a pentagonal shape and the lack of the fishtail shape (Figure 2.14) (Ellis and Deller, 1997). As a result of the lack of absolute (radiocarbon) dates for these sites, the projectile points, including Late Paleoindian Holcombe forms, are placed in a relative chronology based on their position above or below the Glacial Lake Algonquin strandlines, and by extrapolating the order of the typological sequence from the Great Plains based on projectile point attributes.

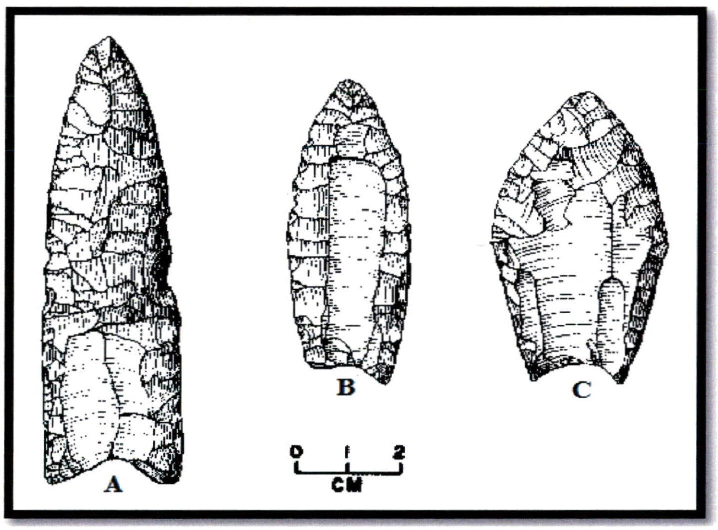

Figure 2.14: Projectile point types found in southern Ontario. A) Gainey point, B) Barnes point, and C) Crowfield point. The Barnes and Crowfield points make up the Parkhill Complex and have a wide distribution from southern Ontario into the north eastern states. Modified from Ellis et al., 1998; Figure 4: 155.

2.5.4 Examples of Taxonomically Confusing Types

To illustrate the problems outlined above with identifying temporally and geographically defined point types, an example from the literature is provided here. The following four groups of Paleoindian projectile points have been confused in the literature because of their obvious similarities, unclear definitions in the original sources, and lack of contextual and stratigraphic control. At the turn of the last century, these types were collectively grouped under the term "Yuma", which referred to well-made lanceolate points that were believed to be of some antiquity (based on stratigraphic context or association with extinct fauna) that did not exhibit a flute (Wormington, 1957; Roberts, 1940; Quimby, 1959). They were subsequently named "Plano" by Jennings (Griffin, 1957) on the basis that they all seemed to be a variation of the same pattern (Quimby, 1959). The four stylistically similar types described below are Angostura, Jimmy Allen, Frederick and Browns Valley.

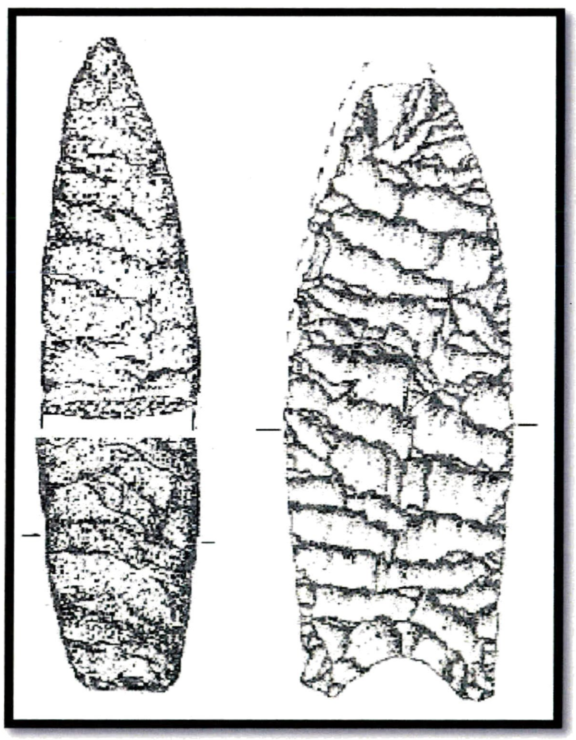

Figure 2.15: Examples of Angostura and Jimmy Allen projectile points. The left image is a point from the type site (Ray Long), in the Angostura Reservoir, South Dakota. This point demonstrates characteristic traits of the Angostura type; parallel oblique flaking, converging lateral sides, and slight basal concavity (Pitblado, 2007: 316). The image on the right is from the type site (Jimmy Allen) in southern Wyoming, demonstrating parallel oblique flaking pattern, converging to parallel lateral edges, and a deep basal concavity (Pitblado, 2007: 319).

Angostura projectile points demonstrate a general convergence towards a narrow base, straight to slightly concave basal configuration, and are characteristically relatively narrow and thick; the flaking pattern is generally collateral, parallel oblique, or random (Figure 2.15) (Pitblado, 2007; Hannus, 1986). Radiocarbon dates obtained from hearth features at the

Angostura type site, the Ray Long Site, place the occupation of the site between 11,000 and 8,900 ^{14}C years B.P. (Hannus, 1986).

Jimmy Allen points typically exhibit parallel to slightly flaring lateral edges, concave basal configuration with rounded corners or ears, and slender parallel oblique or collateral flake scars. There may also be a slight basal constriction that occurs on the bottom third of the projectile point and are typically wide and thin (Figure 2.15) (Mulloy, 1959; Pitblado, 2007; Kornfeld et al., 2010).

Frederick points are typically defined by convex lateral edges, slightly concave basal configuration, and basal thinning by removing small flakes (Irwin and Wormington, 1970). Characteristic flaking pattern is a parallel oblique style and these points resemble the Jimmy Allen assemblage (Irwin-Williams et al., 1973; Pitblado, 2007).

Browns Valley projectile points are named after the discovery of the "Browns Valley Man" in Minnesota (Figure 2.16) (Wormington, 1957; Jenks, 1937). The projectile points are characteristically thin and broad, with a straight to concave basal configuration, and small basal thinning flakes on the base (Wormington, 1957; Jenks, 1937). These points also exhibit slender parallel oblique flake scars similar to the three types above, but Roberts (1940: 65) thought it appropriate to give them their own typological distinction in calling them Browns Valley points (Mulloy, 1959).

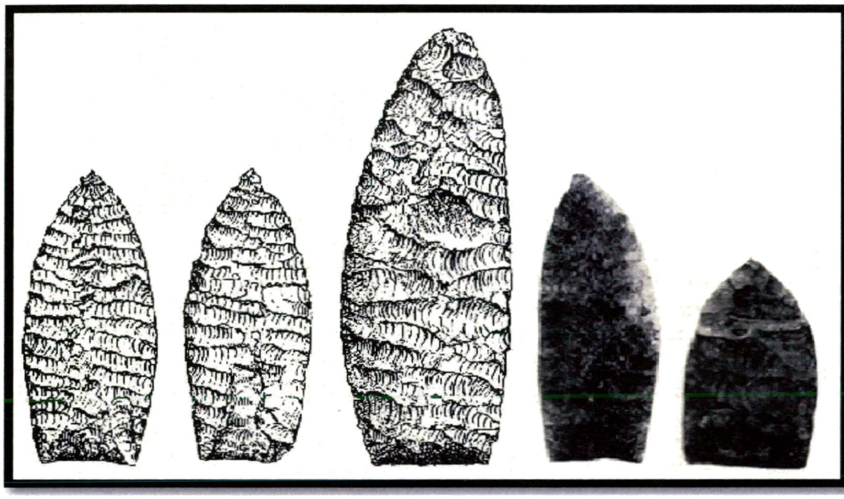

Figure 2.16: Brown's Valley projectile points found in association with the buried remains of the Minnesota Browns Valley Man. The three images on the left are sketches of the original artifacts (Jenks, 1937, Figure 2: 32), while the two on the right are pictures of the artifacts (Plate 7: 33). There is no scale in the original document for either image (Jenks, 1937).

Though the types overlap geographically and temporally, the above examples are defined as distinct cultural markers based on minor morphological differences of the projectile points. Types can be used as broad chronological references, but become controversial as cultural markers extrapolated across geographical space. The confusion in this case, is a result of the complex relationship between the 'cultural diversity' demonstrated in the points combined with the geographical overlap (Sellet, 2001). It is possible that the projectile points were made and used contemporaneously, which would render the chronological distinction misleading (Pitblado, 2003; Sellet, 2001). In any case, the similarities of the types listed above cause the type names to be used interchangeably in the literature.

2.6 SUMMARY

During the Last Glacial Maximum (LGM), the Laurentide and Cordilleran ice sheets entirely covered North America. The ice sheets receded after approximately 18,000 ^{14}C (~21,900 cal) years B.P., eventually resulting in the creation of an "Ice Free Corridor". The glacial retreat also created catastrophic discharges of meltwater, creating the large proglacial lakes. At the end of the Pleistocene, significant climatic changes associated with the Holocene transition altered the landscape further. In Northern Ontario, the boreal forest advanced northward after approximately 10,000 ^{14}C years B.P. (Liu, 1990). The migration of people into North America could have occurred through one or multiple routes (e.g. Clovis First (IFC), Northwest Coast Model, Pre-Clovis, and Eastern Coast Route). The evolving environments encouraged people to take advantage of a more broad subsistence strategy, rather than solely relying on the Pleistocene megafauna.

The conventional approach to a typological analysis in North America is to describe points using morphological attributes and assigning them to an already established typology. This typology often originated from a single site (or a small suite of sites) that offered either stratigraphic control or absolute dating. The typological attributes selected were often those deemed useful to characterize tools recovered within a discrete cultural-historical context, and to differentiate them from those that come before and after. This typological approach tended to be rather 'modal' in orientation, with less attention paid to subtle variation that was subsumed within the type. In some cases, a new regional name may have been assigned to the assemblage if it was in a geographically distinct area, while still using the morphological attributes that define the "classic" types in the literature.

A general trend can be observed through time in projectile point manufacture; projectile points emerge as large, fluted forms in the Clovis technology, and then gradually become smaller and more specialized. Paleoindians appeared to be more than just large game hunters, relying on a wide variety of animal and plant resources for subsistence (e.g., the extensive plant recoveries at Charlie Lake Cave).

As outlined above, there is considerable overlap in the projectile point type descriptions. This grey area of interpretation created by the overlapping attributes makes it difficult to infer patterns when new archaeological assemblages are discovered, especially because the literature repeatedly being cited is generally outdated. The conventional approach to typological analysis has been to extrapolate data over large geographical and temporal distances causing confusion in the literature. The range of variability expressed in projectile point assemblages is not fully addressed because researchers have a tendency to force an assemblage into the classically developed types that have been previously defined.

This chapter introduced the general process of deglaciation of North America, and highlights how humans are thought to have occupied the newly exposed areas. It also introduces some of the weaknesses apparent in conventional archaeological classification by describing the main projectile point types of North America. The types listed above continue to be used to address recoveries from newly discovered sites in different geographical locations. Instead of contributing to this mountain of literature that dilutes projectile point variability, a new approach will be taken in the analysis of the Mackenzie 1 projectile point assemblage that follows.

CHAPTER 3

CULTURE HISTORY OF NORTHWESTERN ONTARIO AND SURROUNDING AREAS

3.1 INTRODUCTION

This chapter synthesize previous literature to describe the Late Pleistocene and early Holocene character of the study area (Northwestern Ontario), focusing specifically on current knowledge about deglaciation, lake level changes, and biotic recovery. Within the broader North American context addressed in the previous chapter, this chapter outlines the complexity of archaeological survey and excavation in Northwestern Ontario with special attention to the Mackenzie 1 site area. It also addresses the probable timing of Paleoindian occupation, and evaluates and critiques the extant cultural-historical framework based on the diagnostic artifacts.

3.2 DEGLACIATION AND MIGRATION

The complex history of deglaciation and meltwater lake formation and drainage in Northwestern Ontario is not completely understood, although there is extensive literature presenting interpretations and hypotheses (Dyke, 2004; Larson and Schaetzl, 2001; Leverington and Teller, 2003; Lowell et al., 2009; Teller, 1995; Zoltai, 1965). The complex formation processes and subsequent drainage of the glacial lakes, in combination with many geomorphic processes, had a profound effect on the surrounding topography and distribution of early archaeological sites in Northwestern Ontario.

3.2.1 Paleogeography of the Lake Superior Basin, ~10,000 – 8,000 cal years B.P.

The Wisconsin Glaciation has been discussed in detail elsewhere (Chapter 2: North American Prehistory), but local events after approximately 11,800 to 11,500 ^{14}C years B.P.

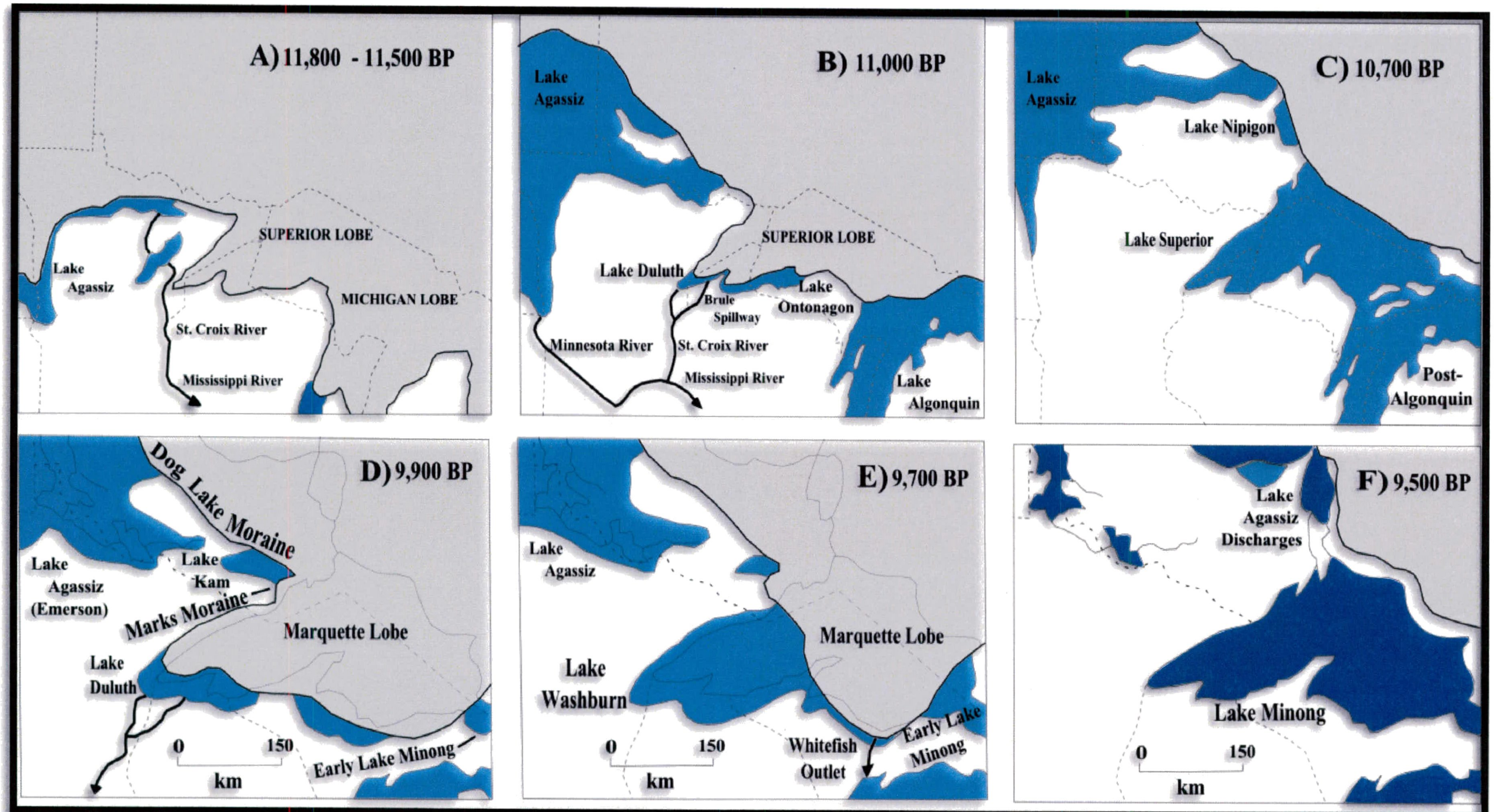

Figure 3.1: Deglaciation sequence (A to F) from approximately 11,800 to 9,500 BP, specifically in the study area, with reference to the glacial lakes and contemporaneous ice margins. The Marquette Re-advance is demonstrated in panel D. (A, B and C modified after Farrand & Drexler, 1985: 21; D, E, and F modified after Phillips, 1993: 95).

(13,700 to 13,400 cal years B.P.) are reiterated in light of their importance for understanding initial human occupation. Glacial Lake Minong formed on the eastern boundary of the Lake Superior basin during the Marquette re-advance (Farrand and Drexler, 1985). As the ice retreated ~9,900 ^{14}C years B.P. (11,300 cal years B.P.), Lake Minong rapidly expanded westward towards Minnesota, Wisconsin and Northern Ontario, producing its highest shoreline features at 259 metres asl approximately 9,500 ^{14}C years B.P. (~10,700 cal years B.P.) (Farrand and Drexler, 1983). The main Minong beach is located at 230-235 metres asl, as a result of differential isostatic uplift (Slattery et al., 2007).

At the glacial maximum, the northeast shore of the Lake Superior basin was depressed more (and for a longer period) than the southwest. This resulted in isostatic recovery initiating earlier in the southwest and later in the northeast, occurring over a greater vertical range, and therefore operating for a longer duration on the south shores (Phillips, 1993). This has been a major problem in identifying lake shorelines because simultaneous water drainage and isostatic rebound were occurring at different rates as the glacier melted and retreated north. This uneven glacial retreat created an axis of tilt across the Superior basin, whereby the lake-plane is now tilted to a higher altitude along the western shore (Phillips, 1993). This has implications for the recovery and interpretation of archaeological materials because some sites may now be underwater along the south shore as a result of this curvilinear deformation of the basin (Phillips, 1993).

As the glaciers were melting, Lake Agassiz drained into the Great Lakes watershed through many different channels, influencing the water levels of Lake Minong. By 9,400 ^{14}C years B.P. (10,600 cal years B.P.) the drainage routes to the east were reopened and Agassiz drained through Nipigon, discharging into the Superior basin, through the Great Lakes-St.

Lawrence Valley and out to the North Atlantic Ocean (Teller et al., 2002; Teller et al., 2005). This is referred to as the Nipigon Phase, which culminated in the catastrophic discharge into the Superior basin. This discharge into the Superior basin resulted from Lake Agassiz's basin gradually shifting north following the receding LIS. Lake level fluctuations over time can be attributed to glacial advances and retreats, meltwater influx from other proglacial lakes, direct runoff from the ice margin, climate change and isostatic rebound, creating a series of beaches or deltas. It has been hypothesized that these glacio-lacustrine features were ideal for Paleoindian occupation (Boyd, 2003; 2007; Farrand and Drexler, 1985; Julig et al., 1990; Lewis and Anderson, 1989; Lewis et al. 2007; Phillips, 1988).

The Marquette re-advance was a resurgence of ice into the Superior basin 9,900 ^{14}C years B.P. (Lowell et al., 1999). This reoccupation of ice in the Superior basin created the Marks moraine and the Dog Lake moraine, where soils and sediments were pushed up under the weight of the ice to create ridges (moraines) that illustrate the extent of the ice resurgence (Phillips and Fralick, 1994; Stuart, 1993). As ice retreated after the Marquette re-advance, water accumulated along the southern edge of the ice sheet, creating Lake Beaver Bay, and subsequently Lake Minong, as water filled in the southeast corner of the basin (Breckenridge, 2007; Farrand and Drexler, 1985). The isostatic rebound of the shoreline in the west was controlled by lower level lakes that formed along the Superior Lobe (Lakes Duluth, Washburn and Beaver Bay), while the eastern shore was controlled by the other Great Lakes (Lakes Minong and Algonquin) (Phillips, 1993). Lake Duluth existed until after the Marquette re-advance, and ice again retreated north, allowing water to spill east into Lake Washburn, that occupied the western extent of the Lake Superior Basin, and subsequently contributed to Glacial Lake Minong ~9,500 ^{14}C years B.P. (10,700 cal years B.P.; Breckenridge et al., 2010; Farrand and Drexler, 1985) (Figure 3.2).

As the ice lobes began to melt, the Superior Lobe receded southeast and the Hudson Bay Lobe receded north, resulting in the formation of Glacial Lakes Baldy and Beaver Bay (Phillips and Fralick, 1994; Shultis, 2013) (Figure 3.2). By ~9,500 ^{14}C years B.P. (10,700 cal years B.P.), the Superior Lobe may still have been present in the Superior basin, with Lake Baldy to the north

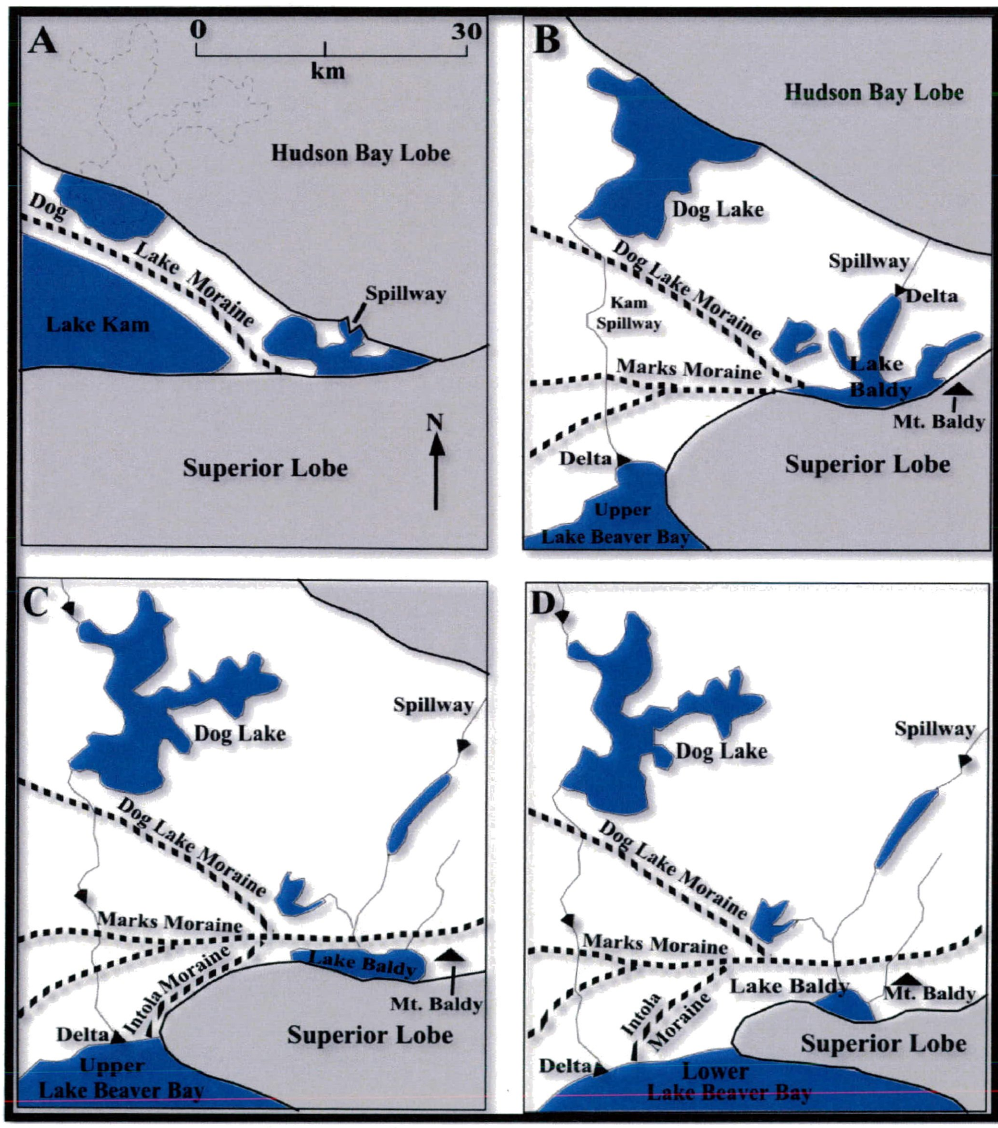

Figure 3.2: An interpretation of the proposed stages (A to D) of the history of pro-glacial Lake Baldy in the Thunder Bay area in the post-Marquette period, approximately 9,900 to 9,500 BP. It has been hypothesized that as the Superior Lobe continued to retreat, Lake Baldy and Lake Beaver Bay coalesced to form a larger pro-glacial lake that continued to flank the Superior Lobe as it receded, creating the Mackenzie Moraine that extends east of Mount Baldy to the Sibley Peninsula (Shultis, 2013). Modified after Phillips & Fralick, 1994: Fig. 4.

and Lake Beaver Bay to the west, and as it retreated, it is proposed that the two lakes joined to eventually form Glacial Lake Minong (Phillips and Fralick, 1994; Shultis, 2013) (Figure 3.2). Following the Marquette re-advance Lake Agassiz drained into the Superior basin through the Nipigon basin, significantly influencing Lake Minong levels. This catastrophic drainage through the Nipigon basin following the Marquette re-advance has complicated the identification of Minong age beaches (Shultis, 2013).

3.3 PALEOECOLOGY AND SUBSISTENCE

The climatic and environmental setting during the Late Pleistocene and early Holocene significantly affected the subsistence patterns of the Paleoindian populations. General paleoecological patterns and associated Paleoindian subsistence were briefly introduced in Chapter 2, while this section reviews evidence relevant for northwestern Ontario.

Pollen cores have been recorded from the Cummins Pond, Oliver Pond, Hayes Lake (Kenora), Pass Lake (near the Brohm site), Rattle Lake, Sioux Pond, Indian Lake, and Cristal Lake that provide evidence to undertake paleoenvironment reconstruction (Björck, 1985; Julig, 1994; McAndrews, 1982). At approximately 10,500 ^{14}C years B.P. the environment consisted of a sparse vegetation cover of mostly open tundra (sage and sedges) with some arboreal vegetation (spruce, birch) likely growing in more protected areas (Julig, 1994). The retreat of the LIS allowed for spruce dominated boreal forests to move quickly north, occupying the once open tundra (Hinshelwood, 1990; Phillips, 1993). By 10,000 ^{14}C years B.P. (11,500 cal years B.P.) the closed spruce forest gave way to the rapid introduction of jack pine and white birch as a result of Hypsithermal climatic conditions (increasingly warm, dry and windy environment) (Julig, 1994; Phillips, 1993; Wright, 1974). This warming reached its peak about 8,000 ^{14}C years B.P. (8,900 cal years B.P.) when pine, birch, and alder locally dominated the forests, until finally by 6,000 ^{14}C years B.P. (6,800 cal years B.P.), pine replaced the spruce dominated forests completely (Hinshelwood, 1990; Julig, 1994). Between ca. 7,000 and 3,000 ^{14}C years B.P. in northern Ontario, the hardwood dominated Great Lakes-St. Lawrence forest was located 140 km north of its present boundary (Liu, 1990; See Chapter 2). Climatic cooling in northern Ontario peaked between 4,000 and 3,000 ^{14}C years B.P. (4,500 and 3,200 cal years B.P.) resulting in the retreat southward of Great Lakes-St. Lawrence forest, and the establishment of boreal forest vegetation in its modern location (Liu, 1990; Wright, 1974). Presently, the ecotonal boundary between the two forest zones (the Boreal and Great Lakes-St. Lawrence zones) occurs at the study area, resulting in a mosaic of deciduous and coniferous tree species (Lui, 1990). The southern limit of the boreal forest coincides with the mean winter location of the Arctic air mass, where only vegetation that tolerates the colder subarctic environments can flourish (Kemp, 1991).

The Paleoindian subsistence economy has always been considered to involve extensive hunting and gathering, utilizing larger areas to obtain sustenance (e.g., possibly seasonal rounds). This was a subsistence pattern that was not necessarily specialized, but was dependent on required knowledge and techniques of the northern Paleoindian people to exploit a variety of resources (Dawson, 1983c). This may have required the ability to move between seasonally productive habitats or pursue migrating prey species on their seasonal round. Human survival would have required adaptation to a variety of environmental factors (i.e., forest fires, winter icing of feeding grounds, depth of snow cover, and wind chill) (Dawson, 1983c; Julig, 1994; Phillips, 1993). As the LIS retreated in a northeasterly direction, the tundra vegetation established itself close to the ice and was bordered by the encroaching boreal forest to the south (Wright, 1974). The formation of large glacial meltwater lakes would have facilitated borealtaiga plant colonization near the lakeshores that might have attracted large grazing mammals such as bison, moose and caribou (Dawson, 1983c; Wright, 1974). However, as time passed, and closed boreal forest developed, the carrying capacity for herbivores likely decreased. This probably required further human adaptation to a closed forest environment, signalled by a change in technology after approximately 7,000 ^{14}C years B.P. (7,800 cal years B.P.) (Dawson, 1983c; Julig, 1994).

The generally acidic soil conditions of the boreal forest result in poor preservation of organic ecofacts, including faunal materials that might directly indicate Paleoindian subsistence choices. Despite the widespread lack of direct information throughout the Great Lakes region, it has long been accepted that Paleoindian populations in this region focused on the procurement of caribou (Storck, 1984; Roosa and Deller, 1982; Ellis and Deller, 1997; Peers, 1985). This was based upon extrapolations from sites located in southern Ontario and northern Michigan (i.e., Holcombe site) that have yielded direct evidence of caribou procurement (Peers, 1985: 31). However, evidence of the large spruce forest browsers, such as mastodon, was found as close as Michigan, but no diagnostic tools were associated with the remains (Fisher, 1984; Julig, 1994).

Mammoth remains have also been found on the southwestern shore of Lake Agassiz (Haywood, 1989). There are fragments of calcined bone from the Cummins site that were identified as white-tailed deer, and caribou remains have been discovered at sites to the east in the lower Great Lakes and northeast United States (e.g., Dutchess Quarry Cave, Bull Brook, Whipple, and Holcombe) (Fitting et al., 1966; Funk, 1982; Julig, 1994). Evidence of bison in the area is also well documented from sites in Minnesota, Wisconsin, Manitoba, Saskatchewan and northwestern Ontario (Hinshelwood and Weber, 1987; Julig, 1994; McAndrews, 1982; Pettipas and Buchner, 1983; Shay, 1971), leading to the suggestion that bison procurement could have been a part of seasonal rounds for Paleoindian groups in the northern Great Lakes area (Julig, 1984). A bison skeleton discovered in Kenora with associated pollen evidence indicates a mid-Holocene coniferous woodland habitat that extended eastward across the shield to the Superior basin (McAndrews, 1982). However, no evidence of human intervention was discovered. The woodland habitat would have been less favourable for bison (preferring the prairies in the south and west) but were still a possible resource available to the Late Paleoindian and Archaic groups (McAndrews, 1982). This type of environment would have also supported moose, beaver, elk, muskrat, rabbit, wolf, black bear, turtle, waterfowl and fish (Dawson, 1983c; Halverson, 1992; Julig, 1994; McAndrews, 1982; Phillips, 1993).

While confounded by the paucity of faunal recoveries, the first researchers to address the problem (Dawson, 1983c; Julig, 1994) proposed that the boreal forest environment that developed in the early to mid-Holocene contributed to an economic shift from heavy dependence upon the pursuit of a narrow range of mobile herd animals like caribou, to a broader subsistence pattern that required the ability to move between seasonally abundant habitats or prey species. This suggests that Great Lakes region Paleoindian populations utilized a wide variety of resources during seasonal rounds and should not necessarily be referred to as simply 'large game hunters'. Newman and Julig (1990) also proposed a broader subsistence pattern in northwestern Ontario, based upon blood protein residue analysis of stone tools from the Cummins site (discussed below).

3.4 PALEOINDIAN ARCHAEOLOGICAL SITES IN THE THUNDER BAY REGION

This section reviews the Paleoindian projectile point assemblages recovered in the Thunder Bay area, beginning with an introduction to the main archaeological sites in the region. Many sites have been discovered but rarely have been extensively excavated making comprehensive interpretations problematic. In part, this reflects the exploratory efforts of academics (MacNeish, 1952; Wright, 1972; Dawson, 1983a, 1983b, 1983c; Stewart, 1984), investigation conducted as part of public archaeology (Halverson, 1992), government inventory building (Newton and Engelbert, 1977; Ross, 1979; 1995; Fox, 1975; 1980; Arthurs, 1986), and

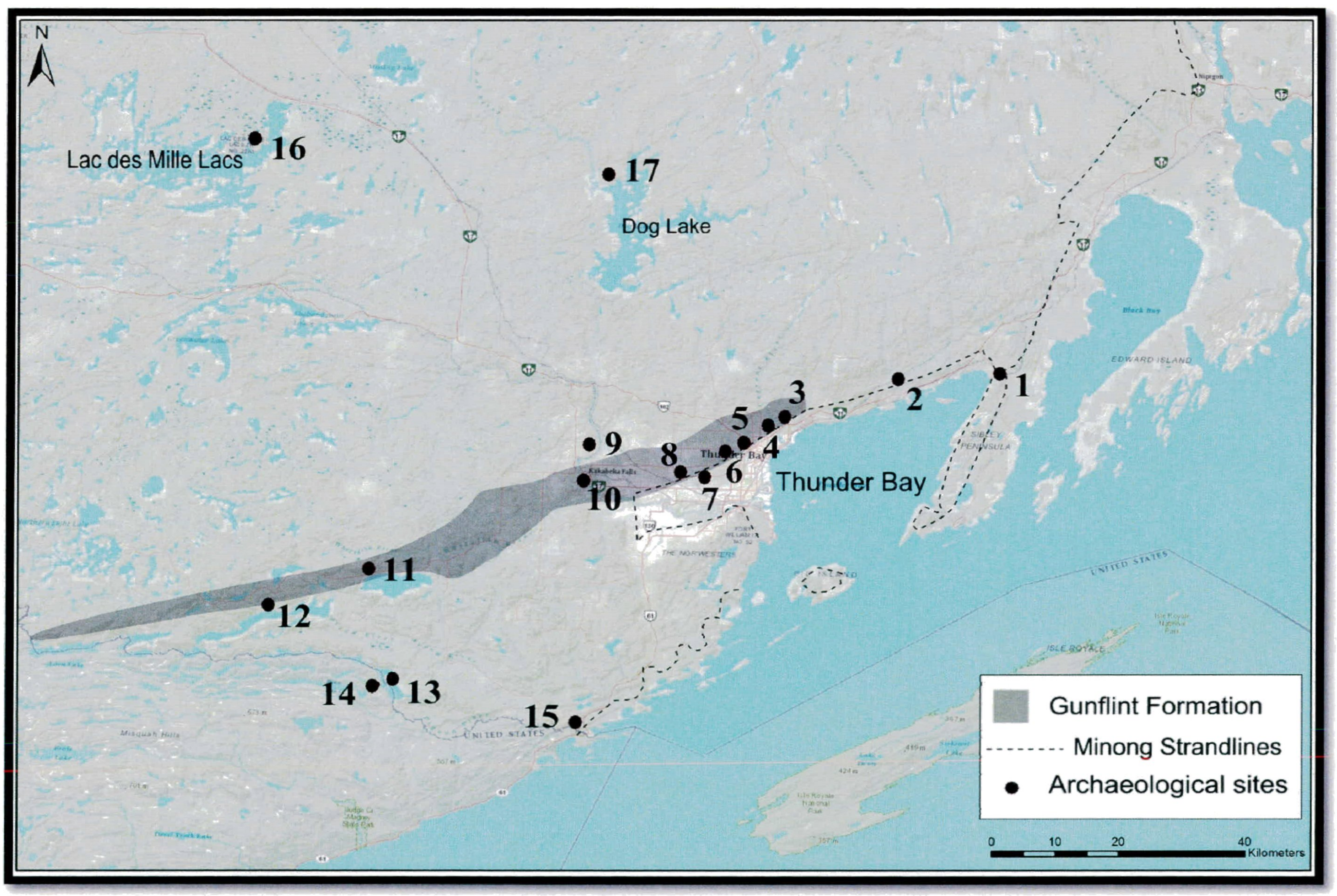

Figure 3.3: Map showing the extent of the Gunflint Formation in the Thunder Bay region, relic Lake Minong strandlines, and archaeological sites. The numbers pertaining to each archaeological site corresponds with Table 3.1. Modified after Fox, 1975; Julig et al., 1990, 1994. It is likely that the full extent of the Gunflint Formation extends east to at least the Sibley Peninsula.

Culture Resource Management (CRM) (Adams, 1995; Hinshelwood, 1990; Hamilton, 1996; McLeod, 1978; 1981; 1982). With the exception of Patrick Julig's (1994) extensive work at the Cummins site, much of the archaeological field work is exploratory, with little in the way of comprehensive analysis.

Map Location*	Site	Borden Number	Diagnostics	References
1	Brohm	DdJe-1	Present	McNeish, 1952; Fox, 1975; Hinshelwood, 1990
2	Newton	DdJf-4	Present	Fox, 1975
3	Boulevard Lake	DcJh-2	Present	Dawson, 1972; Fox, 1975
4	Simmonds	DcJh-4	Present	Dawson, 1973; Halverson, 1992
5	Biloski	DcJh-9	Present	Dawson, 1972; Fox, 1975; Hinshelwood & Weber, 1987
6	Catherine	DcJh-11	Present	Dawson, 1972; Fox 1975
7	Widar	DcJi-6	Present	Fox, 1975
8	Cummins	DcJi-1	Present	Dawson, 1972, 1973; Fox, 1975; Julig, 1983, 1984, 1985, 1986, 1994; Julig et al., 1990
9	Crane	DcJj-14	Absent	Ross, 2011
10	Harstone Hill	DcJj-11	Absent	Fox, 1975
11	Tower Road	DbJm-6	Absent	Fox, 1975
12	Narrows Site	DaJn-7	Present	Fox, 1980
13	South Fowl Lake	in Minnesota	Present	Fox, 1975
14	South Fowl Lake II	in Minnesota	Present	Fox, 1980
15	High Falls	DaJj-1	Absent	Fox, 1980
16	Cressman	DfJn-1	Present	Fox, 1975
17	Rocky Point	DeJj-6	Present	Dawson, 1972; Fox, 1975; McLeod, 1981

Table 3.1: Archaeological site names and additional data from the Thunder Bay region. Site numbers correspond to Figure 3.3.

As of 1994, thirty-nine Paleoindian sites had been identified, with six having been excavated (Brohm, Cummins, Naomi (DcJh-42), Biloski, Simmonds and Crane) and the remainder either subjected to surface collection and/or test pitting (Adams, 1995; Julig, 1994;

Ross, 2011) (Figure 3.3, Table 3.1). Twenty-four of those sites have yielded diagnostic artifacts (Julig, 1994). The exploratory and assessment-oriented nature of past field work has hindered the collection of contextual evidence (such as Biloski and Simmonds), making it difficult to interpret post-depositional processes and geomorphology.

3.4.1 Archaeological Site Bias

Archaeology around the Great Lakes has generally focused on the topographically obvious (and documented) areas containing glacial beaches and strandlines. This bias towards glacial beach ridges, and water sources in general, began with the assumption by Quimby (1959, 1960) that a specific tradition occurred where "lanceolate points [were found] in association with fossil beaches and water planes of glacial and ancient postglacial lakes", and was referred to as the "Aqua-Plano" tradition (1960: 34). This assumption that Paleoindians primarily settled on fossil beaches was applied to all of the Great Lakes basins and implied that the age of the beach deposit would be contemporaneous with the age of the human occupation on that beach (Quimby, 1959: 1960). These "Aqua-Plano" people were thought to have relied on hunting and fishing for subsistence and also had developed some form of watercraft (Quimby, 1959: 1960).

3.4.2 Limitations

The boreal forest environment of Northwestern Ontario hinders archaeological site preservation and interpretation. These factors include poor organic preservation (Phillips, 1993; Wright, 1972), shallow site stratigraphy that contributes to taphonomic issues (Dawson, 1983b; Julig, 1994; Phillips, 1993), survey bias and limitations (Hamilton, 1996; 2000; Hinshelwood, 2004; Ellis and Deller, 1997; Julig et al., 1990; Phillips, 1988; 1993). The survey bias is based upon the past over-emphasis on shorelines and the limitations of survey coverage. This includes considering the appropriate methods for boreal forest archaeology, and the ability to reduce the risk of false negatives from shovel test results required in compliance with the Ontario Archaeological Standards and Guidelines (2011).

The limited long-term preservation of macroscopic organic remains affects subsistence interpretations because any evidence of bone, non-stone tools, housing or transportation devices, such as watercraft, is unlikely to be preserved (Dawson, 1983b; Julig, 1994; Kingsmill, 2011; Phillips, 1993; Wright 1995). Newman and Julig (1990) sought to address this by conducting blood residue analysis on thirty six stone artifacts from the Cummins site, finding evidence of deer (caribou, deer, moose), rodent (beaver, rabbit, muskrat), bovine and guinea pig species. This process involved seeking blood residues that were then subjected to a general typing process that allowed estimation to general taxonomic categories. This approach is controversial and will likely be superseded by new techniques; however some interesting results were generated. Interestingly, Newman and Julig (1990) interpret the bovine residue as confirmation of the presence of *Bison antiquus*, though the residue could indicate the presence of any member of the Bovid family, including musk oxen. The only projectile point analyzed yeilded protein residue of porcupine (guinea pig) (1990: 127; Julig, 1994). This is problematic because Newman and Julig (1990) are able to define the residues only to the Family classification at best, possibly only to Order or Infraorder (e.g. guinea pig and porcupine are classified in the same Infraorder), leading some to challenge the methodology and results (Fiedel, 1996).

Taphonomic processes complicate the archaeological record in every environmental setting, but the boreal forest provides unique complexity. Processes affecting archaeological context include tree root penetration, tree throws, rodent holes (bioturbation), freeze-thaw cycles (cryoturbation) and destruction caused by forest fires (Dawson, 1983b; Hinshelwood, 1996; Julig, 1994; Phillips, 1993). The archaeological context is compromised because of shallow deposition, limited material for secure radiocarbon dating and seldom is there stratigraphic separation of successive occupations (Phillips, 1993).

It is no coincidence that archaeological sites in the area are typically found on the beaches or strandlines of Lake Minong; there is an obvious bias on the part of archaeologists for locating sites on Lake Minong beaches, possibly because they are comparatively easily seen and would have been a high and dry area for people to observe migrating animal herds (Hinselwood, 2004; Kingsmill, 2011; Phillips, 1993). This is a trend observed in southern Ontario as well, where beach ridges of Glacial Lake Algonquin are favoured for archaeological reconnaissance (Ellis and Deller, 1997; Jackson et al., 2007; Roosa and Deller, 1982; Storck and Spiess, 1994). However, there is evidence of inland sites, around Dog Lake (40 km north of Thunder Bay) where Paleoindian and Archaic cultural material has been recovered (Hamilton, 1996; 2000; McLeod, 1978; 1981). Some authors believe that inland sites are rarely discovered because the boreal forest environment obstructs the view of the terrain and becomes an obstacle when trying to get to sites, exponentially increasing costs (Anderton et al., 2004; Boyd, 2007; Phillips, 1993).

The increasing costs of boreal forest archaeology are another limiting factor that makes excavation difficult. Archaeological assessments or reconnaissance (shovel testing) is favoured, while salvage and academic excavations are rare because of the cost of boreal forest archaeology, access to land (public or private), and time constraints that generally only result in enough time for surface collection (Hinshelwood, 2004; Julig et al., 1990; Kingsmill, 2011; Phillips, 1993). Unfortunately, many of the archaeological sites have been impacted by looting and construction; a contributing factor is the Lake Minong beach and deltaic sediments provide excellent aggregate materials (Phillips, 1993). These scenarios are evident within the summary of archaeological sites in the Thunder Bay region below.

3.4.3 Biloski Site (DcJh-9)

The Biloski site was excavated in 1986 as part of a salvage excavation triggered by residential development. Located at 245 metres above sea level (asl), Biloski is situated on a Minong level strandline and has been dated based on comparisons to other Minong level sites (e.g., Cummins) at approximately 9,000 ^{14}C years B.P. (10,000 cal years B.P.) (Hinshelwood and Weber, 1987). Occupation of this strandline is thought to be contemporaneous with it containing Lake Minong waters, but there is no independent evidence to support this claim. Interestingly, the site coincides approximately with what would have been the outlet of the McIntyre River into Lake Minong when this beach strand was active (Figure 3.4). Artifacts recovered from Biloski include 100 bifaces and fragments and over 50,000 pieces of debitage; four identifiable projectile points are among the bifaces recovered (Hinshelwood and Weber, 1987). The projectile points have also been used to date the site by comparing attributes present to those from other classic typologies; cultures believed to be represented are Agate Basin (~10,000-7,000 B.P. at Blackwater Draw, New Mexico and 8,500-8,000 ^{14}C years B.P. at Hell Gap, Wyoming; Agogino and Rovner, 1969; Irwin-Williams et al., 1973), Minaqua (8,000-7,000 B.P. in Wisconsin; Ross, 1979) and "Manitoba" (Manitoba variation of Agate Basin type; Pettipas, 1983). Based on the artifact distribution, the site is hypothesized to represent multiple flint knapping stations. The large sample of bifaces excavated at the site allowed the authors to hypothesize about biface reduction strategies using taconite (Hinshelwood and Weber, 1987: 59-61).

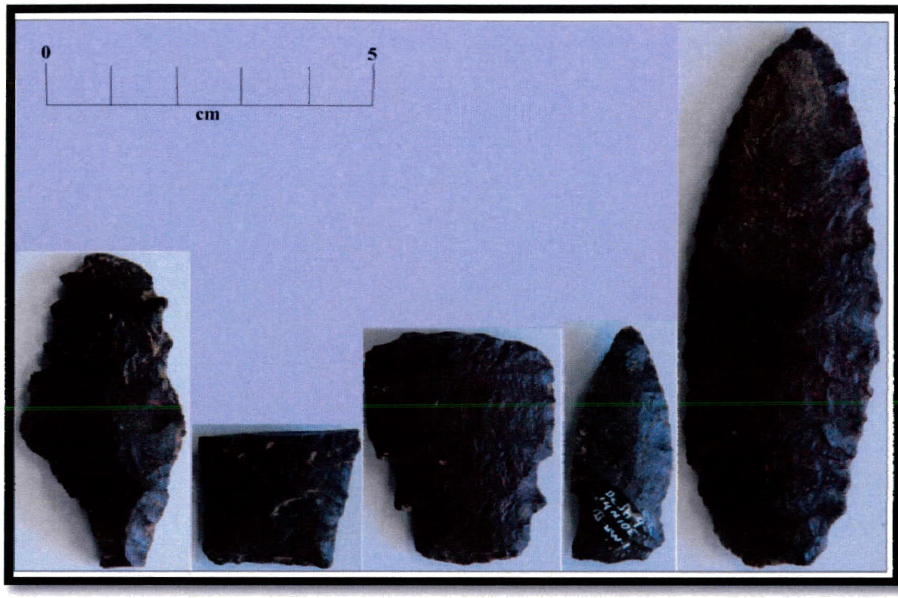

Figure 3.4: Projectile point specimens recovered from the Biloski site. The photos were taken by the author, with the permission of the Ministry of Culture, Thunder Bay, Ontario.

3.4.4 Simmonds Site (DcJh-4)

The Simmonds site is located along the Current River in Centennial Park in Thunder Bay. It is distributed on Post-Minong strandlines at 236 metres asl on the west side of the river (Halverson, 1992: 7). It is hypothesized that this site was a brief habitation site or kill site using the "bluffs" as a natural lookout, and the river mouth was probably also utilized for fishing activities (Halverson, 1992; Phillips, 1988). Examination of the landscape features indicates there was a river mouth adjacent to the Simmonds site, although no stratigraphic work had been done while the site was being excavated (Halverson, 1992). During excavations in 1973 and 1991, a large number of tools (bifaces, unifaces, and utilized flakes) were discovered, but 99% of the materials recovered consisted of debitage. According to the artifact distributions, four areas of

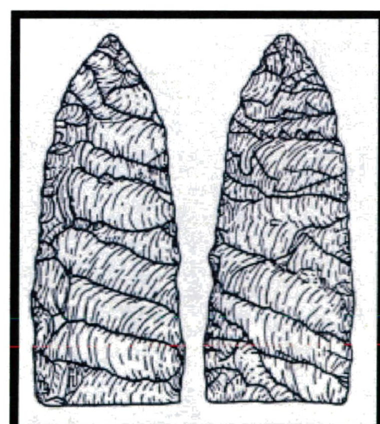

Figure 3.5: Projectile point from the Simmonds site (Halverson, 1992: Fig. 27).

high lithic concentration were identified that consisted mainly of secondary pressure flakes, which are indicative of retouching or finishing stages of tool production (Halverson, 1992). Of the twenty two biface fragments recovered (none were found complete), there were two that may be possible projectile point fragments that Halverson (1992) proposed had similarities to Holcombe, Minocqua, and Flambeau types (Figure 3.5). The site had been previously impacted by modern activity (e.g., a road cut, rock crushing activities and extraction of aggregate materials).

3.4.5 Crane Cache (DcJj-14)

The Crane site was discovered in 1982 and excavated by Bill Ross. The site consists of two self-contained biface caches adjacent to one another, and which yielded a total of 153 specimens (Ross, 1982; 2011; Ross pers. comm., 2012). The recovered artifacts included bifaces, flake scatters, four post molds and four scraping tools. All of the artifacts were taconite, with the exception of one piece of Kakabeka Chert. The bifaces were unfinished bifaces, or blanks, all roughly representing the same stage of manufacture. The biface caches appeared as though they were originally buried in a basket or bag, although no material remained, and there was no stain in the soil (Ross, 1982; 2011; Ross pers. comm., 2012). This site is significant because it is in an unusual geographical location; a permanent water source is not close by and the topography is not beneficial for intercepting game. Ross (1982; 2011; Ross pers. comm., 2012) suggests the post molds represent the remains of a structure, possibly occupied during the winter months, when proximity to water is not required (can melt snow to satisfy the demands of water) and a sizable collection of bifaces were cached, rendering access to a raw material source unnecessary. The similarities observed in the flaking pattern, the depth of the flaking scars, and general proportions further adds to the hypothesis that one person made these bifaces and cached them for a specific reason (1982; 2011; Ross pers. comm., 2012). While there are no dates associated with this site, the flaking pattern reflects a Paleoindian technique utilized during the manufacture process (Ross pers. comm., 2012). This biface assemblage will be further analyzed to assess the degree of relatedness to the Mackenzie 1 assemblage (Gjende Bennett, n.d.).

3.4.6 Brohm Site (DdJe-1)

The Brohm site is located at Pass Lake on the Sibley Peninsula forty kilometres northeast of Thunder Bay, and was originally excavated in 1950 by Richard MacNeish (1952) and again in 1987 by the Ministry of Natural Resources (Hinshelwood, 1990). Brohm is associated with a series of terraces formed by a channel mouth bar transporting sediments creating sand and gravel bars that range from 253 meters asl down to 237 meters asl (Hinshelwood, 1990: 1; Phillips, 1988). Pass Lake is interpreted as once being part of Lake Minong whereby the peninsula was once an island separated from the mainland. However transport of sediment (by wave action) eventually built a baymouth bar, sealing off the narrow strait between the island and the mainland (Phillips, 1988). As Lake Minong waters declined, this configuration was again transformed into stranded shorelines well removed from the current Lake Superior. It is hypothesized that the baymouth bar offered an effective natural trap for game animals crossing from the peninsula to the mainland, making the site ideal for seasonal game procurement (Hinshelwood, 1990; MacNeish, 1952; Phillips, 1988). Geomorphological analysis demonstrated a presently shallow and marsh-filled depression that may derive from a large piece of grounded ice that served to reorient the wave-break configuration and create a sequence of bars. This occurred at a lower elevation, seemingly after the occupation of the Brohm site (Phillips, 1988: 130).

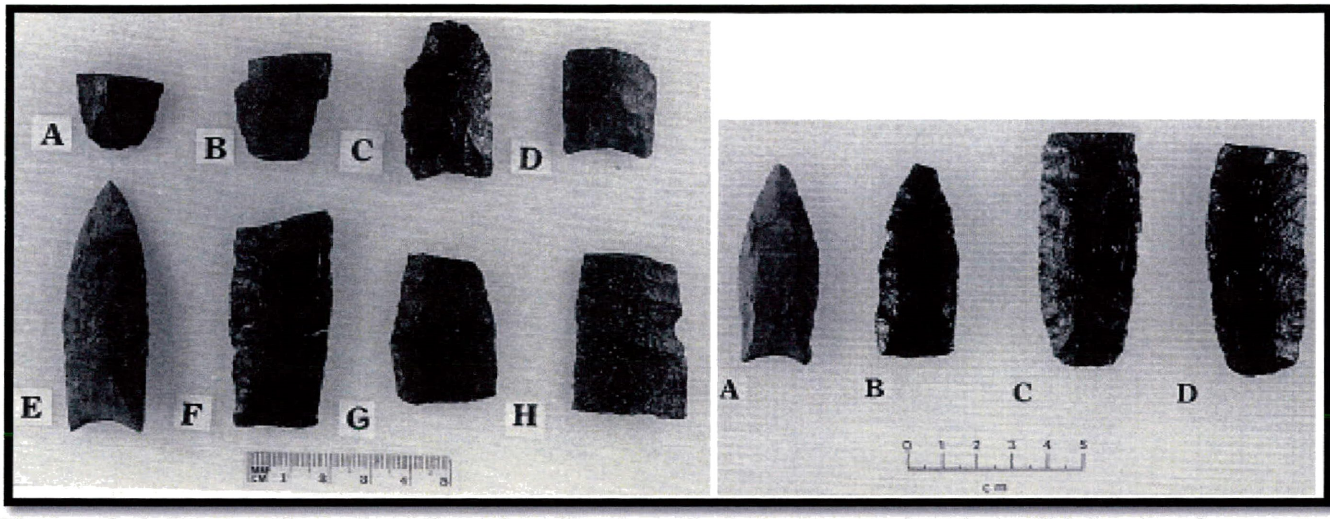

Figure 3.6: Projectile points found at Brohm. Left: excavated points; Right: surface collected by Mr. Brohm. The completed points (left: E, right: A) are both made from siltstone; the rest are made from taconite. Note the parallel oblique flaking on some specimens. Some have also been reworked (left: C & G) and there is evidence of use-wear on the break of D in the photo on the right. (To preserve photo integrity, original images from Julig, 1994 summary of the Cummins site were utilized; Fig. 6.16 & 6.17 respectively).

The combined excavations of the Brohm site produced many formal tools and debitage. MacNeish (1952) initially identified twenty-one projectile points and point fragments that he called Plainview, and an additional four have been confirmed from excavations after 1950 (Hinshelwood, 1990) (Figure 3.6). However, there has been some debate about the initial classification of the bifaces. In the past bifaces have been classified based on a reduction sequence model, consisting of biface stages from material procurement to projectile point finishing. This approach makes attaining a projectile point count problematic because they are not necessarily identified as such, but rather deemed a "late stage biface", ultimately affecting tool assemblage and overall site interpretations (Hinshelwood, 1990). Additionally, on a lower sand bar a side-notched projectile point was recovered, possibly indicating an Archaic occupation (Hinshelwood, 1990; 2004).

3.4.7 Cummins Site (DcJi-1)

The Cummins site is the best known of the sites in the Thunder Bay area because of the extensive data compiled mainly by Patrick Julig as part of his PhD research (1994; Julig et al., 1990), and subsequently published in refereed journals. Further research at the site was conducted by Brian Phillips (1982; 1988; 1993), and focused on reconstructing the shorelines of the various stages of Lake Minong, contributing to the geomorphological history of the Thunder Bay region. The site is located near the northwestern city limits of Thunder Bay with an elevation of 220-240 meters asl (Julig, 1994). The site is believed to be a habitation site as well as a quarry/workshop site because of the conveniently located Gunflint Formation bedrock outcrop adjacent to the site (Dawson, 1983a; Julig, 1994) (Figure 3.7). The expansive lithic

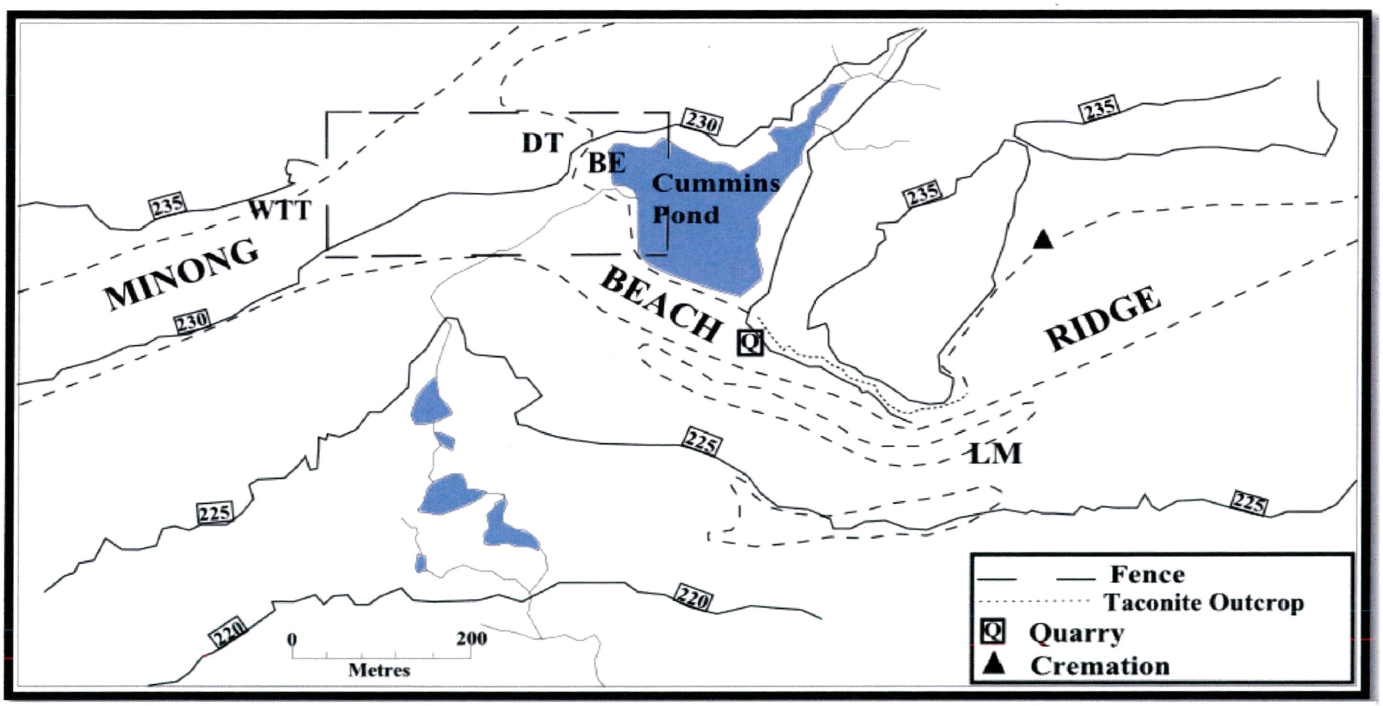

Figure 3.7: The Cummins site map showing the areas of excavation; west test trench (WTT), dozer trench (DT), bog edge excavations (BE), and lower Minong (LM). The quarry site and approximate location of the cremated remains are demonstrated also. The fence outlines the portion of the site purchased by the Ontario Government. Most of the area has been impacted by modern development resulting in total site destruction via development of a hydro corridor, gravel removal and blasting for an old rail bed. Modified after Julig, 1994: Fig. 4.2 and Dawson, 1983a: Fig. 2.

scatter may be a product of the close proximity to bedrock outcrops making it difficult to estimate site extent. Cummins is located on the main Minong beach level at 230-235 meters asl. Just east of the site is the Cummins pond, believed to be a former lagoon or embayment of Lake Minong (Phillips, 1982; Julig, 1994). The site has been heavily impacted by historic and modern quarrying activities, the construction of the old Port Arthur/Duluth railroad early in the century (Julig, 1994), and subsequent development of residential lots and access roads (Figure 3.7).

Excavations were conducted initially in 1963 by Dawson and Wright (Dawson, 1983a), with the most significant discovery being from the gravel pit east of the rock knob, where the "heavily disturbed remains of a cremation burial recovered from an exposed face of this gravel pit, with...occasional flakes found in situ above [water-layered] sands" (Wright, 1963:3 as cited in Julig, 1994: 43) (Figure 3.7). The remains were accelerator dated to 8480 +/- 390 ^{14}C years B.P. (NMC 1216; 2σ 10,513-8,540 cal years B.P., Dawson, 1983a; Julig, 1994). The cultural and

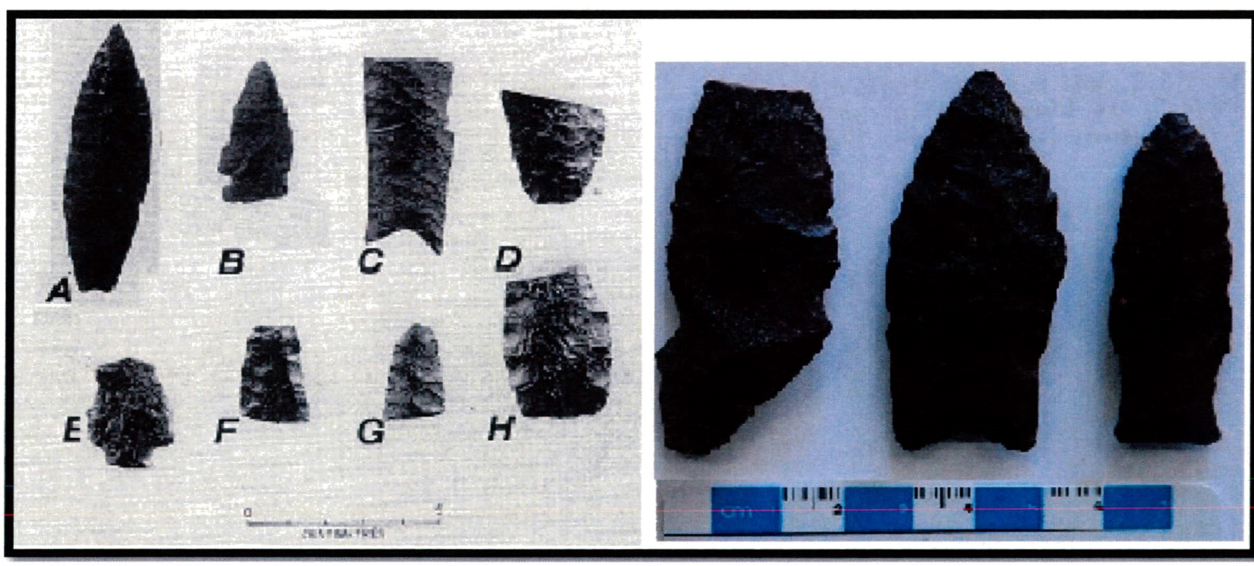

Figure 3.8: Projectile points from the Cummins site. The image on the left is modified from Julig, 1994: Fig. 5.65 & 5.66. Two side notched points are present in this image (B & E); all except A and B were surface finds. The photo on the right was taken by the author with permission from the Ontario Ministry of Culture, Thunder Bay; demonstrating more examples of projectile points. The two on the far right were surface finds.

depositional relationships between the burial and the main area of the Cummins site are unknown. However, this cannot be tested because the remains were destroyed during the process of AMS dating (Bill Ross, pers. comm., 2010). Patrick Julig (1984: 1994; Julig et al., 1990) conducted fieldwork between 1983 and 1985, with the primary objective being collection of geoarchaeological data to aid sediment analysis, stratigraphy and site formation processes.

A complex stratigraphic profile was developed that also shed some light on the development of Lake Minong in the area (Julig et al., 1990; Julig, 1994). Pollen cores were also obtained from the Cummins Pond where a radiocarbon date of 9,260 ± 170 years B.P. (11,092–9,948 cal years B.P.) was obtained from its base (Julig et al., 1990; 2 sigma, intcal09 curve, Calib 6.0, Reimer et al., 2009). Julig et al. (1990) indicates that taconite flakes from the lower depositional units of the main beach appear water-worn, and concluded that the site was initially occupied during active beach formation, and then repeatedly occupied with the cremation date representing a comparatively later occupation. This later occupation may have occurred after water levels had declined from the main Minong high (See Phillips, 1982; 1988, for discussion of beach successions at the Cummins site).

Artifact recovery from the Cummins site was extensive, and consisted of some formal tools and large amounts of debitage. The collection from all of the combined excavations consists of twenty-four projectile points and fragments (Julig, 1994) that Dawson (1983a) assigns to four types: Agate Basin/Angostura-like, Plainview-like, Minocqua, and triangular (Figure 3.8). Julig (1994) prefers to define the points based on the basis of similarities to the Holcombe type found in Michigan (Fitting et al., 1966). Cummins also yielded side-notched projectile points, indicating an Archaic re-occupation (Julig, 1994).

3.4.8 Archaic Site Distribution in the Thunder Bay Region

Paleoindian sites in the Thunder Bay region were apparently reoccupied by Archaic culture groups (see Hinshelwood, 2004). This was offered as an explanation for the recovery of Archaic projectile points from sites yielding predominantly Paleoindian technology. This becomes important here because of some unexpectedly late OSL dates deriving from the Mackenzie 1 site. Archaic reoccupation of this site offers one explanation, although no diagnostic Archaic tools were encountered. This is discussed more fully in the Discussion.

At approximately 7,000 ^{14}C years B.P. (7,800 cal years B.P.) a change in technological and stylistic representations of the projectile points occurred in the archaeological record that marks the beginning of the Archaic Period (Dawson, 1983b). Wright (1972) referred to it as the Shield Archaic to indicate a long-lived tradition that encompassed much of the Canadian Shield from northern Quebec to southwest Northwest Territories. Dawson (1983b) also refers to the Shield Archaic as a northern expression of the Archaic Tradition within the Precambrian Shield. The Archaic period in Northwestern Ontario is defined by notched projectile points, and more frequent recovery of woodworking tools such as wedges and adzes (Dawson. 1983b; Fox, 1977; Hinshelwood, 2004). In the Thunder Bay locality, possible Archaic sites are typically associated with the Nipissing shoreline that is located at around 210 m asl. The highest expression of the Nipissing shoreline occurred approximately 5,500 ^{14}C (6,300 cal) years B.P. (Kingsmill, 2011; Phillips, 1993).

The Archaic Tradition is thought to reflect the shift in subsistence economy and lithic tool kit associated with widespread climatic warming. This is supported by the pollen samples from Cummins pond and Oliver pond that suggest a warming event at 8,000 ^{14}C years B.P. (8,900 cal years B.P.) that persisted until about 6,200 ^{14}C years B.P. (Julig et al., 1990).

Hypotheses about the Archaic period in northwestern Ontario focus on an *in situ* change from Paleoindian to Archaic tool traditions forced by development of the closed boreal forest that supported different animal species (Dawson, 1983b; Hinshelwood, 2004; Kingsmill, 2011; Pilon and Dalla Bona, 2004). This hypothesis is also offered to explain the recovery of Archaic artifacts at local Paleoindian sites, such as Cummins and Brohm (McAndrews et al., 2004), as well as sites around Dog Lake (McLeod, 1978; 1981) and the Kaministiquia River Delta (Hamilton, 1996; Kingsmill, 2011). By way of explanation, it was proposed that Lake Minong strandlines remained attractive for Archaic occupation after they had been abandoned by declining lake levels because they represented high, well drained linear ridges, often in proximity to bedrock outcrops offering high quality raw material. This led to reuse of large quarry sites that appear on Minong strandlines (e.g., Cummins). The reoccupation of beach ridges occurred more frequently where streams bisect the strandlines (e.g., the Neebing and McIntyre Rivers), which could suggest the well-drained areas were preferred because of the access to a local fresh water source (transportation, food resources). This hypothesis is constrained by the archaeological survey bias that focuses on ancient lake shorelines, with minimal survey of other localities.

3.4.9 Other Significant Archaeological Sites in Adjacent Areas

It has been demonstrated that Paleoindians occupied the Great Lakes area during deglaciation. These other archaeological sites are important for this discussion as they might have had some cultural, economic and technological influence on the study area, and offers points of comparison to the local situation.

3.4.10 Southeastern Ontario

As noted in Chapter 2, the Gainey, Parkhill and Crowfield Complexes are seen in Southern Ontario as a regional variant of Early Paleoindian cultural groups because the associated point styles are fluted. The majority of the sites are located on the beaches of glacial Lake Algonquin, and include the Zander, Udora, Parkhill and Fisher sites (Deller,1976; Deller and Ellis, 1988; Stewart, 1984; Storck, 1983). The Parkhill site specifically is suggested to roughly correlate with the last manifestation of Lake Algonquin, dating to 10,500 years B.P. based on morphological similarities to the Clovis, Folsom and Debert complexes (Roosa, 1977; Roosa and Deller, 1982). This date remains speculative because it has not yet been independently demonstrated that the site was occupied when the Algonquin strandline was an active beach.

3.4.11 The Caradoc Site (AfHj-104) in Ontario

The Caradoc site is located about thirty kilometres west of London, Ontario. The site was discovered in 1997 and excavations yielded over 60 tools and preforms made of Bayport Chert from eastern Michigan that appear to have been purposefully broken by deliberate blows to the dorsal/ventral surface of the tool (Deller and Ellis, 2001) (Figure 3.9). The artifacts appear to

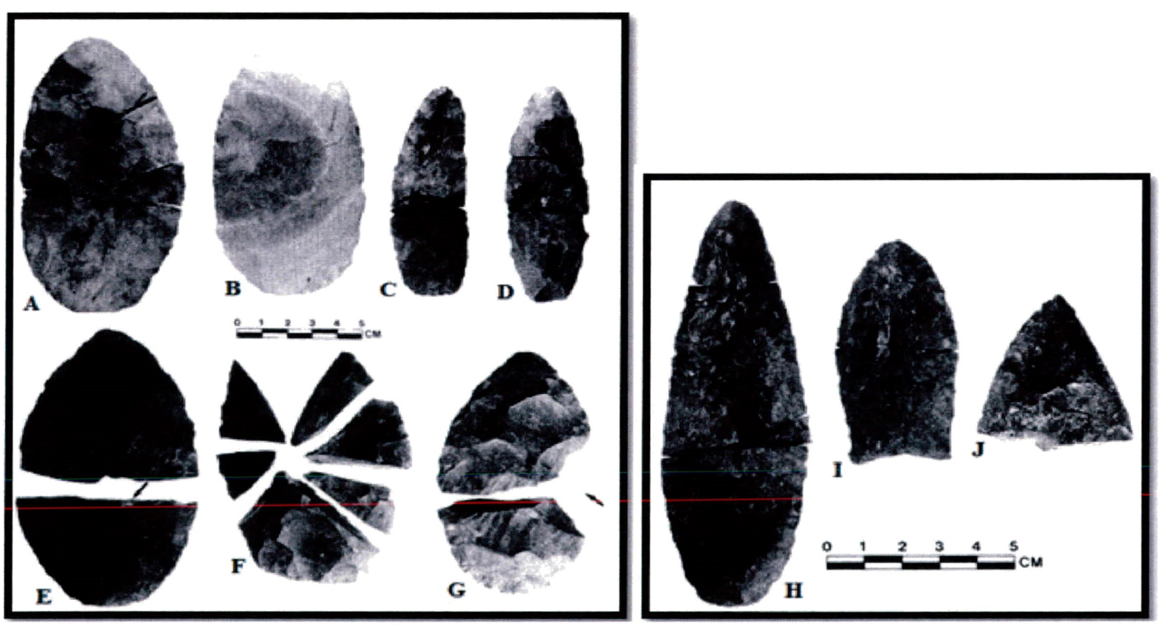

Figure 3.9: Examples of bifaces (left, A-G) and projectile points (right, H-J) from the Caradoc site in southern Ontario, where it is believed stone tools were broken intentionally. The pieces have been refitted to show the breakage patterns, especially on specimens E (demonstrating a snap break), F (radial break) and G (complete cone fracture). The arrows indicate the cone initiation from the break. Modified after Deller & Ellis, 2001: Fig. 2, 3 and 4.

have been struck purposefully in order to break the tool into multiple pieces. This is conclusively characterized as intentional damage because the bifaces recovered from Caradoc demonstrate different breakage patterns than what would be typical of an artifact damaged in use (fragments break upon impact). The lack of debitage, the weathered surface breaks, and deliberate breakage all contribute to the hypothesis that the breaks observed on the artifacts were not accidents in manufacture (Deller and Ellis, 2001).

The site is located on a strandline of the pro-glacial Lake Whittlesay that existed 13,000 ^{14}C years B.P. The date of the site is considered to be 10,500 to 10,000 ^{14}C years B.P. based on the morphology of the unfluted lanceolate projectile points that appear similar to Holcombe and Hi-Lo point types (Deller and Ellis, 2001). The site is believed to have served ritualistic functions because the tools have been "sacrificed", and other examples of this seemingly ritualistic activity is found at other sites in the upper Midwest; the Renier site (Mason and Irwin, 1960) and the Pope site in Wisconsin (Ritzenthaler, 1972), and the Gorto site in Michigan (Buckmaster and Paquette, 1988) where projectile points are purposefully burned believed to be associated with the ritual activities of a cremation burial.

3.4.12 The Grant Lake Site (KkLn-2) in Nunavut

The Grant Lake site is located in the Keewatin District in what is now Nunavut, just west of Hudson Bay. It was first discovered in 1955 and excavated in 1973 by Wright (1976). The site consists of multiple habitation areas represented by weighstones and hearth floors that appear to delineate tent rings. The site is flanked to the north and south by large eskers that likely attracted caribou herds travelling through this area. Artifacts recovered from this site include projectile points, knives, chithos, wedges and adzes, as well as a large amount of debitage and fire cracked rock (Wright, 1976). The 136 projectile points are all made from a local quartzite, with the exception of one made from a red slate; the majority of the points are lanceolate in configuration except for three that are notched (Wright, 1976) (Figure 3.10). Wright (1976) believes that the people who occupied this area were part of the Agate Basin complex and offers a date of occupation between 9,000 and 8,000 ^{14}C years B.P., based on the similarities to point finds form the Agate Basin site in Wyoming (Wright, 1976). Many radiocarbon dates with what were thought to be in reliable artifact association were obtained from the site, but which yielded recent dates. This led the author to suggest that the associations were spurious and do not correspond to the time of occupation (Wright, 1976). Wright (1976) offered a controversial interpretation that suggests that people migrated northward through the Northern Great Plains, along the western flank of the proglacial lakes and the LIS, presumably attracted northward by available herd animals. In the face of Hypsithermal warming and forest development, Wright (1995) proposed that these people adopted new technologies and lifestyles suited to that forested environment, which eventually lead to the appearance of the Shield Archaic ca 7,000 ^{14}C years B.P. (Wright,

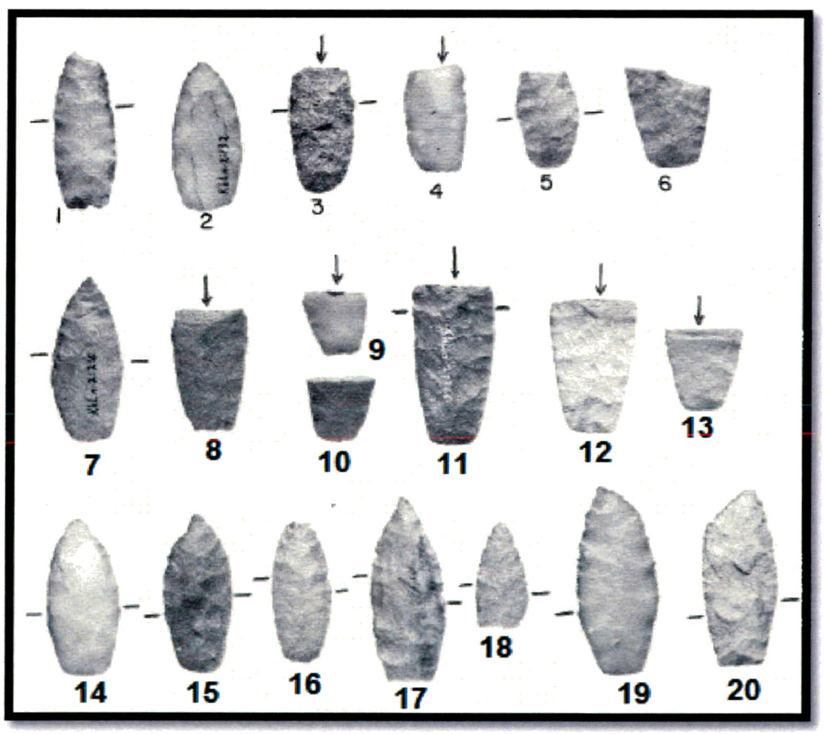

Figure 3.10: Projectile points from the Grant Lake site. The bottom row of points are surface finds. Modified from Wright 1976: Plates VII, VIII, & IX.

1995).

3.4.13 The Sinnock site (EcKx-4) in Manitoba

The Sinnock site is located on the eastern bank of Winnipeg River, near Great Falls, Manitoba. The site was discovered in 1976 and excavated by Buchner (1984) in 1980 and 1982. The site consists of three terrace features; the lowest was excavated in 1980. In 1982 the site was flooded by hydro activity rendering it impossible to revisit for further excavation. The lower terrace consisted of three activity areas that yielded 5,788 artifacts. The 1982 excavations produced over 40,000 artifacts from the upper two terraces. The artifacts found include thirty-eight projectile points, bifaces, knives, scrapers, and trihedral adzes (Buchner, 1984). The second terrace yielded tooth enamel fragments that were reconstructed to provide evidence for the presence a bovid species, which is consistent with the surrounding sites in Manitoba producing bison remains (Buchner, 1984).

Figure 3.11: Examples of projectile points found at the Sinnock Site in Manitoba. Modified from Buchner, 1984: Plate 3 and 4.

This site contributes to the previously established Caribou Lakes Complex in Manitoba that was defined by Wheeler (1978) and Buchner (1979) that consists of Agate Basin-like projectile points, large bifaces and trihedral adzes (Buchner, 1984; Steinbring and Buchner, 1980) (Figure 3.11). Buchner (1984) suggests that, based on the morphological characteristics of the projectile points found, the site dates to the Agate Basin cultural sequence in the Plains from 10,500 to 8,000 ^{14}C years B.P. Four radiocarbon dates were obtained from the site, 8,030 +/-160 (OxA-116), 4,500 +/-80 (OxA-508), 4,295 +/-90 (Beta-4868), and a modern sample (OxA-115) (Buchner, 1984; Canadian Archaeological Radiocarbon Database). The oldest date was obtained from a bison bone fragment from a surface exposure on the site, while the two 4,000 dates are from buried contexts, consisting of fine organic sediment with charcoal inclusions from a pit feature. The oldest date has been widely accepted and presented by the author, even with the questionable context of the find. Unfortunately, Buchner (1984) makes little mention of the other dates that challenge assertions about the depositional integrity of the site, with its constant flooding activity and evidence of erosion of the upper terraces.

3.4.14 Minnesota, Wisconsin and Michigan

Paleoindian sites and phases reported in the United States portion of the Upper Great Lakes are briefly discussed, with special reference to the Minocqua and Flambeau phases from northern Wisconsin. Many of the specimens are isolated projectile point finds held in private collections; fluted examples have been discovered near Round Lake, Minnesota; Tony Romano discovered a fluted point in the Reservoir Lakes region (Bill Ross, pers. comm., 2012; Tony Romano, pers. comm., 2011). Joe Neubauer from Pine City, Minnesota holds sixteen projectile points made from a variety of lithic raw materials (Hixton Silicified Sandstone, Prairie du Chein chert, quartz, Knife Lake Siltstone), and resembling Clovis, Folsom, Gainey and Holcombe projectile points (Mulholland and Mulholland, 2011).

A not yet published collection from Shawano County in northern Wisconsin contains hundreds of Paleoindian tools, including approximately two hundred projectile point and point fragments (Ray Reser, pers. comm., 2012). The site is located on a terrace above an old oxbow of the Embarrass River. All of the tools have been collected on the surface in a farmer's field (some time ago) (Ray Reser, pers. comm., 2012). Raw materials represented include Hixton Silicified Sandstone, taconite, Knife Lake Siltstone, rhyolite, and various chert specimens (Ray Reser, pers. comm., 2012). He suggests that the projectile points resemble Scottsbluff, Agate Basin, Hell Gap, and Angostura-like types (Ray Reser, pers. comm., 2012).

3.5 LITHIC RAW MATERIALS

Paleoindians appear to have relied heavily upon locally available raw materials for stone tool manufacturing. The locally outcropping Gunflint Formation yields the primary lithic raw material represented in the local Paleoindian collections, including the Mackenzie 1 site. Other raw materials represented include Knife Lake Siltstone, with consistent recovery in most sites of a few examples of Hixton Silicified Sandstone (HSS), a non-local material.

3.5.1 The Gunflint Formation

Silica-rich material from the Gunflint Formation including taconite (jasper taconite), Kakabeka Chert, and Gunflint Silica, are strongly favoured in Paleoindian assemblages. The formation runs southwest from Thunder Bay to Gunflint Lake (Hishelwood, 1987; Lindenberg and Rapp, 2000) (Figure 3.3). Taconite, Kakabeka Chert and Gunflint Silica are terms applied by local archaeologists to describe subtle differences in rock types all deriving from the same formation, which for simplicity, should all be considered siliceous chert from the Gunflint Formation. The exposures are characteristically bedded in configuration, with alternating qualities of the material (reflecting silica content and internal faulting) that grade into one another (Lindenberg and Rapp, 2000). The formation quality varies between bands and within bands, containing iron-rich compounds that precipitate out into the fracture planes, acting to cement them, which may cause material failure early in the reduction sequence. The material can be removed from the bedrock source in blocky pieces. This is a result of the banded nature of the material, where siliceous materials alternate with bands of shale (Pye, 1968; 1969). The formation consists of siliceous cherts ranging from fine to course grained, with iron-rich and quartz inclusions that may not be immediately obvious (Pye, 1968; 1969). The appearance of the material from the outcrop source may have an influence on the reduction process of stone tools, as platform preparation and careful selection of the striking point and angle was crucial (Gjende Bennett, pers. comm., 2012; Gary Wowchuk, pers. comm., 2011). The influence of the source material on tool shape is discussed more fully below.

Gunflint Silica ranges from transparent to black in color demonstrating two textures, granular or cherty that may either appear waxy or glossy (Lindenberg and Rapp, 2000). Gunflint Silica is relatively easy to work because the material is silica-rich, with few inclusions and fault planes. The few inclusions evident in the material are often oriented in a parallel fashion, creating bands, or as random, scattered aggregates (Lindenberg and Rapp, 2000). Experimental work suggests that the application of heat to the material may improve the quality, resulting in more pliable characteristics (Romano, 1991; Dan Wendt, pers. comm., 2011).

Kakabeka chert demonstrates a characteristically banded appearance, with a dark (black, grey, blue, brown) cherty layer alternating with a lighter (yellow, brown, blue) carbonate layer exhibiting a rusty manifestation (Lindenberg and Rapp, 2000). Heat treatment does not improve the workability of Kakabeka chert (Lindenberg and Rapp, 2000; Romano, 1991).

Taconite (sometimes referred to as jasper taconite) ranges in color through red, blue, black, and grey, demonstrating a dense distribution of iron-oxides within the chalcedonous matrix (Lindenberg and Rapp, 2000). Taconite contains a large amount of iron giving it the characteristic opaque and pebbly surface. Taconite is characteristically brittle making it difficult to work; it is prone to shatter along fault planes hidden within it (Hamilton, 1996). Researchers remain divided on the effect of heat treatment on taconite to improve flaking qualities. It was initially thought that the presence of 'potlids' on the material indicated "intentional thermal alteration" of the material in order to improve the workability (Hishelwood, 1987: 45). As indicated in Chapter 7, this hypothesis has been critically addressed through a series of experiments with taconite (Dan Wendt, pers. comm., 2011; Gary Wowchuk, pers. comm., 2012). The boreal forest is prone to forest fires, and while potlids indicate some sort of thermal alteration, it is difficult to say if the application of heat was intentional unless found in association with a hearth feature.

Exposed raw material of all qualities is extensive within the Thunder Bay region, with quarry sites located at the Cummins site, the Irene site, Centennial Park (Simmonds and McDaid sites), and others along the formation, but these associations have not been fully investigated. Many archaeological sites are within walking distance of taconite outcrops, allowing for quarrying and easy transport to workshop sites (Julig et al., 1990). The tabular pieces of material available in the formation are easily removed by prying free slabs directly from the outcrops. In some areas the Gunflint Formation is closely located to the Minong strandlines, leading researchers to hypothesize the attraction to the beach ridges was partially the result of improved availability of raw material through wave action (Fox, 1975; 1980; Julig, 1984; 1994; Ross, 1995). Well-drained beaches adjacent to Gunflint Formation outcrops would have also provided attractive seasonal campsite locations (Julig, 1984).

3.5.2 Knife Lake Siltstone/Lake of the Woods Chert

Knife Lake Siltstone is available from outcrop site(s) at Knife Lake, located on the border of Minnesota and Ontario a short distance south of Thunder Bay. According to Nelson (1992) there are twenty known quarry sites on the Ontario side of the lake and four on the American side, with another six located inland. The material ranges in color, including grey, black and green, and in some cases may contain quartz content as high as 50%. Poor quality material tends to be dull in appearance and exhibit planar fractures along lamination layers (Lindenberg and Rapp, 2000). The lower silica content makes the material susceptible to weathering; the patina can be white, cream, or light grey in color. Knife Lake Siltstone is available from the original geological context, as well as through glacial and fluvial transportation of large cobbles.

A debate surrounds the relationship between Knife Lake Siltstone and Lake of the Woods chert, thought to originate from primary deposits, or outcrops, in the northern Lake of the Woods area (Nelson, 1992). The term is utilized by archaeologists to describe a wide variety of fine-grained lithic materials that range in color from green to black. Based on Neutron Activation Analysis conducted by Nelson (1992), Knife Lake Siltstone and Lake of the Woods chert are chemically similar and could possibly be part of the same formation. The different names for the material may reflect archaeologists in each region independently naming the same material that actually derives from the same formation. In this thesis, the terms are treated as synonymous.

3.5.3 Hixton Silicified Sandstone

The only primary deposit of Hixton Silicified Sandstone (Hixton) in North America is from Silver Mound, a Hixton quarry site located near the town of Hixton in west-central Wisconsin. The mound itself is a 65 m tall hill, flanked by multiple rivers and creeks (Carr and Boszhardt, 2010). Silver Mound contains eighty seven known archaeological sites, consisting of eleven extensive quarrying pits, seven rockshelter locations, several workshop areas, and various surface finds on the mound and adjacent fields (Carr and Boszhardt, 2010). Hixton reveals dramatic ranges in color, including white, yellow, light brown, red, orange and black. The higher qualities are semi-translucent demonstrating a fine, grainy texture ('sugary quartz' appearance). Importantly, Hixton is susceptible to frost and is easily fractured by freeze/thaw action. Other raw materials present in varying quantities within the Silver Mound archaeological sites include Prairie du Chein and Galena cherts from Minnesota and taconite from northwestern Ontario (Carr, 2005).

The presence of Hixton at other archaeological sites some distance from the primary source indicates that Silver Mound was frequently utilized for the raw materials (Adams, 1995; Buckmaster and Paquette, 1988; Carr, 2005; Mason and Irwin, 1960; Ross, 1995). Sites in Michigan, Minnesota and Ontario demonstrate the presence of Hixton in lithic assemblages, commonly in the form of finished tools such as projectile points, with little debitage represented (Adams, 1995; Buckmaster and Paquette, 1988; Carr and Boszhardt, 2010; Mason and Irwin, 1960; Norris, 2012; Ross, 1995). This characteristically indicates that the quarry site also functioned as the primary reduction site, where initial knapping was performed and the blanks and preforms were produced for final tool fabrication in other locations (Carr and Boszhardt, 2010). This could indicate the possible dispersal of Hixton through widespread interaction networks, resulting in hypotheses that Paleoindians employed an extensive cyclical procurement strategy involving the repeated use of the material via periodic returns to Silver Mound (Carr, 2005). The presence of Hixton at a number of Paleoindian sites in the Thunder Bay area indicates the significance of the Silver Mound quarry source.

3.6 NORTHWESTERN ONTARIO ARCHAEOLOGICAL SYNTHESIS: PALEOINDIAN PERIOD

The primary archaeological syntheses addressing Paleoindian cultures reported in the Thunder Bay region was done by William Fox (1975; 1980), and with later contributions by Bill Ross (1979; 1995, 2011). The majority of the information concerning archaeological collections in northwestern Ontario is reported in Cultural Resource Management reports that are generally never published. Fox and Ross have attempted a higher level of analysis to develop an interpretive framework for interpretation of Paleoindian occupation of the study area. Fox (1975; 1980) proposed that assemblages associated with this specific time period should be grouped into the Lakehead Complex on the basis of the use of taconite as a raw material, and the association of habitation sites with Lake Minong shorelines. The main beach ridge of glacial Lake Minong dates to approximately 9,500 years ago, and it is assumed that the main Paleoindian occupations date to when these beaches were active (Fox, 1975; Ross, 1979). Bill Ross's research is mainly concerned with reorganizing Fox's Lakehead Complex, and including it as one of several complexes within the Interlakes Composite (Ross, 1995). This analysis focused upon addressing the stylistic/typological diversity of the Late Paleoindian projectile points (Ross, 1995). A review of the Paleoindian culture sequence is given below, specifically focusing on the diagnostic tools, or projectile points found in Northwestern Ontario and the surrounding region.

3.6.1 Lakehead Complex

The major archaeological sites that Fox (1975, 1977) included in the Lakehead Complex are (but not limited to) Brohm (DdJe-1; MacNeish, 1952), Catherine (DcJh-11), Cummins (DcJi-1; Dawson, 1983a), Rocky Point (DeJj-6), Knife Lake (DeJj-6), Narrows (DaJn-7), Sturgeon Sand Spit (DcJv-1), and South Fowl Lake II from the United States. The apparent settlement pattern of Paleoindian people with its strong spatial association with ancient Lake Minong glacial beach ridges is consistent with similar patterns around Lake Algonquin to the southeast (Ellis and Deller, 2000) and Lake Agassiz to the northwest (Pettipas, 1983). The assumption that

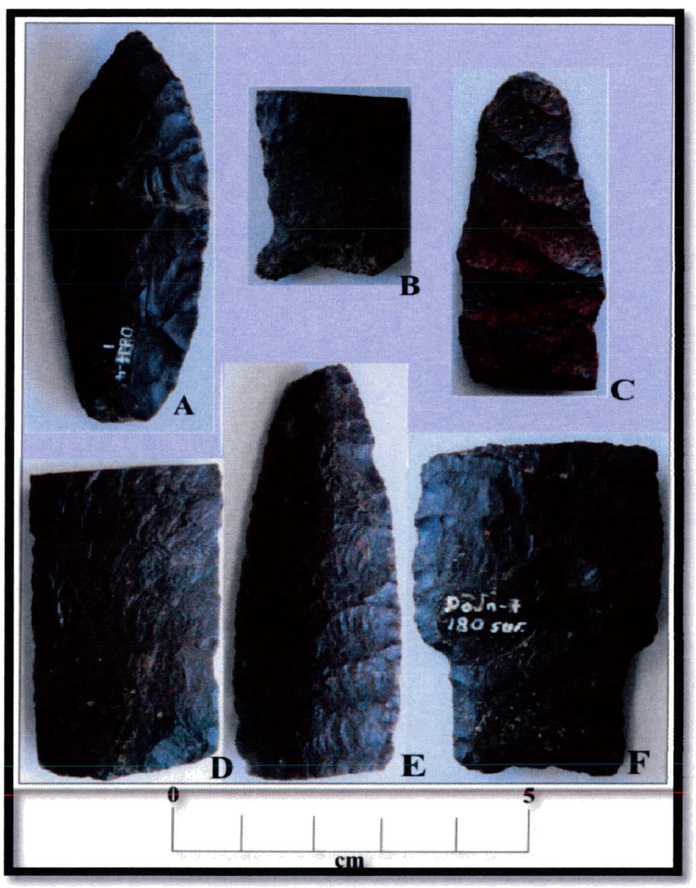

Figure 3.12: Projectile points found at other Lakehead Complex sites around Thunder Bay, Ontario. Specimens are from the Newton site (A), Dog Lake site (B), Catherine site (C), Rocky Point site at Dog Lake (D), Wiktoway site (DfJg-1) at Hicks Lake (E), The Narrows site (F). The photos were taken by the author, with the permission of the Ministry of Culture, Thunder Bay, Ontario.

Paleoindian settlement was restricted to ancient beaches was the basis of the "Aqua-Plano" concept (Quimby, 1959), and has been repeatedly used to predict the placement of other archaeological sites in the region (Fox, 1975, 1980). This contributed to the discovery of the Newton, Simmonds, McDaid, Boulevard Lake, and Harstone Hill sites after the discovery of the main sites at Cummins and Brohm (Fox, 1975, 1980; Ross, 1995). There are smaller non-specific habitation sites located towards the interior positioned on major water transport routes such as Rocky Point, South Fowl Lake II and Narrows, which Fox includes in the Lakehead Complex despite the bias for exploring ancient beach ridge sites (Fox, 1980).

The physical characteristics that define Lakehead Complex projectile points include oblique parallel collateral flaking patterns, varying degrees of bilateral edge grinding, and basal edge grinding (Fox, 1975). The general shape morphology of the projectile points demonstrates a preference for a lanceolate configuration, with a slightly convex to straight to slightly concave basal configuration, basal-lateral constriction (resulting in the appearance of a stem in some cases), and either a concave or convex basal form (Fox, 1975) (Figure 3.12). The cross sections of the Lakehead Complex projectile points are primarily lenticular and bi-convex in form, and a diamond shaped cross section is uncommon on Lakehead points (Fox, 1980).

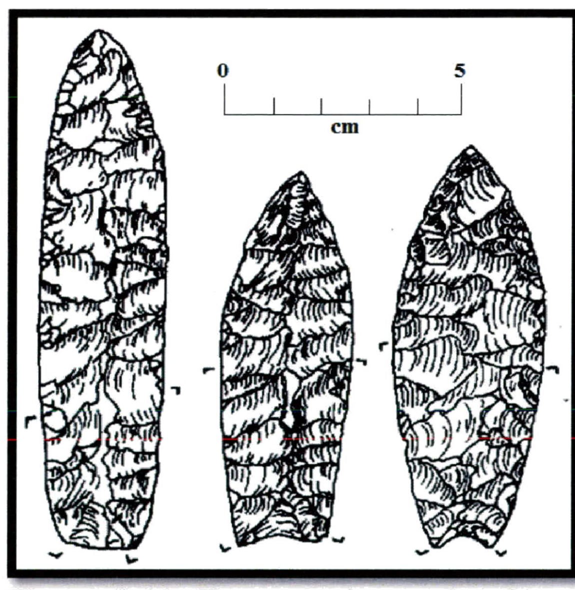

Figure 3.13: Type specimens for the Flambeau phase projectile points from northern Wisconsin. Modified after Salzer, 1974: Fig. 1.

The Lakehead Complex was defined using collections characterized by small samples of diagnostic tools exhibiting considerable stylistic variability. As a consequence, analysts were often limited to offering (often superficial) comparisons to the named types already established in the literature, often from far distant archaeological sites. Thus, Lakehead Complex projectile points have been most frequently identified as Plainview, Angostura, Agate Basin and Minocqua points, more commonly found on the Great Plains. Interpretations of temporal duration, and even lifestyles associated with these distant sites are then extrapolated from these distant sites, with little or no supporting evidence.

Raw material selection noted at Lakehead Complex sites suggests a strong preference for materials deriving from the Gunflint Formation (jasper taconite, taconite), Knife Lake siltstone, quartz and some evidence of exotic materials such as amethyst, Hudson's Bay Lowland Chert and Hixton silicified sandstone (Fox, 1975; 1980). All of these materials are available within the Thunder Bay region with the exception of Hixton silicified sandstone that is found, as noted above, at one known bedrock source located in south-central Wisconsin (Carr, 2005; Ross, 1995). Fox (1975) suggests a strong similarity to the Reservoir Lake (Harrison et al., 1995; Steinbring, 1974), Flambeau and Minocqua (Salzer, 1974) Phases in terms of raw material sourcing, settlement/activity pattern and general projectile point form. These later Phases are all found along the south side of the Lake Superior basin, and such similarities can be used for regional comparison.

Definition of the Flambeau and Minocqua phases derive from the results of the North Lakes Project in Wisconsin (Salzer, 1974). The Flambeau phase is defined on the basis of surface-collected Paleoindian artifacts from three sites and included scrapers, projectile points, utilized flakes, wedges, large bifaces, and bifacial knives (Salzer, 1974). The projectile points were moderately long are un-notched, with generally contracting lateral edges that are usually heavily ground near the base (Figure 3.13). The bases are slightly convex, straight, or concave and are generally only slightly ground (Salzer, 1974). The points are identified as Agate Basin-like but exhibit more variability in the basal configuration than is normally noted with Agate Basin (Salzer, 1974). There are no radiocarbon dates associated with these sites, so site antiquity was estimated on the basis of stylistic similarities to the Hell Gap site located in Wyoming, dating to 7,300 to 7,900 BC (9,300 to 9,900 years B.P.) (Salzer, 1974 citing Irwin et al., 1966).

The Minocqua phase derives from three sites: two surface collected sites and an excavated isolated component at the multi-component Robinson site (Salzer, 1974). The Robinson site yielded two lithic concentrations; one area yielding 400 flakes and is interpreted as a workshop, while the other was characterized by debitage and associated broken artifacts showing some use-wear and is interpreted to be a temporary camp site (Salzer, 1974). The artifacts consisted of scrapers, projectile points, bifaces of varying sizes, bifacial knives, wedges and utilized flakes (Salzer, 1974) (Figure 3.14). The artifact assemblage resembles the Flambeau tool kit except that the projectile point assemblage conforms to a different morphology. The small assemblage of projectile points demonstrate slightly inset, roughly parallel-sided or contracting stems which terminate at the base in two short lateral projections, or “ears” (Salzer, 1974). The points also exhibit poorly executed attempts at collateral flaking on one face with crudely done flaking on the other, and are ground on the stem (Salzer, 1974). Again, the estimated age of this complex is based on the stylistic similarities in

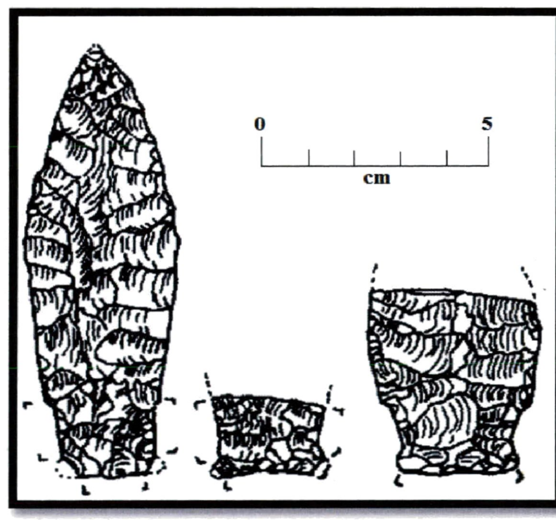

Figure 3.14: Type specimens for the Minocqua phase projectile points from northern Wisconsin. Modified after Salzer, 1974: Fig. 2.

point form and technique of manufacture to the Hell Gap Site in Wyoming (6,000 to 5,000 BC, or 8,000 to 7,000 years B.P.) (Salzer, 1974).

The Reservoir Lakes Phase in Minnesota is defined by Steinbring (1974: 67) as "a recurring combination of Plano types, including clear, intermediate and variant forms of Scottsbluff, Agate Basin, Eden, Hell Gap and Plainview points, many of which are made from jaspilite [jasper taconite]" (Figure 3.15). The other associated artifacts include choppers, crude bifaces, crescent blades, adzes, long, heavy picks and a variety of scrapers (Steinbring, 1974).

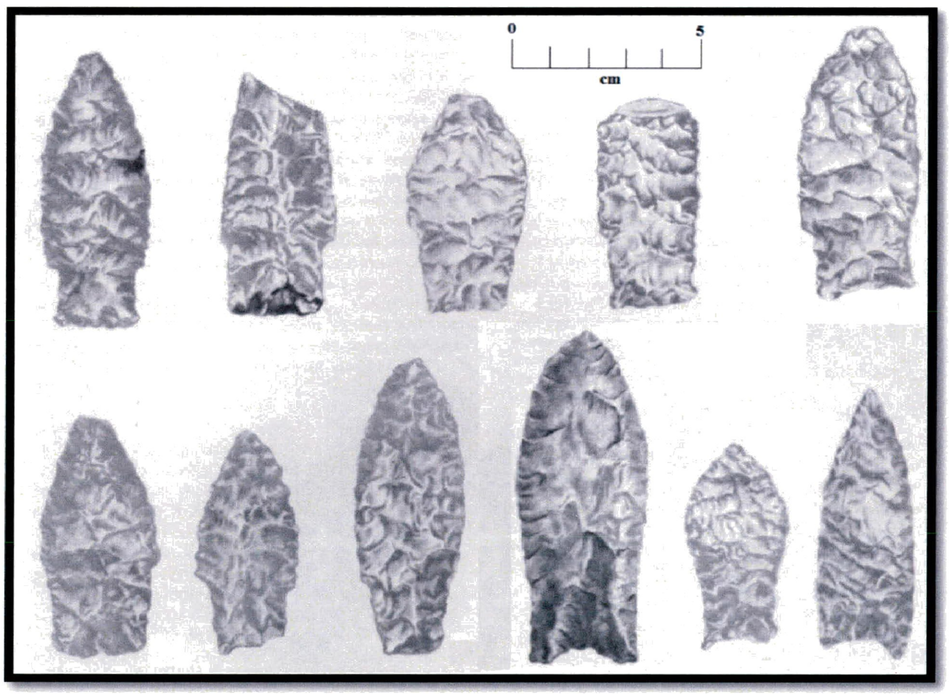

Figure 3.15: Examples of projectile points from the Reservoir Lakes Phase/Complex in northern Minnesota. Notice the two fishtail shape projectile points in the bottom row. Modified after Steinbring, 1974: Fig. 1 and 2.

3.6.2 Interlakes Composite

Bill Ross (1995) has reorganized Fox's Lakehead Complex into the Interlakes Composite. He reiterates that ancient strandlines of Agassiz and Minong are an important factor in determining the extent of archaeological sites between the two glacial lake basins (Ross, 1995). Ross (1995) also notes that the only radiocarbon date derives from the cremation burial at the Cummins site. However, Dawson notes the disturbed nature of the recovery, and questions the integrity of the archaeological and geological context of the cremated remains (1983a: 8; Julig et al. 1990; Ross, pers. comm., 2011). The appearance of water worn artifacts at sites such as Cummins and Catherine suggest human occupation when the beaches were active, and therefore may date to ca. 9,500 years B.P. (Fox, 1975; Julig, 1994; Ross, 1995).

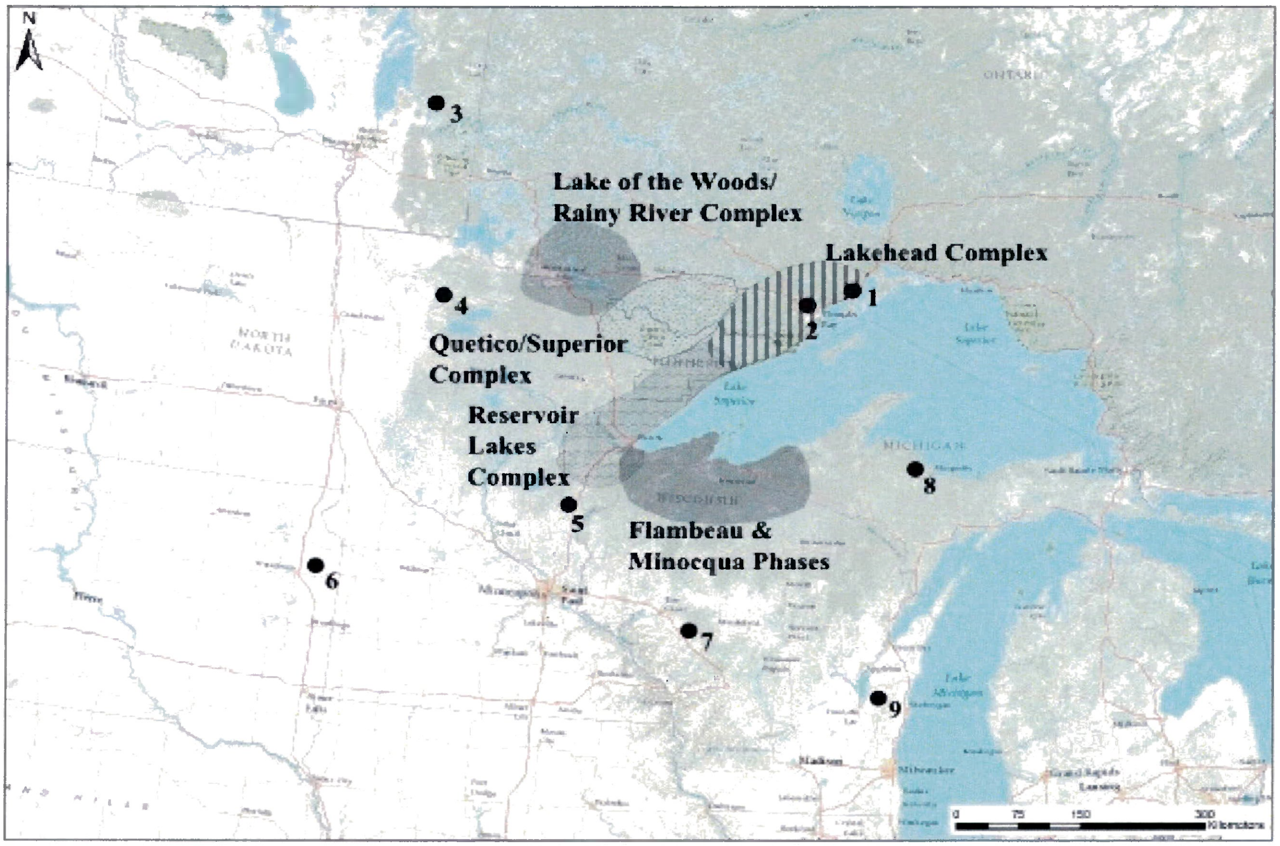

Figure 3.16: Image demonstrating the complexes included within the Interlakes Composite, as defined by Bill Ross (1995). The geographical area where Flambeau and Minocqua sites are discovered is outlined, though not part of the original composite. Other major sites mentioned in the text are included; 1) Brohm, 2) Cummins; 3) Sinnock; 4) Round Lake; 5) Pine City; 6) Browns Valley; 7) Silver Mound (source of Hixton); 8) Gorto; 9) Renier. Modified after Ross, 1995: Fig. 2.

Ross (1995) emphasizes the difficulties associated with assigning the existing projectile point typologies into regional recoveries because of the small sample size and typological variability of the recoveries. This morphological diversity led him to question whether they could be subsumed within a single named Complex (Lakehead Complex). Instead, he proposes four regionally distinct Late Paleoindian complexes that collectively should be grouped into the Interlakes Composite (Ross, 1995).

These four complexes are Lake of the Woods/Rainy River, Quetico/Superior, Lakehead Complex, and Reservoir Lakes (Ross, 1995) (Figure 3.16). The complexes are differentiated on the basis of raw material selection and geographical space, while they should be included within the Interlakes Composite because of the co-occurrence of the parallel oblique flaking, lateral and basal grinding, and the general morphological shape of the projectile points. The representation of Hixton at all of these sites is minimal, but persistent, with formal tools composed of Hixton being recovered at each site, but with little to no representation in the debitage. This indicates that the formal tools or tool preforms were transported northwards as completed tools (Ross, 1995). Other raw materials that dominate all the sites come from the Gunflint Formation

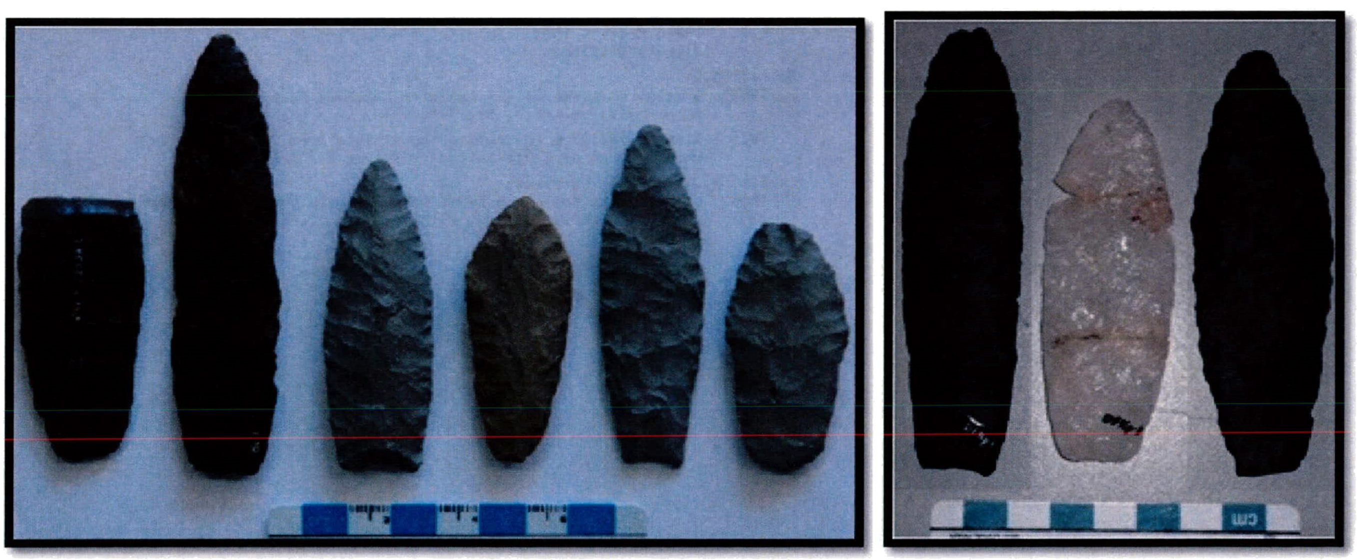

Figure 3.17: Projectile points from the Lake of the Woods/Rainy River Complex. Left: photo captured by the author with the permission of the Ontario Ministry of Culture, Thunder Bay. The four projectile points on the right of the image are casts. Right: photo captured by the author with the permission of Bill Ross. The quartz point in the middle is glued back together.

(including taconite, Gunflint silica and Kakabeka chert), and Knife Lake Siltstone/Lake of the Woods chert (Ross, 1995).

The Lake of the Woods/Rainy River complex is based on a series of surface collected artifacts by Reid (1980), of which five are projectile points. The five points are considered Agate Basin like and are made from Lake of the Woods chert, with the exception of one made from quartz (Reid, 1980) (Figure 3.17). The complex was later defined based on multiple recoveries in northern Minnesota and Wisconsin. However, these artifacts were generally stored within private collections or curated in museums (e.g., the Pelland, Brenning and Plummer collections), and consist of projectile point assemblages that are rarely published. As a result, when considered in conjunction with the published assemblages, these projectile points contribute significant variability to Reid's (1980) initial discoveries (Magner, 2001) (Figure 3.17). From these collections are additional lanceolate points with similarities to Agate Basin, Hell Gap, Scottsbluff and Plainview types, made from a variety of other materials, such as Knife Lake Siltstone, rhyolite and Hixton (Magner, 2001). The Quetico/Superior complex is also poorly represented, consisting of surface collected artifacts with a high degree of stylistic variability among the projectile points (Reid, 1980) (Figure 3.18). The Reservoir Lakes Complex is defined by Steinbring (1974:67) as "a recurring combination of Plano types, including clear, intermediate and variant forms of Scottsbluff, Agate Basin, Eden, Hell Gap and Plainview points, many of which are made from jaspilite [jasper taconite]." The other associated artifacts include choppers, crude bifaces, crescent blades, adzes, long heavy picks, and a variety of scrapers (Steinbring 1974; Harrison et al. 1995). Some of the material is available in the published literature (e.g., Harrison et al., 1995; Steinbring, 1974), but the majority of the complex is in private collections that are generally unavailable for comparative analysis. The wide range of variability exhibited in this complex can be attributed to the large geographical area yielding assemblages demonstrating little context and association. The largest single assemblage that has been published is from the Redepenning Collection representing forty different find sites (i.e., surface finds, eroded river banks).

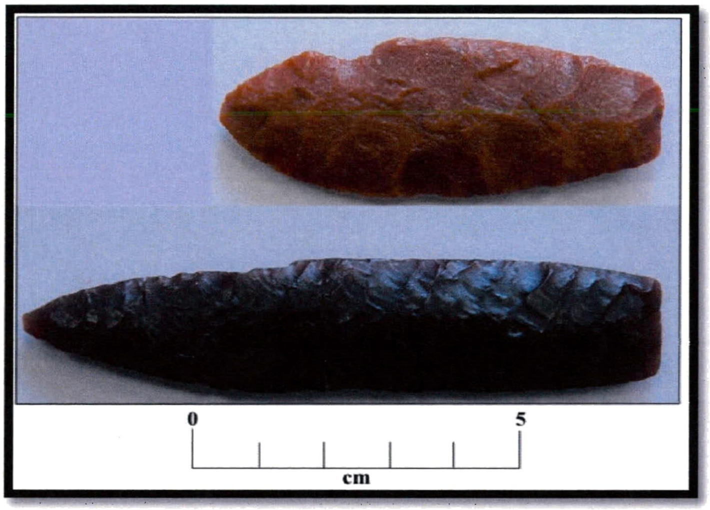

Figure 3.18: Projectile points from the Quetico/Superior Complex. The specimen on the top is a cast of a Hixton Silicified Sandstone point. Photos by the author with permission of the Ontario Ministry of Culture, Thunder Bay.

3.6.3 New Discoveries

Since the publication of work by Bill Fox and Bill Ross, there has been a great deal of new information collected, although little of it is published or otherwise readily accessible. There have been several examples of fluted points recovered from northern Minnesota and parts of Wisconsin through the collective efforts of Tony Romano, Sue and Steven Mulholland and Dan Wendt (Mulholland, pers. comm., 2012; Romano, pers. comm., 2012; Wendt, pers. comm., 2011). In Ontario, the work being conducted by Western Heritage, specifically on the Mackenzie 1 and 2, Woodpecker 1 and 2, RLF, Hodder and Naomi sites, also yielded new data that was unavailable when the Lakehead Complex and Interlakes Composite were developed. What implications does the new data have for the refinement of the Lakehead Complex and Interlakes

Composite? Do these discoveries provide new, previously unknown information that will require refinement of archaeological perspectives for the region? These are questions that this analysis of Mackenzie 1 may be able to contribute.

3.7 SUMMARY

At approximately 10,700 to 10,400 ^{14}C years B.P. the LIS retreated north east of Lake Nipigon, exposing outlets from glacial Lake Agassiz to the west that covered most of Manitoba. This allowed for water to drain into the Superior basin creating Early Lake Minong along the western flank of the LIS while Lake Agassiz shrank to the Moorhead Low phase (Clayton, 1983; Farrand and Drexler, 1985; Phillips, 1993; Teller, 1985). During the Marquette re-advance the eastern outlets for Lake Agassiz closed, isolating it from the Great Lakes. As a result Lake Kaministiquia drained into Agassiz increasing the size and depth of the lake, referred to as the Emerson phase (Phillips, 1993). As the ice sheet from the Marquette re-advance retreated from the area west of Lake Nipigon ~9,500 years B.P., the eastern outlets of Lake Agassiz reopened causing a catastrophic draining event into the Superior basin. Approximately 4000 km^3 of Lake Agassiz water poured into the Superior basin through a series of five drainage channels through Lake Nipigon over two years, raising water levels 50 metres (Farrand and Drexler, 1985; Phillips, 1993; Teller and Thorleifson, 1983). This drastic event caused spill over to the Huron basin that was responsible for the erosion of the Nadoway Point barrier of glacial sediments, reducing it to bedrock (Farrand and Drexler, 1985; Phillips, 1993). Processes such as isostatic rebound compound the already complex Superior basin history, where the land once stressed by the weight of the glaciers became free and began correcting for this constant pressure, rising at different rates across the Superior basin.

These events had significant implications for archaeology in the area. Archaeologists focused primarily on these ancient shorelines for survey and excavation because of the obvious topography. High, dry areas were considered ideal for Paleoindian settlement because it provided a vantage point for observing prey and were ideal for travel corridors. Paleoindians were utilizing the natural Gunflint Formation outcrops for local raw materials almost exclusively, with some exceptions of exotic materials from Wisconsin. This bias to a specific raw material demonstrates that people were occupying the area for an extended period of time. Taconite was a reliable source demonstrating no shortage, as reflected in the archaeological record where vast amounts of lithic debitage is recovered from Paleoindian contexts.

The primary archaeological syntheses addressing Paleoindian cultures reported in the Thunder Bay region have been done by William Fox (1975; 1980) and Bill Ross (1995). The majority of the information concerning early archaeological collections in northwestern Ontario is reported in unpublished Cultural Resource Management reports, or in limited run manuscript series. As a result of the fragmented information collected during archaeological excavations in the past, Fox (1980) and Ross (1995) have attempted a higher level of analysis to develop an interpretive framework for Paleoindian occupation of the study area with the development of the Lakehead Complex and the Interlakes Composite.

The implications of the glacial meltwater lake level activity on Paleoindian settlement within the Thunder Bay region are significant. The creation of strandlines and beach ridges made for an ideal/preferred area for occupation and settlement. It is not surprising that the Mackenzie 1 site, the largest excavated Paleoindian site in the region, has been discovered on an ancient strandline of Glacial Lake Minong.

CHAPTER 4

ARCHAEOLOGICAL THEORY

4.1 INTRODUCTION

Following the theoretical review of North American archaeology offered by Willey and Sabloff (1993), it can be argued that Subarctic Ontario archaeology remains in its intellectual infancy. This reflects the incomplete geographic coverage of investigation, the severe depositional and preservation limitations associated with the region, the small number of active researchers, and the generally small-scale and exploratory nature of investigations. While pioneering research has established a basic cultural historical framework (outlined in Chapter 2 and 3) coupled with definitions of the primary diagnostic technology, our understanding of the region's human history remains rather superficial. As a consequence, most research remains focused upon typological and cultural historical priorities. Thus, this thesis focuses on developing a descriptive typology to more fully document or understand the patterned variability apparent in the most diagnostic objects within the Paleoindian tool kit.

Given the infancy of archaeological research in Northern Ontario, a key objective of this thesis is to refine the typological characterization of regional Late Paleoindian projectile points. In this sense, this work reflects the priorities of Willey and Sabloff's (1993) "Classificatory-Descriptive Period", which had its heyday in the late 19th to early 20th centuries. Typology, however, remains a critical tool in the archaeologist's repertoire and, in this thesis, is used to better understand the variations observed within attribute states on the Mackenzie 1 collection. The "Classificatory-Descriptive Period" was characterized by physical description and classification of archaeological materials (especially architecture and monuments). Reflecting the development of scientific and taxonomic classification, particularly after publication of Darwin's

Origin of Species, early North American archaeological classification focused on function and geographic variation in, material culture (Willey and Sabloff, 1993).

Typological classification is still relevant because it is the primary means by which archaeologists organize material culture, seek pattern, and infer meaning from the recoveries. However, typologies remain the product of the analyst's intellectual imagination, and primarily serve to address the analyst's research priorities. Indeed, they may have limited connection to the original meanings applied by the ancient populations who produced and employed the objects. For example, early archaeological artifact typology was focused on determining the mechanical function of the tools, usually relying heavily upon ethnographic analogy. Also important, particularly before the development of absolute dating, was the examination of stratified archaeological sites to identify material culture changes, that might define diagnostic 'fossil indicators' useful as temporal markers, or to propose ancient patterns of socio-cultural organization (Kooyman, 2000; Lyman and O'Brien, 2000; 2003; O'Brien and Holland, 1990).

Conventional Paleoindian typologies were created at least half a century ago. They tend to offer modal generalizations about types that are thought to reflect cultural historical meaning compared to other types in the chronology. This tends to minimize description of variation that is deemed trivial for differentiating between the cultural-historically important main types. This was the central objective of the typological exercise at the 'type sites'. The goal of this thesis is to examine formal variability in a specific tool type to understand the range of morphological variation by engaging in a classificatory descriptive analysis, not the 'classic' cultural historical approach to typologies, consisting of coercing types into an overcrowded cultural chronology deriving from distant 'type sites'.

4.2 CULTURE HISTORY DEVELOPMENT

Reconstructing North America's culture history has involved methods developed at the turn of the 20th century (Fagan, 2005). Two important theoretical perspectives arose out of the descriptive culture history approach; inductive research methods and a normative view of cultures. Patterns emerging from a succession of excavations, led to inductively derived generalizations about the cultural sequence and the diagnostic artifacts characteristic of each (Fagan, 2005). The patterns observed at a series of so-called 'type sites' were then used to develop generalizations about the cultures represented using the notion that abstract rules governed what was considered to be normal behaviour in tool fabrication and decoration. Changes in artifact style observed over time (from stratigraphic excavation) were thought to reflect changing norms of human behavior through time (Fagan, 2005). Thus change in artifact form throughout time was seen to reflect either gradual transformation of these behavioural norms governing design, or the introduction of new influences (or groups into the region). Typological similarity between objects recovered from different sites within a regional context was interpreted to suggest the territorial dispersal of groups sharing cultural values, or alternatively, migration of said groups more broadly across the landscape. In this sense, artifact form was seen to somehow represent or encapsulate human social behavior and identity. At the foundation of this approach was the creation of typologies that captured this variation in material culture.

Artifact types represent recurring combinations of discrete attributes that suggest deliberate culturally-mediated decisions by the original artisans. At its most fundamental, archaeological analysis involves a search for these recurring patterns and interpretation of their cultural meaning. This might reflect mechanical function of the object, or socially mediated 'style' that might be diagnostic of social, temporal, or spatial patterning. Analysis begins with the selection and documentation of attributes that occur in recurring combinations that are deemed to have some meaning. These recurring combinations of traits are formalized with definition of artifact types. However, it is important to recognize that these types are analytic constructs designed to elicit cultural-historical insight. Archaeologists strive to describe the structure (or order, pattern or predictability) of the data, expressed in the form of relationships among artifacts and human behaviours (Spaulding, 1982). Types represent the basic organization of archaeological data of a cultural component for the purpose of behavioural inference. It is meant to be a material reflection of a more or less discrete culturally patterned division of human activities; a division involving separation depending on kinds of tasks (function), stylistic representations, or possibly a combination of both function and style (Spaulding, 1982). A typology is a classification philosophy employed to produce an orderly class scheme based on physical properties of artifacts. A typology, or classification, requires the analysis of diagnostic modes or attributes that were selected for definition of artifact types (Willey and Sabloff, 1993).

Typological analysis developed out of many archaeological concepts and methods throughout the late 19th and early 20th century, at a time when archaeological analysis was influenced by stratigraphic interpretation and seriation, but often without means of absolute chronological contextual control (Willey and Sabloff, 1993). This led to a tendency to consider specimens in isolated cross-cultural classes rather than being considered within a framework of cultural complexes or units (Trigger, 1968; Willey and Sabloff, 1993). These developments led to the realization that by studying changes in the frequencies of artifact types, or variants, of a culture trait, 'time sequence' could be measured as a continuous variable (Lyman et al., 1997). These observations were significant in the development of the McKern Midwest taxonomic system (Rouse, 1939). One central goal for these developments was to employ artifact typology to suggest chronological or socio-cultural distinctions between assemblages (Ford, 1952; Rouse, 1939; Willey and Phillips, 1958).

There was also a tendency with these typological approaches to focus on the modal 'type' that best captured the cultural historical distinctiveness of a specific stratigraphically defined deposit. This reflected a tendency to emphasize the modal ideal that offered a contrast to other types defining what was deposited earlier and later. However, this tended to downplay subtle variations evident around that modal ideal. Subsequent researchers then sought to compare diagnostic recoveries from newly excavated sites to the modal types in order to 'place' recoveries within a temporal context relative to the stratigraphically ordered type site. As time progressed, a trend occurred towards large-scale excavation that might yield large numbers of diagnostic recoveries that drew attention to the range of subtle variation within each modal type. This approach to typological analysis can lead to an artificial and inappropriately narrow sense of what the normal range of variation within each type might be in relation to such cultural historical constructs such as cultures, traditions, phases, etc. (see discussion below). Essential to the discussion is determining how much variability of trait expression is 'permitted' to allow individual points to fall into a specific type as opposed to defining a new type (i.e., lumpers versus splitters).

4.3 ARTIFACT VARIABILITY

The classic approach to typological analysis seeks to identify artifact attributes that may demonstrate either the function of the artifact, or other non-functional attributes, representing stylistic choices. Subtle variation may occur within projectile point assemblages mainly because of stylistic attributes that do not appear to have any functional purpose. Human behavior, manifested as stylistic choices during the procurement and manufacture processes of artifacts, contributes significantly to the variation of artifact assemblages. There are four factors that contribute to the variability of an archaeological sample outlined in the literature; style, function, raw material choice, and technology (Kooyman, 2000; Whittaker, 1994).

4.3.1 Style versus Function

The style versus function debate remains unresolved, providing archaeologists with a hot topic for discussion. This debate derives from the 1960's when François Bordes and Lewis Binford offered differing views about the interpretation of Neanderthal (Mousterian) tools in France (Andrefsky, 1998; Kooyman, 2000; Whittaker, 1994). Bordes (1972) suggested the differences displayed in the collection of Mousterian tools reflected a change through time of different tribes or social groups living at the same time. Binford (1969) strongly disagreed, suggesting the variation reflected different functional examples of tools with obvious activity areas illustrated by their distribution (See Andrefsky, 1998 and Whittaker, 1994 for full discussion).

Formal variation in artifact assemblages is crosscut by two aspects of archaeological analysis that can be termed as either reflecting style or function (Sackett, 1982). Form and style are equally significant when determining the formal variation of an assemblage, and cannot be considered individually when creating tool typologies (Sackett, 1982). Functional representation of a projectile point will indicate the mechanical purpose of the artifact (i.e., a projectile point attached to a spear and thrown at an animal) (Odell, 1981; Meltzer, 1981; Whittaker, 1994). Archaeologists may not ever know for certain what specific tools were used for. However, utilizing ethnographic analogy, contextual evidence in archaeological excavations, use-wear analysis, residue analysis, and experimentation, allows for an easier interpretation (Andrefsky, 1998; Kooyman, 2000; Whittaker, 1994). Each of these artifacts have a specific shape beneficial for their intended use (i.e., tools attached to a spear and thrown at a target define the projectile point tool class), the roles it plays (utilitarian/material, or non-utilitarian/societal and ideological), and the various ways in which it interacts with other cultural and natural elements in the activities it participates in (Odell, 1981; Meltzer, 1981; Sackett, 1983).

The stylistic attributes present in an archaeological assemblage may reflect how morphological or formal variation among artifact assemblages contributes to groups of people restricted to a specific time and place (culture-historical significance) (Sackett, 1982). This reflects decisions made by the maker while manufacturing a tool (Andrefsky, 1998; Kooyman, 2000; Whittaker, 1994). There are two sources of variation within the stylistic category; iconic (or intentional) and isochrestic (or unintentional) (Kooyman, 2000). Intentional expressions of individual preferences and identity are generally a makers' mark or stamp, which would provide a way of marking who made or owned that tool. Unintentional expressions become more difficult to extract from a stone tool because it includes the skill, experience level, how the maker holds the piece to execute the blows during manufacture and to some extent, even a consideration of the handedness of the maker (Kooyman, 2000).

Stylistic similarity is generally the result of cultural contact or common descent because tool manufacture requires a highly characteristic manner of doing something. If like begets like, similarities observed in the assemblages are assumed to be related in a cultural-historical context. This allows archaeologists to identify connections between groups because they are culturally bounded by characteristic ways of doing things (Dunnell, 1978; Hodder, 1985; Meltzer, 1981). Caution should be exercised when considering this because stone tool form is restricted by the nature of the material and the techniques that make up the manufacture process, and in some cases, accidental similarities preserved by groups in unrelated historical contexts is present (Sackett, 1982). It is possible that a tool was used for many different jobs, resulting in a skewed interpretation of the overall function of the tool (Frison, 1989; Meltzer, 1981). There are minimum functional requirements to effectively make a tool "work". For example, a projectile point requires a tip, axial symmetry, relatively uniform thickness, and accommodations for hafting (Frison, 1989; Meltzer, 1981; Raymond, 1986). On the other hand, there is no predictable empirical manifestation of style. As a result, the variation in tool class can never be fully attributed to stylistic choices because all tools are by definition, functional in some way (Frison, 1989; Meltzer, 1981).

While all aspects of Paleoindian cognitive and behavioural analyses can be fully understood, examining an assemblage in its entirety can provide significant information concerning individual and group intentions. Specific material culture patterning during the manufacture process evokes and forms values and expectations in individuals and in culture groups (Hodder, 1985; LaMotta and Schiffer, 2001). Understanding human behaviour, agency and culture needs to be considered in relation to how humans depend on the material world (Hodder, 1985; 2001; LaMotta and Schiffer, 2001). Material culture can be used to express different stylistic or functional intentions or as individual creative expressions. Slight variation occurs within assemblages because artifacts can act as a mode of communication. This involves interpreting how people send, emit and receive information, and how ancient people taught skills while producing the material culture (Schiffer and Miller, 1999; LaMotta and Schiffer, 2001).

4.3.2. Other Sources of Artifact Variability

Although style and function make up a large part of variability seen in stone tools, raw material and technology choices also contribute to morphological variability of the stone tools. These influences provide further aspects of variation affecting the manufacturing process leading to a final tool product. All aspects of variability are significant in order to understand what implications the different attribute states have on typological construction.

Raw material choice is a significant factor influencing variability within archaeological collections. Each type of rock has different properties and inclusions that make it more or less pliable and flexible for knapping (Whittaker, 1994). The hardness and the chemical make-up of the stone also directly affects the specimen's 'knappability', and ultimately what tool the maker can create with that piece. Some materials, such as the local and primarily utilized taconite within the study area, require specific considerations during the procurement and knapping because of the high frequency of structural flaws. This is evident in the reduction sequence associated with the Lakehead Complex sites, as discussed below (Hinshelwood and Ross, 1992).

The raw material choice also has cultural/behavioural implications. If exotic materials are present within the assemblage, it suggests that either the material was brought in via trade/exchange, or was obtained while travelling (e.g., seasonal rounds or migration) (Andrefsky, 1998; Whittaker, 1994). Mobile groups tended to carry items that were more portable and multifunctional, while more sedentary groups were able to cache larger pieces of material readily at their disposal (Andrefsky, 1998). Once an abundance of good quality material had been discovered (e.g., a quarry site), people would take full advantage of the availability and create all of the lithic artifacts from the one material. This is generally the case, regardless of the amount of effort expended in the process of reduction (Andrefsky, 1998; Whittaker, 1994). The availability of raw material may also allow for wasteful experimentation during teaching and learning processes of unskilled knappers (Ferguson, 2008). This may result in the appearance of stone tools that demonstrate varying degrees of skill represented within the assemblage (Ferguson, 2008).

Creating a stone tool reflects a learned skill, demonstrating preferred methods within a broad range or alternate strategies. Different cultures may use different technologies to solve problems or complete a task, thereby offering traits diagnostic to a specific time or social unit (Andrefsky, 1998; Whittaker, 1994). For example, there are soft and hard hammer techniques, pressure and percussion flaking, indirect and direct pressure and/or percussion flaking that can be used to create a stone tool (Andrefsky, 1998; Kooyman, 2000; Whittaker, 1994). Such decision-making can be replicated with experimental archaeology (Whittaker, 1994).

The processes of teaching and learning how to create stone tools could result in the recognition of novice knappers or people creating stone tools with different skill levels. Skill is the ability to use ones knowledge effectively and readily in execution or performance, where aptitude or ability is developed (Andrews, 2003; Bamforth and Finlay, 2008). A common distinction between two different types of knowledge utilized during knapping is practical knowledge and knowledgeable practice (Bamforth and Finlay, 2008). Practical knowledge reflects ones motor skills, dexterity, motivation, fatigue, practice and advice, while knowledgeable practice refers to ones cognitive understanding and strategic decision making (Andrews, 2003; Bamforth and Finlay, 2008; Ferguson, 2008; Young and Bonnichsen, 1984). Stylistic and functional interpretations of projectile point assemblages are common because of the seemingly large amount of work and decision-making required to create the points (LaMotta and Schiffer, 2001; Sackett, 1983). Variability within a stone tool assemblage may be a result of more or less skilful knappers attempting to execute similar patterns, or children learning stone working skills (Andrews, 2003; Bamforth and Finlay, 2008; Ferguson, 2008; Knudson, 1983; Young and Bonnichsen, 1984). The recognition of what is considered acceptable to the knapper needs to be measured and qualified, and temporally and geographically differs widely (Hinshelwood and Ross, 1992).

Another contributor to variability within lithic artifacts is the lithic reduction sequence employed (Table 3) (Andrefsky, 1998; Callahan, 1979). There are multiple reduction sequence models in the literature that were initially utilized for specific lithic industries. For example Callahan (1979) offerend one to describe Clovis material culture, while Crabtree (1966) developed one to reflect the Folsom reduction sequence. Some more general sequences are summarized in Table 3.

A specific reduction sequence has been proposed for the Lakehead Complex recoveries because the Late Paleoindian lithic industry varies slightly from those described in the literature (Hinshelwood and Ross, 1992). The regional distinction for the "revised stages of manufacture" can be attributed to the knapping characteristics of taconite, the preferred local raw material (see Chapter 3) (Hinshelwood and Ross, 1992; Hinshelwood and Weber, 1987). As a result of the bedrock nature of the material, the tool blanks are generally blocky but there is also evidence of flake blanks at Lakehead Complex sites (e.g., Crane Cache and Biloski) (Hinshelwood and Ross, 1992; Hinshelwood and Weber, 1987). The stages of manufacture apparent in Lakehead Complex assemblages are important to consider when discussing the projectile points, the final product of the knapping sequence. The knapping sequence reveals choices of the functional and stylistic nature, as well as demonstrates the understanding of the cognitive sequence leading up to the end product.

Hinshelwood and Weber	Callahan	Whittaker	Andrefsky
Stage 1: Obtaining the Blank	Stage 1: Obtaining the Blank	Stage 0: Raw Material Aquisition	Stage 1: Flake Blank
Stage 2: Initial Edging	Stage 2: Initial Edging	Stage 1: Edged Blank	Stage 2: Edged Biface
Stage 3: Primary Thinning	Stage 3: Primary Thinning	Stage 2: Preform	Stage 3: Thinned Biface
Stage 4: Secondary Thinning	Stage 4: Secondary Thinning	Stage 3: Refined Biface	Stage 4: Preform
Stage 5: Shaping	Stage 5: Shaping	Stage 4: Finished Biface	Stage 5: Finished Point
Stage 6: Finished Point	Stage 6: Fluting the First Face		
	Stage 7: Preparing for Second Flute		
	Stage 8: Fluting the Second Face		
	Stage 9: Retouching		

Table 4.1: Summary of the biface stages defined in each of the prominent biface analyses; Callahan, 1979; Whittaker, 1994; Andrefsky, 1998. They are all very similar in stages of production, however the numbering of the stages is slightly different because Callahan's work refers specifically to the Clovis reduction sequence. On the far left is a summary of the biface stages utilized in Northwestern Ontario as defined by Hinshelwood and Weber, 1986; Hinshelwood and Ross, 1992. It is a reuse of Callahan's stages, while adding a final Stage 6 biface representing the finished projectile point.

The five stages of biface reduction proposed for Northwestern Ontario Paleoindian tool production (Hinshelwood, 1990; Hinshelwood and Ross, 1992; Hinshelwood and Weber, 1987; Gjende Bennett, *n.d.*) consist of: Stage 1 = Obtaining a blank, Stage 2 = Initial Edging, Stage 3 = Primary Thinning, Stage 4 = Secondary Thinning, Stage 5 = Shaping, and Stage 6 = Finished point (Table 4.1) (a complete discussion of the Lakehead Complex reduction stages is upcoming in Bennett, *n.d.*). These stages refer to the reduction of a tabular/blocky piece of taconite, however it is probable that flake blanks were utilized in the creation of projectile points, in which case they enter the sequence at Stage 3 (Hinshelwood and Ross, 1992). The manufacturing stages and the nature of the raw material imply the initial establishment of the subtle attribute states that are present on the Lakehead Complex projectile points.

It is emphasized in the biface analyses that the direction taken through all of the stages of biface production, and ultimately what a knapper produces, depends upon the original shape of the blank (Figure 4.1) (Andrefsky, 1998; Callahan, 1979; Whittaker, 1994). There are two recognized blank forms in the literature, a biface from a larger tabular piece and a flake blank

(Andrefsky, 1998; Callahan, 1979; Hinshelwood and Ross, 1992; Hinshelwood and Webber, 1987; Whittaker, 1994). A biface blank generally does not demonstrate any twisting or warping of the blade. It is a larger block that has been reduced to a large biface by percussion flaking (Figure 4.1). This removes any irregularities in the material and forms the general shape of the finished product. A flake blank is a piece that has been struck from a core, referred to as a blade flake by Callahan (1979) to distinguish between the utilization of flake blanks versus more typical flake spalls (Knudson, 1982). The blade flakes also display a characteristic twist or warp of the blade (Andrefsky, 1998; Callahan, 1979; Hinshelwood and Ross, 1992; Hinshelwood and Webber, 1987; Knudson, 1982; Whittaker, 1994).

The utilization of flake blanks has been referred to as "direct thin flake manufacture" by Knudson (1982) that consists of a specific reduction sequence because it is already sufficiently thinned. As mentioned above, flake blanks would enter the Lakehead Complex reduction sequence at Stage 3 because no thinning is necessary. The thin flake manufacture sequence consists of initially removing widely spaced, broad flakes, followed by a second pass removing closely overlapping flakes to shape the edge for the desired point form (Knudson, 1982). This method generally employs pressure flaking instead of percussion flaking used on larger pieces. The success of this method would be dependent upon the efficient removal of long, slender flakes across the blade of the piece, resulting in a 'rippling' effect of the flake scars (Knudson, 1982). Attributes of the final product that can be affected by utilizing a flake blank are length, flaking pattern, and distal edge conformation (Knudson, 1982).

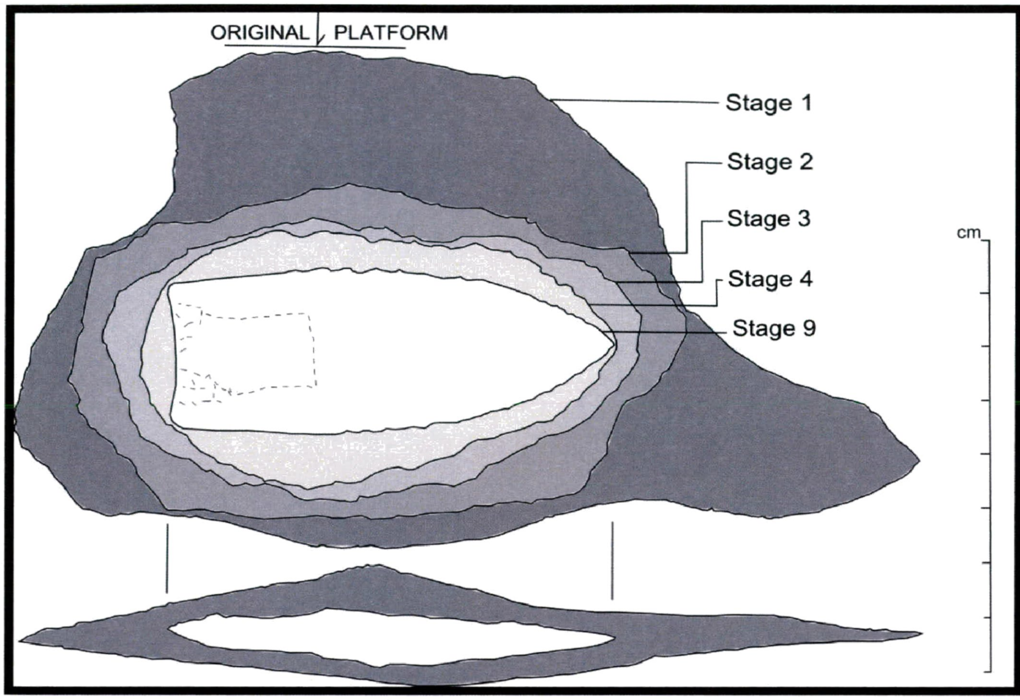

Figure 4.1: Image depicting the reduction sequence by Callahan (1979), beginning with the flake blank (dark grey), and continuing to reduce in size and thickness down to a Stage 5 biface (Stage 9 in Callahan because of the addition of the flutes on the basal portion). Modified after Callahan, 1979, Figure 66: 154.

As an individual is creating a stone tool, decisions are made at each stage of manufacture with some preconceived notion as to what the finished product will look like. These considerations demonstrate where stylistic/functional choices are expressed (Andrews, 2003; Andrefsky, 1998; Kooyman, 2000; Whittaker, 1994). Three behavioural aspects affect material culture production, and affect variability in final products. They are, knowledge (what people know), application (how they apply their knowledge) and standards (Bleed, 1997; Knudson, 1982). The way in which people apply this knowledge will produce work related activities such as scheduling and organization, certain motor habits or routines, and creating specific tool kits consisting of specific tools that are utilized frequently depending on the surrounding environment (Bleed, 1997). There are also standards that govern the appropriateness of the tool to the craftsman consisting of tolerances, aesthetic biases and values. People tend to employ specific techniques to create a distinctive end product that reflects stylistic preferences. A decision is made by the maker whether something is considered "done" or "good enough" based on the above influences (Bleed, 1997). The core of behavioural methodology is to consider the life history sequence of artifacts as the sequence of behaviors through the various stages of manufacture, use and discard (Bleed, 1997; LaMotta and Schiffer, 2001; Schiffer, 2004).

Archaeological material culture reflects a culmination of human behavior. Artifact creation, use, reuse, breakage, and disposal all create a one dimensional image of different human activities (Schiffer, 2004). The life history sequence of artifacts are expressed in the form of a behavioural chain or flow diagram that illustrates the behaviours associated with the procurement of raw materials, manufacture, use and reuse, and depositional interactions and the

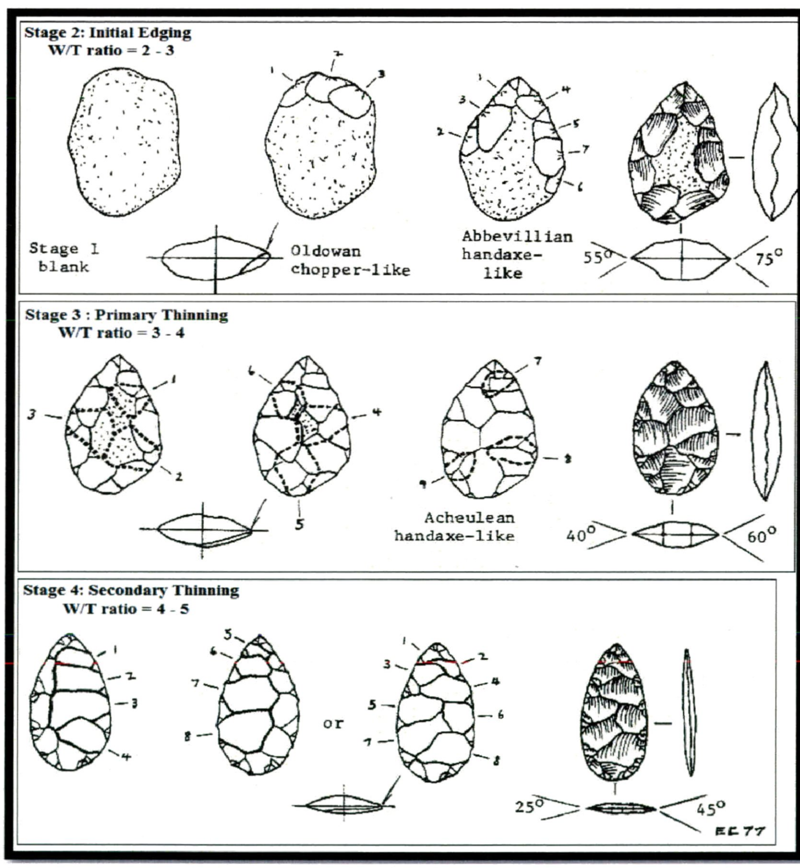

Figure 4.2: A visual representation of Callahan's (1979) biface Stages 2 to 4, demonstrating the characteristic edge angles, width/thickness ratios and the nature of the flake scars. Modified after Callahan, 1979, Table 1: 10.

archaeological recovery (refer to Chapter 7, Figure 7.15 for an example) (LaMotta and Schiffer, 2001; Schiffer, 2004). The behavioural chains can be used to infer different patterns of human activity that may have been responsible for the formation of a specific archaeological deposit.

One limitation identified when considering the archaeological record, is that it can be distorted or transformed reflection of past behaviors because of depositional and post-depositional processes affecting the archaeological site. This might include discard and abandonment behaviours at a site which may not always be a product of waste-generating activities (e.g., the caching of biface blanks) (Binford, 1979). A detailed understanding of depositional behavior is required to investigate their linkages to other activities in the behavioural system to facilitate explanation of the artifacts.

4.4 CONCLUSIONS

Archaeologists are conditioned to think about material culture as being informative about the culture of the people who produced, used and discarded the artifacts, and to reconstruct history and culture of past people from the material culture remains.

The objectives of this thesis reflect the foundations of archaeological typology, while also seeking to understand the meaning of the formal variability. This will be accomplished by first documenting the patterned form and variability of the points, with particular attention to the traits that do not reveal any readily discernible function. While considering the pragmatic reality of working with a difficult raw material, the analysis suggests a surprisingly narrow range of variation of attribute states define the morphological and stylistic variability.

Most Paleoindian projectile point typologies offer modal representations of artifact variability that is thought to have some temporal or spatial meaning. In these ‘classic typologies’, similarities are observed based on macroscopic characteristics that are deemed to reflect cultural relatedness. These types offer a means of defining the chronological sequence for specific regions, particularly if recovered in a stratigraphic sequence or associated with absolute dates. However, if these types are uncritically used to characterize similar projectile points found in other regions unwarranted interpretations about contemporaneity and affiliation might occur.

The following chapter (Methods) provides a description of the analysis of morphological variation evident in the Mackenzie 1 projectile point assemblage with the goal of defining types. While starting with considerations of the attributes that contributed to the definition of the classical projectile point types in Paleoindian studies, special care was taken to identify subtle variation within the assemblage. The goal of the taxonomic exercise was not to identify a modal type that might best fit the Mackenzie 1 assemblage, but to document the range of variability based on the co-occurrence of traits observed.

CHAPTER 5

METHODOLOGY

5.1 INTRODUCTION

This chapter introduces the Mackenzie 1 site, reviews the excavation methodology and then presents the rationale underlying the typological characterization employed in this analysis. This analysis sought to avoid the interpretive shortfalls of forcing the recoveries into one (or more) of the named types currently in the literature. After information collection from both metric and non-metric perspectives, the typology was developed to characterize the collection as a prelude to comparison to other Late Paleoindian assemblages.

5.1.1 Typologies in the Past: Review

Conventional typological analysis in North American archaeology has focused on addressing variability evident at sites with suitable stratigraphic integrity. This often sought to reflect transformation of tool design (learned cultural behavior) through time and across space. Typological similarity was assumed to reflect common learned behaviour, and was used to propose the spatial distribution of the social unit, or the gradual transformation of learned behaviour over time. Conversely, regional variation in tool morphology was thought to reflect the geographic expanse of discrete social units, while typological admixture was sometimes used to suggest temporal evolution, or technological influences between contemporaneous populations.

The definition of artifact types was often based upon a comparatively few attribute states that were thought to be sufficient to characterize the variation within a specific depositional unit in contrast to others. While this approach demonstrates the attributes deemed important to characterize an assemblage from cultural-historical perspectives, it tends to ignore other, more subtle details that might be otherwise analytically useful. Archaeological typologies developed and applied in one region are often extrapolated and applied to other archaeological sites in other regions that may not offer the same degree of stratigraphic and temporal control. Without such control, it becomes difficult to assess the contemporaneity of collection distributed over large regions, nor to assess the time-transgressive implications of such geographic expanses.

While different artifact assemblages might share typological attributes, they seldom are identical. Such variation might reflect production by individual artisans using diverse lithic materials, learned behaviour over successive generations, and across expansive territories. This creates a serious analytic challenge; what degree of typological similarity is required to appropriately utilize the type names reported in the literature? When does subtle variation merely reflect 'noise' in the culturally mediated production process, and when does it express the direction of temporally controlled evolution of design, or the influence/expression of other discrete populations?

Given the pioneering nature of regional Paleoindian studies, particularly in light of the small sample sizes available, past analysts have tended to employ the existing Late Paleoindian projectile point typologies, and 'force' specimens into one category or another. As a consequence of generally poor stratigraphic and temporal control over these assemblages the cultural meaning of such typological characterisation is often unclear.

Such typological efforts also often tend to be rather normative, with the characteristic types being rather broadly defined, and subsuming some poorly defined variability. Following such approaches, it is often difficult to determine the 'typological boundaries' of each type.

This typological approach is widely used in North America Paleoindian studies. The weakness in this is that sample sizes are generally small, which limits the ability to adequately measure variability from the normative type, especially in under-studied regions. This also results in imperfect typological matches whereby the most similar type names being applied (e.g., "Agate Basin-like"; e.g., see Harrison et al., 1995). This research strives to move away from that normative behavioural approach and instead apply an inductive theoretical perspective. I sought to identify attributes that are best able to reflect the range of variability observed within the Mackenzie 1 assemblage, without applying previously defined type names.

5.1.2 Methods Discussion: Context of Mackenzie 1 Analysis

There are multiple ways to create a projectile point typology, either through an attribute-based or a metric-based analysis. Both of these approaches are valid, and have various strengths and weaknesses (Bettinger and Eerkens, 1997; Christenson and Read, 1977; Justice, 1987; Lyman and O'Brien, 2000). It is beyond the scope of this thesis to conduct both approaches. An attribute-based analysis was chosen because it is more feasible considering the large sample size, and complete metric data is not always immediately available from other point collections for comparative purposes (i.e., the author did not get to examine regional collections personally). This approach has been documented in other projectile point analyses (Anderson et al., 1996; Bradford, 1976; Justice, 1987; Kooyman, 2000; O'Brien et al., 2010). In these cases, morphological characters or attribute states are used as sorting criteria (O'Brien et al., 2002). Projectile point type "...definitions are derived by sorting through a collection of specimens, placing similar specimens together, and using average properties of the specimens in a pile to create a type definition" (O'Brien et al., 2002: 137). This is particularly evident in regional analyses, where more specimens are introduced and type boundaries are reconfigured to include new/more variation. Morphological characters are chosen before analysis commences that is thought to be of analytical interest (O'Brien et al., 2002). During the execution of the attribute based analysis, the author collected some of the conventional projectile point measurements, which are included in Appendices 3 to 5 for the benefit of subsequent research.

The Mackenzie 1 projectile point analysis began with systematic observation of the attribute states evident in the assemblage, and includes those deemed important in other Paleoindian assemblages, coupled with more subtle ones useful in characterizing variation apparent within the sample. As discussed in more detail below, the non-metric attribute observation identified the general morphological trends apparent within the collection. While metric data offer important insight in validating the distinctions made between non-metric attribute states, variability in length, width and thickness for example, may reflect material choice, experience level of the maker, and other aspects of the manufacture process and use-life of a projectile point (i.e., reworking and rejuvenation) (see Appendices).

The Mackenzie 1 site projectile point assemblage is currently unique compared to local Lakehead Complex sites that usually yield modest numbers of projectile points, and exhibit considerable variability in form. This results in assemblages with one or two specimens each, representing several morphological types (see Ross, 1995). Thus, until now, it has not been possible to conduct a detailed study of projectile point morphology to determine the full range of variation, or the most stylistically important traits. In light of the large sample available, this analysis does not focus on a narrow range of attributes useful for defining the conventional types, but rather, attempts to document the range of attribute expression within each formally defined trait to more comprehensively document stylistic variability within the collection. This may lead to inferences regarding the choices' made in the creation of the projectile points at the Mackenzie 1 site.

The methods chosen for this analysis stem directly from the objectives outlined above, whereby attribute states were evaluated on every specimen to define the patterned variability and determine what attributes contribute to the intra-assemblage variability. The uncharacteristically large Paleoindian projectile point sample recovered from Mackenzie 1 permits this kind of taxonomic analysis, thereby enabling more complete documentation to explore subtle trait expression. The methods are used to develop interpretations of variation and define what that variation means for sites in northwestern Ontario. The challenge of this typological analysis will be attempting to apply the current North American culture-historical sequence in order to define the chronological progression of the Thunder Bay region. This research is attempting to incorporate data into the established culture historical chronological ladder of North American Paleoindian research, while moving beyond the foundations in the area (i.e., Fox, 1975; 1980, Ross, 1995, MacNeish, 1952) to illustrate variation by using a taxonomic description.

5.2 EXCAVATION OF THE MACKENZIE 1 SITE

The Mackenzie 1 site is located on an ancient strandline of glacial Lake Minong approximately 40 km east northeast of Thunder Bay, Ontario on Highway 11/17. The site was subjected to salvage excavation over the field seasons of 2010 and 2011 by Western Heritage, and yielded a variety of tools from a total of 2,539 1 metre square units (Figure 5.1). Field excavation methods consisted of conformed to the provincially mandated archaeological standards (see the Archaeological Standards and Guidelines for Consultant Archaeologists, MCL 2011) and included the following specifications: 1) establishment of Cartesian grid, with topographic mapping of the site locality; 2) excavation of 1 m^2 units, with the matrix removed in successive 5 cm thick levels, with each level divided into four quadrants (north east, north west, south east, south west); 3) removal of sediment using a combination of shovel and/or trowel excavation; and 4) screening of the matrix through rocker screens equipped with both 3 mm and

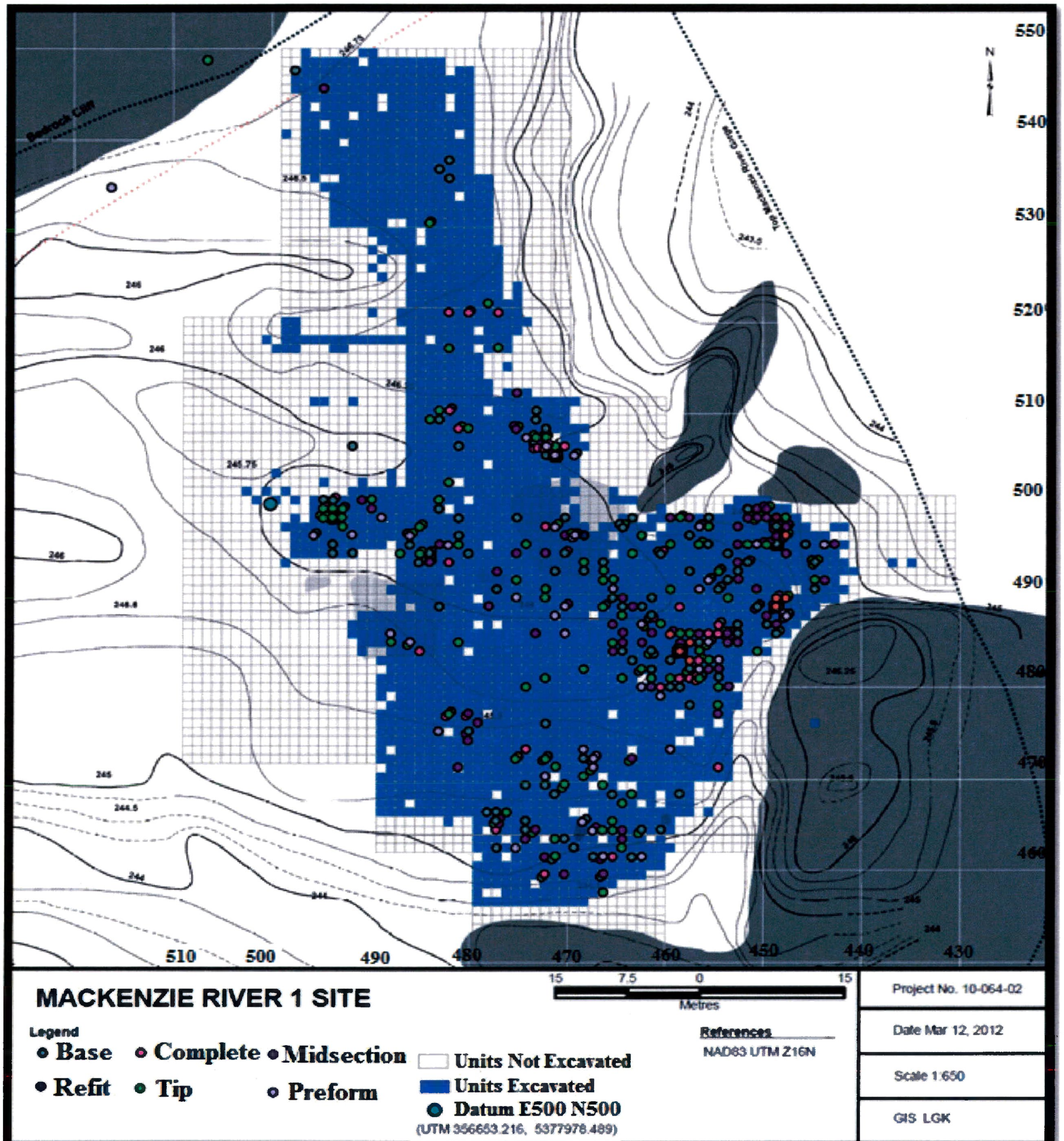

Figure 5.1: Image of the Mackenzie 1 site, demonstrating the units excavated (in blue), and the topographic features of the site. Note the position of the bedrock outcrops/erradics in dark grey. Site map created by Western Heritage, 2011; topographic map created by Dr. Scott Hamilton, Lakehead University, 2010.

6 mm mesh. When artifacts were recovered *in situ* a three point provenience was reported for each specimen, and the recoveries where recorded on prepared level summary sheets that included an estimated tally of recoveries, sediment texture and disturbance factors. The artifacts were catalogued by Western Heritage within a computer database and will eventually be curated and stored at Lakehead University in Thunder Bay to facilitate further research.

The site is located at approximately 246 metres asl and is positioned on the top edge of the west bank of the Mackenzie River that has carved out a deep gorge that could have possibly acted as a glacial outwash channel (Shultis, 2013.). The artifacts were recovered from bioturbated sand and pebbles that mantle intact river mouth and beach deposits (Shultis, 2013.). The northern portion of the site immediately south of bedrock controlled upland consists predominantly of beach deposits, with the artifacts recovered from bioturbated fine sands with no visible stratigraphy (Shultis, 2013.). The southern portion of the site consists of well-sorted small to medium gravel and silty sand characteristic of a river mouth deposit. This noticeable difference in stratigraphic deposits could be a result of the 3 m elevation difference between the northern beach sediments of the site and the large gravel lens orientated northeast to southwest between the bedrock knobs in the southern portion. The majority of the projectile points are distributed in the southeast portion of the site where it is bordered on the south and east by bedrock knobs/erratics (Figure 5.1). This could indicate the presence of a shallow and spreading stream flowing across a beach or delta. The sequence of events from deposition of the beach sediment through occupation and abandonment are debatable, and a detailed evaluation of the sedimentological history of the area has recently been incorporated into a Master's thesis by Shultis (2013).

It has been suggested that there is no evidence of artifact sorting from fluvial reworking of the site and its sediments (Shultis, 2013). Artifact sorting by fluvial reworking would present as linear features of size sorted artifacts, but this is not evident at the Mackenzie 1 site (Shultis, 2013). This suggests that the artifacts were largely recovered *in situ* (but subject to taphonomic processes that are certainly moving objects around, albeit more modestly than would have occurred with fluvial or lacustrine action) (Shultis, 2013). However, artifacts were recovered from highly bioturbated sediments, indicating some reworking of the site (bioturbation, cryoturbation and aeolian) likely before and after occupation. As a result, the identification of the series of events at the site (deposition of the artifacts in relation to the active beach deposits) is difficult to determine (Shultis, 2013). Artifacts were recovered from the surface and up to one meter below the surface, with the majority found from 0 to 30 cm below the surface. In the event of active deposition of the sediments during occupation, artifacts would appear buried in recognizable occupation layers, which were only observed at Electric Woodpecker 2 (DdJf- 12; Shultis, 2013). The occupation layers at Mackenzie 1 do not appear to be contemporaneous with fluvial or river-mouth sediments; however the projectile points recovered from Electric Woodpecker 2 display similarities to the Mackenzie assemblage so the groups occupying the two sites may have been closely related. The sediments where the majority of artifacts were discovered at Mackenzie 1 consisted of similar size particles from the layers below the recovery zone, indicating that sediments and the artifacts within it were pulled towards the surface by bioturbation (e.g., tree roots) (Shultis, 2013). So while there does not appear to be any fluvial reworking of the site, it has been extensively disturbed by bioturbation.

The Mackenzie site likely represents a habitation area where a variety of activities occurred, from domestic habitation, through to processing meat and hide, and the creation of stone tools, though more research is still required. In order to interpret site activities, it is important to consider why this large and repeatedly used habitation site is located here. The site would have looked very differently approximately 9,000 years ago, and the reason for this specific location could be built around a possible ambush crossing of a stream outlet. The geographical location of the site would provide certain advantages if a kill site was close by, possibly a caribou crossing site over the Mackenzie River. The river would have been filled with sediment from glacial meltwater resulting in a much higher water level during the time of occupation (Shultis, 2013). The sediment would have eroded away as glacial meltwater outbursts occurred; as a result of a combination of fluvial and glacial actions, the deep river gorge would have been carved out over time to the modern day level. Caribou crossings have been found in close association with other Paleoindian sites in Southern Ontario, demonstrating the favoured location for base camps near water (Deller, 1976). The close proximity to a kill site is suggested in the high instances of tip and midsection projectile point fragments. During the hunting process, stone spear tips may come into contact with bone inside the animal, causing impact damage to the projectile point which could potentially lodge point fragments inside the animal. When the carcass is brought back to camp for processing, these fragments would be discovered and discarded; hunters would also return with broken spear tips where the base could still be attached to the wooden spear or fore-shaft (Frison, 1989). Broken basal fragments would then be removed from the spear of fore-shaft discarded and replaced with new projectile points.

There may, however, be some question regarding the context of the recoveries. The absolute dates obtained from the Mackenzie 1 site may be considered inconsistent with the Paleoindian identification of the site. The samples were dated by both AMS and OSL methods, but produce inconsistent results and demonstrate a large standard error (see Chapter 8). Notably, approximately the first 30 to 40 cm of sediment at the site is bioturbated (Shultis, 2013), and may contribute to some of this inconsistency. Due to the site size and density of recovery, it is assumed that Mackenzie 1 is a multi-occupation, single component Paleoindian site. All of the diagnostic tools are also Paleoindian in nature. At the time of this analysis the artifact processing and site reporting is not completed. As a result, I do not have a comprehensive summary of the depositional/stratigraphic character of the entire site, other than personal observation during excavation and in reference to the available literature (Gilliland, 2012; Kinnaird et al., 2012; Shultis, 2013). It should be noted that the stratigraphy may be variable throughout the site (Terry Gibson, pers. comm., 2013), which may not have been observed in the areas that were not closely investigated by Shultis (2013). The ambiguity introduced by absolute dating that diverges from expectations of this Late Paleoindian site will be addressed by Western Heritage through their ongoing analysis.

5.2.1 Optical Stimulated Luminescence (OSL) and Radiocarbon (AMS) Dates

Sediment samples were taken for optical stimulated luminescence (OSL) dating from Mackenzie 1 and one of the other neighbouring sites, Electric Woodpecker 1 (DdJf-11). OSL dating involves measuring the radiation accumulated in quartz and feldspar grains subsequent to burial in order to assess the timing of the last exposure to sunlight, representing the age of the sediments (Gilliland et al., 2012).

At Woodpecker 1 three samples were taken from a unit (502N, 469E) adjacent to a large pit feature for dating using the OSL technique. One sample was removed from cross bedded stratigraphy that overlies beach sands created from deltaic or fluvial deposits and yielded a date of 7,980-7,040 B.P. (Gilliland, 2012; Kinnaird et al., 2012). The cross bedding is a result of high energy alluvial (river, deltaic, or storm beach depositions) activity prior to and after the event that deposited the sediment that was sampled, demonstrating no post-depositional disturbance (Gilliland, 2012: 14). The two other dates represent the bottom and top of the cultural layer containing artifacts, yielding dates of 6,840-5,740 B.P. and 3,100-2,660 B.P. respectively (Gilliland, 2012; Kinnaird et al., 2012). These dates were recovered from a visually distinctive feature, and fall in the right order (oldest at the bottom to youngest at the top). The dates for this particular feature do appear younger than conventional wisdom for Paleoindian occupation in the Thunder Bay area.

At Mackenzie 1 three samples were also taken for OSL dating from unit 478N, 518E where a pit feature containing artifacts was discovered. One sample was removed from the bottom of the pit feature (within the pit fill) and yielded a date of 6,500-5,680 B.P. The other two samples were taken from the middle and the top of the pit feature, yielding dates of 6,210-5,330 B.P. and 5,820-5,180 B.P. respectively (Gilliland, 2012; Kinnaird et al., 2012).

During excavation of Mackenzie 1, two charcoal samples were recovered and submitted for radiocarbon dating. In 2011 a charcoal sample was submitted for dating from unit 498N, 506E that yielded a projectile point (WHS-P-13810) and other artifacts from the adjacent pit feature (the projectile point was discovered outside the visually distinctive pit feature). The charcoal sample was taken from the top of the pit feature and yielded a date of 3,540 ± 30 B.P. (Beta 301998; 3,910-3,730 cal years B.P.; 2 σ, INTCAL04).

The second radiocarbon date was obtained from the Woodpecker 2 site during the 2012 excavations. Charcoal was recovered in association with artifacts contained in an intact stratigraphic layer of beach sediments, indicating the charcoal date represents the occupation of the Woodpecker 2 and the deposition of the beach deposits of the Minong lake level (Shultis, 2013); the charcoal yielded a date of 8,680 ± 50 B.P. (Beta 323410) and calibrated to 9,760-

9,540 cal years B.P. (2 σ, INTCAL09). This site demonstrates deposition of cultural material when the Lake Minong beach was active and dates to the time period expected for Paleoindian occupation. The date is also consistent with the only other absolute date for the Lakehead Complex from the Cummins site.

There is some discrepancy between the OSL dates from the Woodpecker 1 site and the radiocarbon date from Woodpecker 2, where both samples are dating the same Minong lake level; there is a difference of approximately 2,000-3,000 years (Shultis, 2013). The date yielded by OSL techniques at Woodpecker 1 of 7,980-7,000 B.P. is highly unlikely to date to when the shoreline actively contained glacial lake waters because at this time water in the Superior basin would have been between Minong and Houghton levels, 230-183 metres asl (Boyd et al., 2012; Kingsmill, 2010; Shultis, 2013; Yu et al., 2010). The beach sediments were likely deposited after the Marquette re-advance dating between 10,000 B.P. and 9,300 B.P. (Yu et al., 2010), which is consistent with the radiocarbon date of 9,760-9,540 cal B.P. (Shultis, 2013).

The radiocarbon date from Mackenzie 1 of 3,540 ± 30 B.P. is also considered to be too recent relative to conventional wisdom regarding Paleoindian occupation of the region, and is hypothesized to be the result of intrusive root burn into the pit feature, as noted by the author and Project Manager during excavation. The projectile point found in the same unit was recovered outside of the confines of the pit feature and is Paleoindian in nature. Determined from field observations, the charcoal continued throughout the pit feature and samples were taken at each level down to a depth of one metre. No further radiocarbon samples have been submitted for dating (due to the lack of reliable samples to date), however this would prove useful in determining the context of the one available radiocarbon date as well as provide more dates for the entire site. The OSL dating of the pit feature at Mackenzie 1 could represent the date of occupation for that artifact cluster; however no diagnostic artifacts were recovered in the pit or adjacent to it. It could be a possibility that the date is correct, but is dating a later occupation of the site, as the diagnostic artifacts (projectile points) recovered from the rest of the site are Paleoindian in nature. It is also probable that the recent date represents the highly disturbed nature of the site; the date may indeed be accurate but is dating a time when the sediments were disturbed, exposing them to sunlight and consequently emptying the stored radiation. This could explain the correct chronological sequence of dates (oldest to youngest) during the deposition of sediments in the disturbed pit feature.

5.3 INTRODUCTION TO TERMINOLOGY USED DURING ANALYSIS

A series of standardized terms were used in this analysis to document the orientation of the projectile points. The proximal end, commonly the projectile point base is always orientated towards the observer. In the case of tip fragments, the break would be considered the proximal end. Midsections are somewhat more difficult to orientate, and depended upon the size and features of the remaining portion. The distal end refers to the portion of the projectile point that is thought to be closest to the tip, and is positioned furthest away from the observer.

When it can be determined, the ventral surface of a projectile point refers to the interior/ventral surface of the flake from which the point was produced. This ventral surface might contain remnants of the original bulb of percussion or other distinctive features. The dorsal surface was the original outside surface of the flake that was detached from the core. In some cases the dorsal side will reveal some evidence of cortex, or perhaps remnants of flake scars from previously detached flakes. The ventral and dorsal orientations of the projectile points cannot always be determined, and in those situations a face designation was arbitrarily assigned and consistently used in the analysis.

It is generally thought that the final stage of projectile point production involves grinding of the proximal lateral and basal surfaces, presumably as a prelude to hafting it to a spear or fore shaft. While grinding has been used as a measure of the "completeness" (i.e., finished/unfinished) of a projectile point, this interpretation was not assigned in considering the Mackenzie 1 assemblage. It is believed here that the only way to positively determine use as a projectile is to conduct a use-wear analysis. Since this has not been carried out on the Mackenzie assemblage, everything that resembled a projectile point from a functional perspective (projectile points require a point, axial symmetry, relatively uniform thickness, and a provision for hafting; Meltzer, 1981: 315) was included in this analysis. Another form of grinding may be present along the lateral edges of the projectile point that represents edge grinding for platform preparation to facilitate flaking. This technique is commonly observed on Paleoindian projectile points, but grinding in this analysis is limited to reference of the grinding of the lower lateral edges to prevent the cutting of the binding during hafting of the projectile point to a spear.

Given the multiple activities expected to have occurred at a habitation site it is possible that finished projectile points were also used as knives or perforators prior to hafting and use as projectile tips. The assumption stated above, that grinding could be used as a measure of completeness (i.e., finished/unfinished), does not seem credible at a large scale habitation site where many activities would have occurred. The variation of activities would have required expediency of previously constructed tools that may have initially been intended for other purposes. The Mackenzie 1 assemblage supports this theory, where the number of specimens lacking lateral and basal edge grinding may indicate the expedient use of tools. Therefore, the tools may go through different stages of use-life between completion of the manufacture process and the intended use (Chapter 4).

5.3.1 Summary of Metric and Non-Metric Data Collection

Metric and non-metric data collection was collected for all 380 specimens. To better understand the challenges posed by the taconite raw material, and to demonstrate the stylistic and functional choices made earlier in the knapping process, 42 preforms were also included in the analysis. This was important because some of the attributes normally thought to represent the final stages of projectile point production are also found on some objects representing earlier stages in the lithic reduction process. They were identified by their characteristics within the reduction sequence identified in Northwestern Ontario outlined in Chapter 4.

Some of the metric measurements included, with some modification, are commonly collected in other North American Paleoindian point assemblages (Arnold, 1985; Frison, 1982; Irwin-Williams et al., 1973; Irwin and Wormington, 1970; Wormington, 1957). The metric attributes were adopted from Arnold (1985), and include maximum length, maximum width, thickness, depth of basal concavity, number of basal thinning flakes (ventral and dorsal), length of area subjected to lateral edge grinding (left and right), constriction ratio (Morrow and Morrow, 1999; O'Brien et al., 2001), length to width ratio, and angles of the lateral edges (see O'Brien et al., 2001) (Figure 5.2). These data are tabulated in Appendix 4, with some further discussion in Chapter 6.

Some of the metric measurement techniques are described here, to minimize confusion and to enable reproducibility (Figure 5.2). Maximum length was taken with all parts of the base touching the callipers to the tip. In specimens where the base was incomplete, its configuration was estimated and then a measurement was taken to correct for any asymmetry caused by breakage. The medial length was taken from the apex (the shallowest point) of the basal concavity to the tip of the point. In this case, only the complete specimens were used to provide a medial length measurement.

Maximum width also proved to be less valuable than was hoped. The widest point in most cases was where there was a flaw or irregularity in the flaking due in large measure to the raw material. The maximum and minimum widths were taken while the point was lying on its face on a flat surface. The callipers were placed at a 90 degree angle to the midline of the specimen (Figure 5.2).

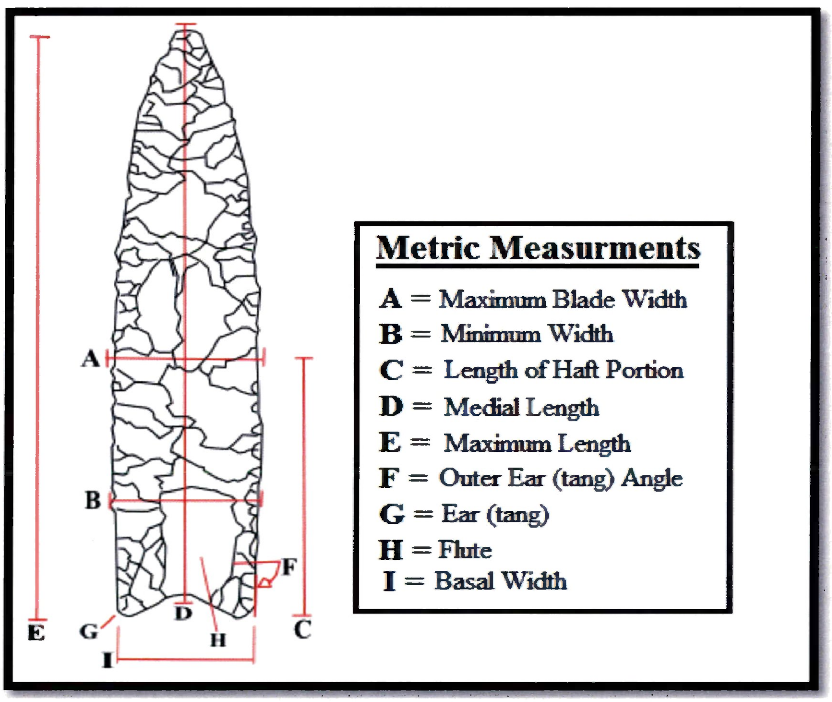

Figure 5.2: Image demonstrating the landmarks where the metric measurements were taken (modified from O'Brien et al., 2010 and Arnold, 1985).

For specimens that refit, the maximum measurements were taken using all conjoining pieces, and generally required the use of computer softwear. Measurements of midsections and tips were also taken when appropriate.

The non-metric analysis consisted of an evaluation of the flaking pattern, cross section, degree of edge retouch, portion present and material used. Measurement of these attributes is somewhat subjective in nature, and therefore may not be precisely replicable by another analyst. The faculty of the Department of Geology at Lakehead University, Bill Ross (former Regional Archaeologist), Dan Wendt (avocational archaeologist and flintknapper) and Gary Wowchuk (Western Heritage and flintknapper) aided in the identification of materials unknown to the author.

5.4 MACKENZIE 1 ATTRIBUTE ANALYSIS

After laying out and closely examining the entire point assemblage, analysis began by identifying the individual attributes that best characterize the collection. These morphological traits were then examined relative to the metric measurements in an effort to validate distinctions made between attribute states. As the analyst became familiar with the specimens, it became apparent that patterned co-occurrence of a surprisingly narrow range of attributes served to capture much of the variability apparent in the assemblage. While the collection is comparatively large, the analyst was also advised to attempt to parsimoniously capture this variability by rank-ordering traits in terms of their frequency of representation to define the primary types, with subsequent subdivision based upon variation in less frequently expressed traits. This involved efforts to capture the general morphological trends without inordinate splitting into permutations and trait combinations that might result in many types represented by few or no examples. This reflects a classic problem in archaeological taxonomy whereby one seeks a balance between lumping (and ignoring) subtle variation within a few modal 'types', versus inordinate 'splitting' into numerous subtypes that exceed the number of 'cases'.

5.4.1 Attribute Taxonomy

Consistent with most other similar analyses, the attributes chosen for the analysis emphasized the projectile point basal configuration, specifically the proximal third of the specimen (Kooyman, 2000; O'Brien et al., 2010). The haft portion, where the projectile point is attached to the spear, provides the most information about functional and stylistic choices (Flenniken and Raymond, 1986; Cheshier and Kelly, 2006). Most projectile points exhibit a comparatively narrow range of culturally-mediated attributes that reflects 'functional' considerations coupled with 'stylistic' choice. The combinations of attributes, therefore, are thought to reflect the cultural 'rules' or parameters of what archaeologists suggest the artisan imagined to constitute a suitable tool form (Flenniken and Raymond, 1986; Cheshier and Kelly, 2006). Taxonomically recognized variability in tool form sometimes represents temporally and geographically defined variation that is thought to be diagnostic of the various cultural sequences reported across North America (Ford, 1962; O'Brien et al., 2001).

Following this rationale, the primary traits chosen centred on the morphology of the base; lateral edge shape, and basal degree of basal concavity (after O'Brien et al., 2001). Flaking pattern, cross section and lateral and basal grinding were also included as secondary traits to more fully illustrate the patterns of variability. The midsection and tip fragments were significant in providing information to confirm the consistency of secondary attributes such as flaking pattern, cross section and grinding. The analysis of the complete points and the basal fragments consisted of examining variation in five primary attributes to define groups of morphologically similar projectile points. A description of the attributes chosen and the various states in which they were identified is provided below.

5.4.2 Lateral Basal Shape (Hafting Portion)

The lateral basal shape of the projectile points is the first primary attribute and describes the general shape of the lateral edges of the hafting portion (Figure 5.3). There are five attribute states represented in the Mackenzie assemblage:

A) Constricting

Lanceolate forms demonstrating slightly varying degrees of constriction of the lateral edges from the midsection proximally towards the base. There is a smooth transition from blade to haft portion, with no evidence of shoulders. The minimum width is at the base.

B) Ears

Lanceolate forms generally demonstrating a constriction towards the base then a slight flaring out of the base to produce ears. They can be present on one side or both basal lateral edges. The minimum width is not the base, but immediately above the ears where the lateral edge constriction ends. These ears appear more rounded or blunt than is observed with the 'fishtail' variety.

C) Fishtail

Lanceolate forms with lateral edges that first taper along the haft section, and then recurve outward towards the base, resulting in the widest part of the point being near the centre of the blade, resulting in the formation of slight, protruding ears. Minimum width is above the base (defining the narrowest part of the tool), located in the middle of the length of the haft portion. The lateral edges constrict before flaring to produce the ears on the base. The combination of this specific lateral edge shape and the basal concavity produces a characteristic ear shape (ear type number 1 on the scale of 5; see Chapter 6: Results).

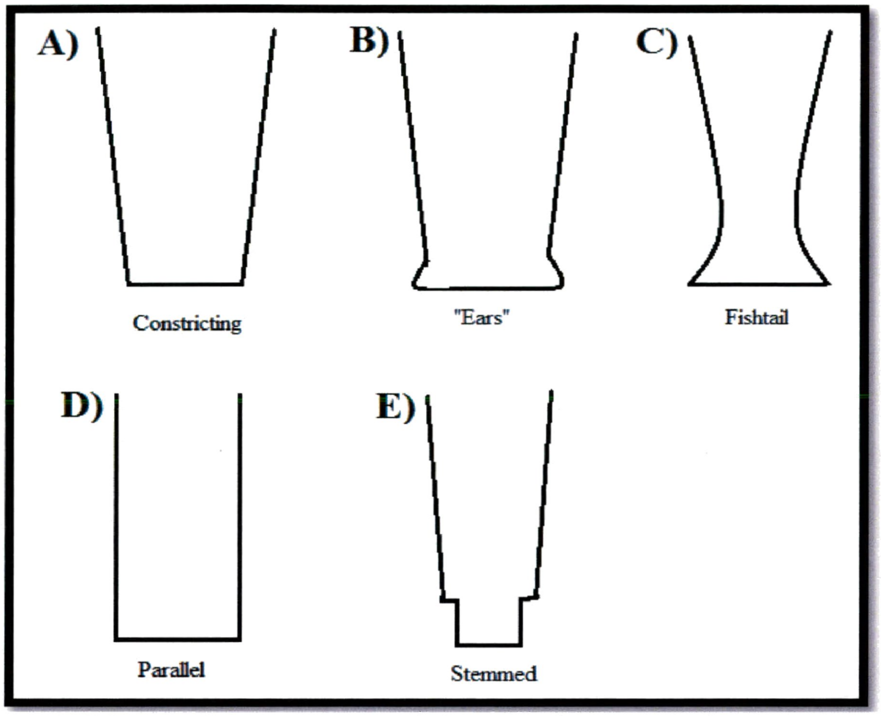

Figure 5.3: Schematic drawings of the varying lateral edge shapes observed within the Mackenzie 1 projectile point assemblage.

D) Parallel

Lanceolate forms with lateral edges that run parallel to each other, demonstrating no constriction or flaring. Width is the same along the entire haft portion down to the base.

E) Stemmed

Lanceolate forms with straight stems representing the haft portion, producing a slight shoulder where the blade meets this haft portion. Slight basal ears may or may not be present on certain specimens, all within the range of variation for the stemmed variety.

5.4.3 Basal Concavity

The basal treatment is the second primary attribute and is described based on the degree of indentation of the basal edge. There are four attribute states present in the assemblage that were defined based on arbitrary measurement boundaries defined after consideration of the metric data (Figure 5.4).

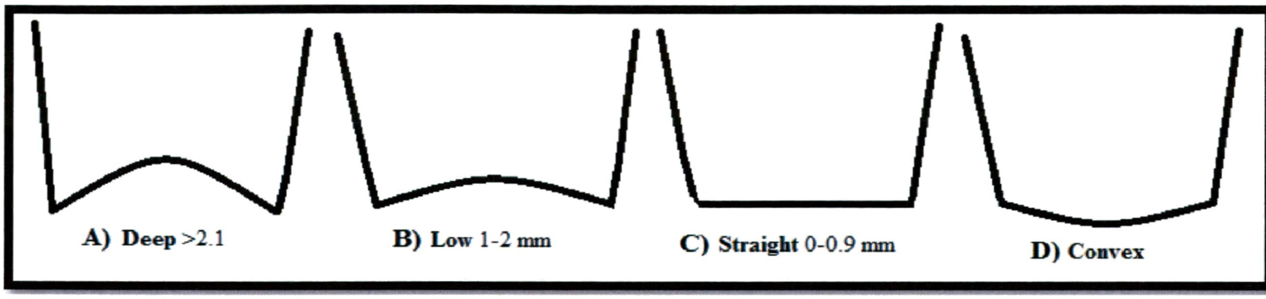

Figure 5.4: A schematic drawing demonstrating the arbitrary boundaries that define the basal concavities identified within the Mackenzie 1 projectile point assemblage.

A deep basal (**A**) concavity is defined by a basal indentation that is greater than 2 millimetres. A basal indentation between 1.01 and 1.99 millimetres demonstrates a slight basal concavity, considered low (**B**). A basal indentation that is less than 1 mm and demonstrating little to no basal concavity is considered a straight basal configuration (**C**). The last category includes any base where there is no basal indentation but is convex (**D**), producing the appearance of a rounded base. In some cases, the widest part of the point is at the base and the lateral edges constrict towards the tip (Figure 5.4).

5.4.4 Flaking Pattern

Flaking pattern was used as a secondary attribute because it reflects the production methods, but not necessarily the morphological character of the specimen (see Chapter 4). There are a series of attribute states that represent variations of the parallel oblique flaking pattern that dominates the assemblage (Figure 5.5). The variation in the flaking pattern results from varying degrees of success in executing the specific flaking sequence (outlined below). There is minimal representation of random and collateral flaking in the assemblage.

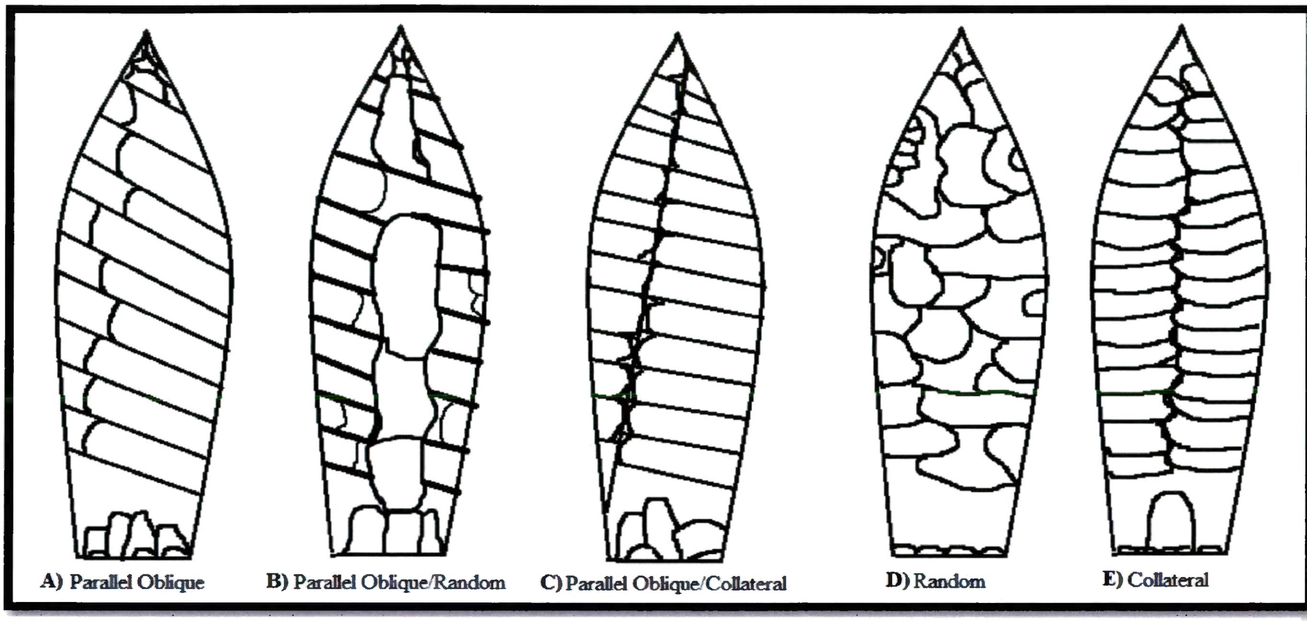

Figure 5.5: Schematic drawing illustrating examples of the different flaking patterns found on the projectile points in the Mackenzie 1 assemblage.

A) Parallel Oblique (PO)

Flake scars are long and slender, extending ½ to 2/3 across the face of the blade, and since they are oriented in parallel rows, they produce a ripple effect. Each of these primary parallel flakes is met by a shorter flake struck along the same orientation from the opposite lateral edge, thereby producing a blending effect, with the end product resembling a transverse parallel oblique scar. Flake scars generally originate on the right lateral edge and are orientated obliquely to the blade long axis. These oblique flake scars are always orientated towards the distal (tip) end of the object, and generally terminate with a hinge fracture beyond the midline. This fracture is occasionally obliterated by the secondary flake scar that was struck from the left lateral edge down to the right. This second flake is deliberately orientated to run parallel to the one it meets, resulting in it blending into the primary scar as it terminates. On rare occasions, the flaking process is reversed; the primary flake is struck from the left lateral edge and travels distally towards the tip and obliquely orientated to the long axis of the point. The terminations of the primary scars appear to be systematically expressed, with primary flake scars extending furthest across the midline towards the proximal end of the blade, but less so towards the distal end. This produces an offset visual appearance to the flake termination relative to the medial ridge in most cases. This may reflect technological considerations for thinning the piece, but also may express a deliberate strategy of stylistic expression. This style of flaking produces an off-centre lenticular cross section. This flaking style dominates the assemblage, and is interpreted as the ideal form for flaking style.

B) Parallel Oblique/Random (PO/R)

This flaking category displays a mix of parallel oblique and random styles of flaking. The random flaking pattern is usually accompanied by some attempt at retouching the edges of the projectile point in a parallel oblique orientation. These are very short, thin flake scars that only appear around the edges of the point. This could potentially be a product of resharpening or retouching an edge to get a specific shape (Figure 5.6). The removal of fine flakes along the edges of the blade in a parallel oblique orientation over an initial random flaking style gives the specimen a mix of parallel oblique and random flaking styles.

There is also a variety where one face demonstrates perfectly executed parallel oblique, while the other face has more random flakes present (PO/R/PO). This usually results from some form of extensive parallel retouch along the edges or a flaw in the material, removing most of the original parallel oblique scars, except for what remains down the centre of the blade because of the retouch. This resembles a random style of flaking.

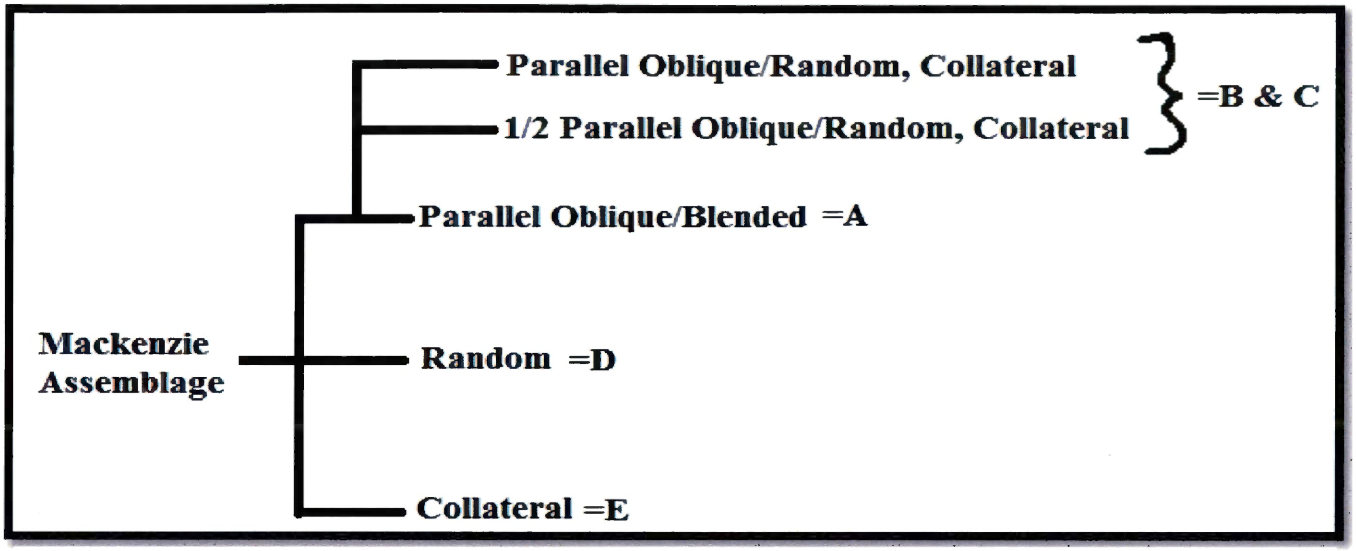

Figure 5.6: Dendrogam illustrating the three categories of flaking patterns; random, collateral and blended parallel oblique. There are also two subcategories of the parallel oblique pattern (1 of 2 blade faces demonstrates blended parallel oblique with random/collateral on the other; a mix of parallel oblique and random/collateral on both faces), demonstrating the range of variability accepted for the parallel oblique category.

C) Parallel Oblique/Collateral (PO/C)

Flake scars are a mix of collateral flakes that are orientated in a parallel oblique pattern and does not exhibit a medial ridge. This also includes specimens that have a slight medial ridge that runs diagonally down the long axis of the point. This occurs when flake scars removed from the right lateral edge travel across half the face of the blade and terminate with a hinge. The subsequent flake removed from the upper left in order to blend the two scars hinges at the same location where the original scar initially hinged. This produces a diagonal ridge that is generally evident along the left side of the projectile point. The flake scars terminate at this ridge extending down the length of the projectile point and are considered collateral but do, in some cases, exceed half way across the face because of the nature and orientation of the diagonal ridge.

There is also a variety where one face demonstrates perfectly executed parallel oblique, while the other face has more collateral flakes present (PO/C/PO). This usually results from some form of extensive collateral retouch along the edges or a flaw in the material, removing most of the original parallel oblique scars, except for what remains down the centre of the blade because of the retouch. This resembles collateral flake scars and produces a slight ridge, either from the retouch or because of the flaw in the material (e.g., potlids).

D) Random (R)

This flaking category has no discernible pattern visible on the faces of the point. It is considered random because the flaking pattern does not conform to the frequently expressed parallel flaking pattern. This mode of flaking produces a different visual and stylistic effect, whereby the stylized, consistent pattern, such as the ripple effect of the parallel oblique flaking is abandoned (Figure 5.6). This could reflect limitations of the material, the skill level of the artisan, or less interest by the artisan in expressing the stylistic 'ideal' noted above. It is important to emphasize that there is still a specific method at work in producing such projectile points. The flaking is being conducted to thin and shape the piece sufficiently and effectively to satisfy the functional requirements. However, the manner of that flaking involves a less stylized approach, with no effort to produce the ripple effect evident with the parallel oblique pattern (Chapter 4).

E) Collateral (C)

Flake scars originate at each lateral edge and terminate at the centre of the face of the blade, often creating a medial ridge and a diamond shaped cross section.

5.4.5 Cross Section

The cross section is found when examining the lenticular orientation of the projectile point (Figure 5.7).

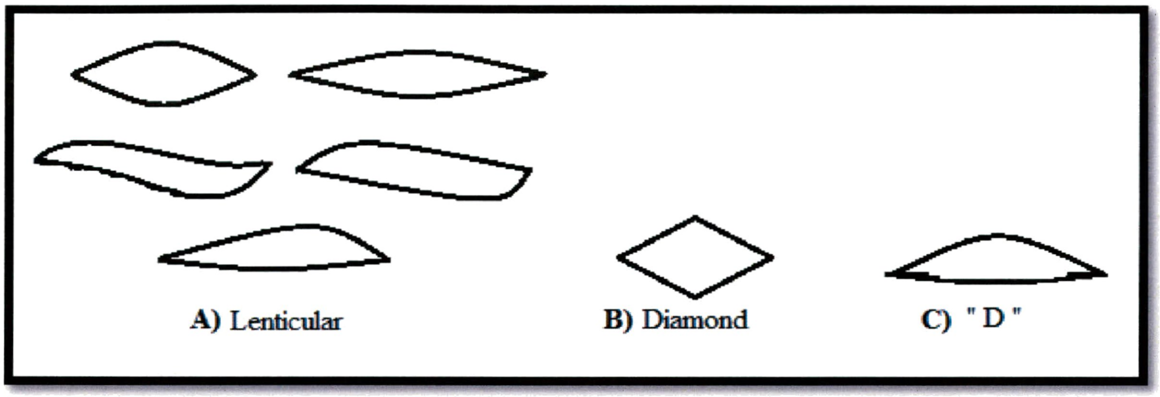

Figure 5.7: Schematic illustration of the variation of cross section observed on the projectile point assemblage from the Mackenzie 1 site.

A) Lenticular

Is a lens-shaped cross section that is thick in the middle and thin along the lateral edges. This category demonstrates a high range of variability because of the nature of the material combined with the flaking pattern used. There is no medial ridge

B) Diamond

A diamond cross section is the result of collateral flaking pattern on both faces of the blade, whereby flakes from both lateral edges meet in the middle creating a medial ridge. This creates a diamond cross section.

C) Lens-Shaped (plano-convex), or “D”

The ventral surface of the original flake scar was sufficiently flat and did not require further lateral thinning. The dorsal surface required thinning and the flake scars do not consistently travel over half way across the surface. This created a slight ridge or ‘low dome’ shape (medial or diagonal) on the dorsal side, as attempts to thin the piece laterally were made.

5.4.6 Grinding

Grinding is the last of the secondary traits considered and is represented by three attributes states in the Mackenzie assemblage. Presence and absence of grinding was evaluated on the lateral and basal edges, while the description of one side being ground refers to lateral grinding only.

1) Presence/Absence (P/A): Lateral grinding is either present or absent on both lateral edges (left and right). This includes presence or absence of basal grinding also.

2) Grinding present on 1-side (lateral only): Lateral grinding is present on one side and absent on the other.

5.5 CLADISTIC APPROACH TO ORGANIZATION

Some archaeologists see value in a statistical approach to archaeological classification (Justice, 1987; Lyman and O'Brien, 1997, 1998, 2000; O'Brien, 2005). This approach involves collection of a battery of metric attributes that are then examined for patterns of correlation using computerized statistical program to determine the relatedness of archaeological assemblages that are analytically meaningful (O'Brien et al., 2001; 2010).

The present analysis took a more traditional approach to develop a descriptive typology that grouped specimens into groups that reflect co-occurring combinations of specific attributes. Few specimens are identical, but rather, reflect subtle variation in the expression of primary and secondary attributes. In order to create a taxonomy that reflects these 'degrees of similarity", a cladistic approach was employed as a heuristic device. This classification approach is more commonly used to address biological relatedness for differentiating between closely related species. In this way, the primary (morphological attributes) were used to identify general categories or types, some of which are subdivided into subtypes that reflect patterned variation in the expression of secondary traits.

5.6 SUMMARY

An attribute analysis approach was used to document and interpret projectile point morphological variability observed in the Mackenzie 1 assemblage. This approach to classification of Lakehead Complex projectile points differs from that used in the past. In those earlier efforts, the very small sample sizes and considerable morphological variability forced analysts to offer general comparisons to types identified elsewhere in North America. Because of the uniquely large assemblage size available here, a more systematic consideration of trait expression and morphological variability was possible. The patterned variation apparent in this assemblage enabled the inductive development of a descriptive typology to more fully describe the Mackenzie 1 collection. In the latter portion of this thesis the morphological and stylistic patterns observed will then be compared to other Late Paleoindian types in the literature.

CHAPTER 6

RESULTS

6.1 INTRODUCTION

This chapter presents the results of the analysis of the projectile points using metric and non-metric data (see data tables in the Appendices). This contributed to the formulation of analytic groups, consisting of the complete points and the base fragments with sufficient intact attributes to enable analysis. The most analytically identifiable attributes include the lateral edge shape, basal concavity, flaking pattern, cross section and the presence/absence of grinding. These attributes and the various attribute states observed are sufficient to represent the variation apparent within the projectile point assemblage.

The projectile point specimens discussed will be referred to using the Western Heritage Serial (e.g., WHS-P-00000) number given to each artifact when discovered in the field. In order to maximize the sample size, projectile points collected during the 2009 preliminary surveys were also included. These specimens, collected by a different archaeological consulting firm are catalogued with a different numbering system (e.g., L000). If a refit specimen is referenced, it will include both Western Heritage Serial numbers if they were found and bagged separately in the field (e.g., WHS-P-00000 & 00000). Photographs of some of the artifacts are also presented, and these are assigned separate numbers using a different labelling system (e.g., DSCN0000).

6.2 BRIEF SUMMARY OF THE METRIC AND NON-METRIC ANALYSIS

The metric and non-metric data were collected and compiled in a series of tables presented in Appendix 1. Metric measurements taken for each specimen include maximum length, width and thickness, degree of basal concavity, number of basal thinning flakes, (degree of or presence/absence of) grinding, constriction ratio and a measurement of the angles of the lateral edges (see Methods chapter for more detail). Non-metric attributes examined include flaking pattern, cross section, degree of edge retouch, the portion present and the raw material used.

The metric analysis, while imperative for cataloguing purposes, to define classificatory boundaries for delimiting non-metric attribute states, and used in comparison to other classically defined types, proved less effective in documenting the subtle morphological variation demonstrated in the assemblage. The non-metric analysis proved more effective to document variability, and will be discussed in detail below. First, some of the significant metric data will be outlined for the complete projectile points and the basal fragments in a brief summary (all the data is presented in the Appendix).

6.2.1 Complete Points

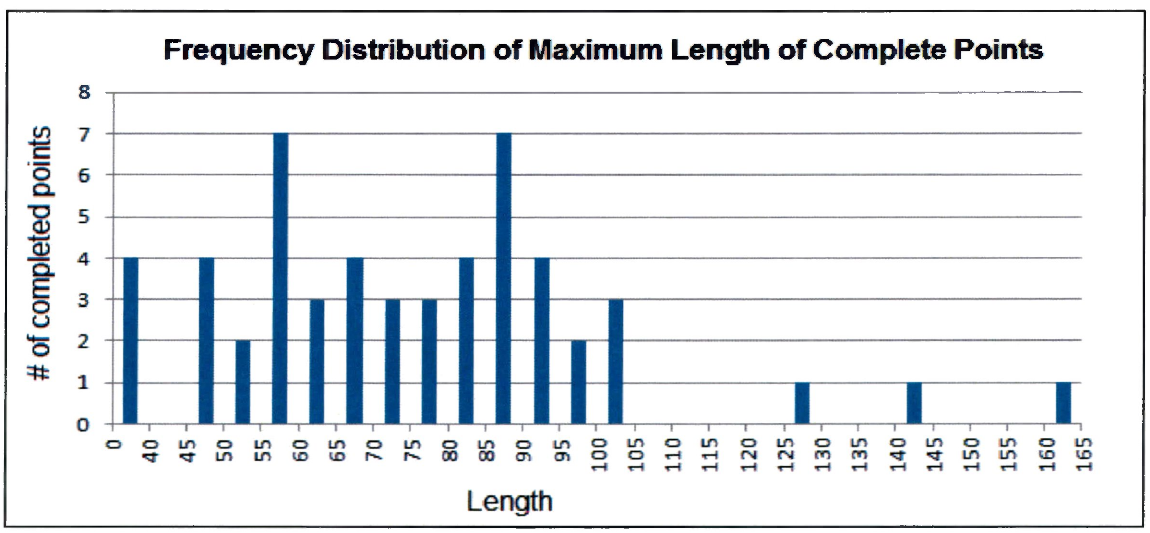

Figure 6.1: A histogram demonstrating the distribution of the maximum length of the complete points.

The maximum length of the completed specimens range between 160.8 (WHS-P-10056 & 16400) and 37.5 mm (WHS-P-08239). The majority (n=46) of complete specimens cluster around the average maximum length of 75.3 mm, between 45 to 105 mm (Figure 6.1). There are specimens that are outliers from the larger cluster, both longer and shorter than the mean. The highest frequency of specimens (n=7) occurs between 55 to 60 mm and 85 to 90 mm, where seven completed points are represented in the respective measurement brackets. This suggests a weakly expressed bimodial distribution.

The maximum width of the completed specimens ranges from 52.1 mm (WHS-P-10056 & 16400) to 18.8 mm (WHS-P-06453 & 04449), with an average width of 25.7 mm. The measurements are irregularly spread across the range (Figure 6.2). The highest frequency represented includes 16 specimens clustered between 22 mm and 23.5 mm.

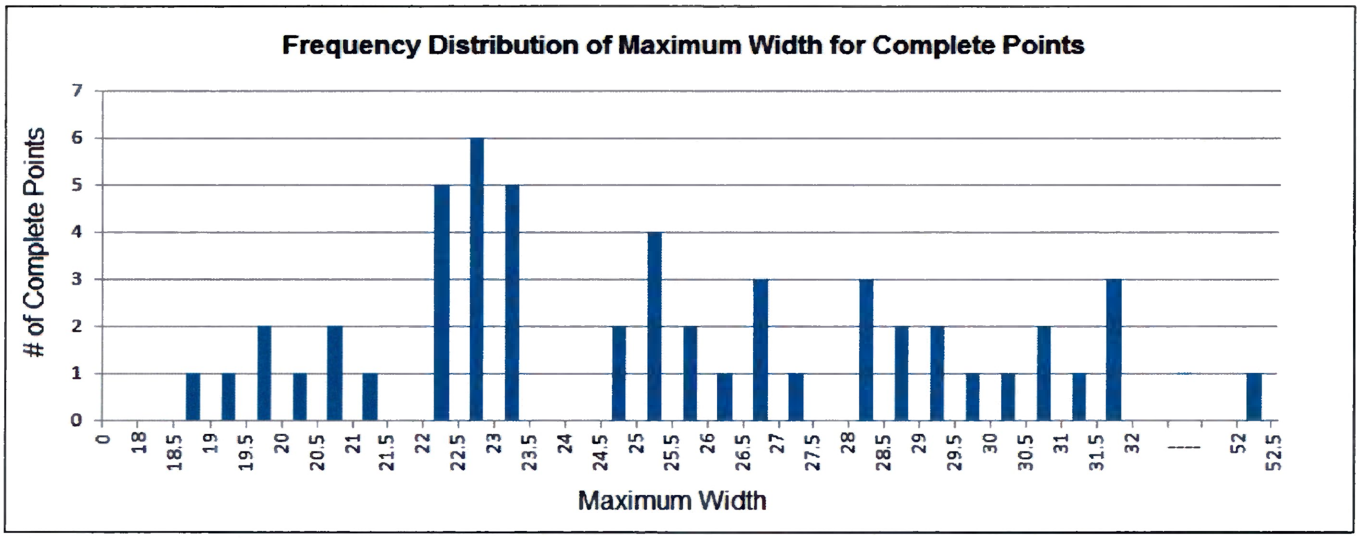

Figure 6.2: Histogram demonstrating the distribution of the maximum width of the complete points.

The range of basal width represented in the completed specimens is between 26.3 mm (WHS-P-07265) and 15.4 mm (WHS-P-20565) with an average of 20.5 mm. The frequency of basal widths demonstrates a wide range of variability with no discernible pattern (Figure 6.3). The majority of the specimens are clustered around the mean value, where 40 specimens are clustered between 18 mm and 24.5 mm. There are also outliers representing both narrower and wider specimens.

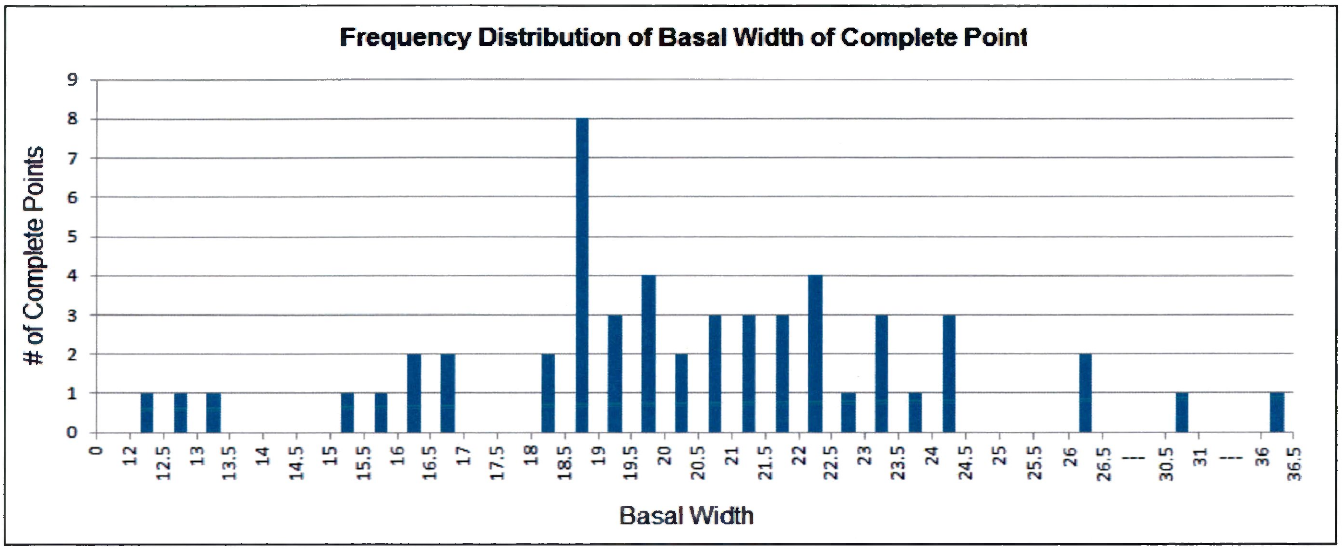

Figure 6.3: Frequency distribution of the basal width for the complete points.

The measurements for completed projectile points vary greatly within each frequency distribution. There is no apparent pattern to the length, width or basal width of the specimens. This suggests that there was no predefined size standard used during the manufacturing of the projectile points or during use (i.e., resharpening and rejuvenation).

The maximum thickness for the completed specimens ranges between 11.1 mm (WHS-P-00179) and 4.7 mm (WHS-P-06453 & 04449), with an average of 7 mm. The thickness measurements of the completed points demonstrate a relatively unimodal distribution approximately centred on the mean with one outlying specimen that is relatively thick (Figure 6.4). The distribution of measurements is between 4.5 and 9.5 mm, with a large majority (n=13) between 6 and 6.5 mm (n=16) and between 6.5 and 7.5 mm. During the manufacturing process for each specimen the resulting thickness seemed to be a consequence of utilizing a specific raw material, in this case taconite, where the maker seemed constrained by its physical properties during the reduction sequence.

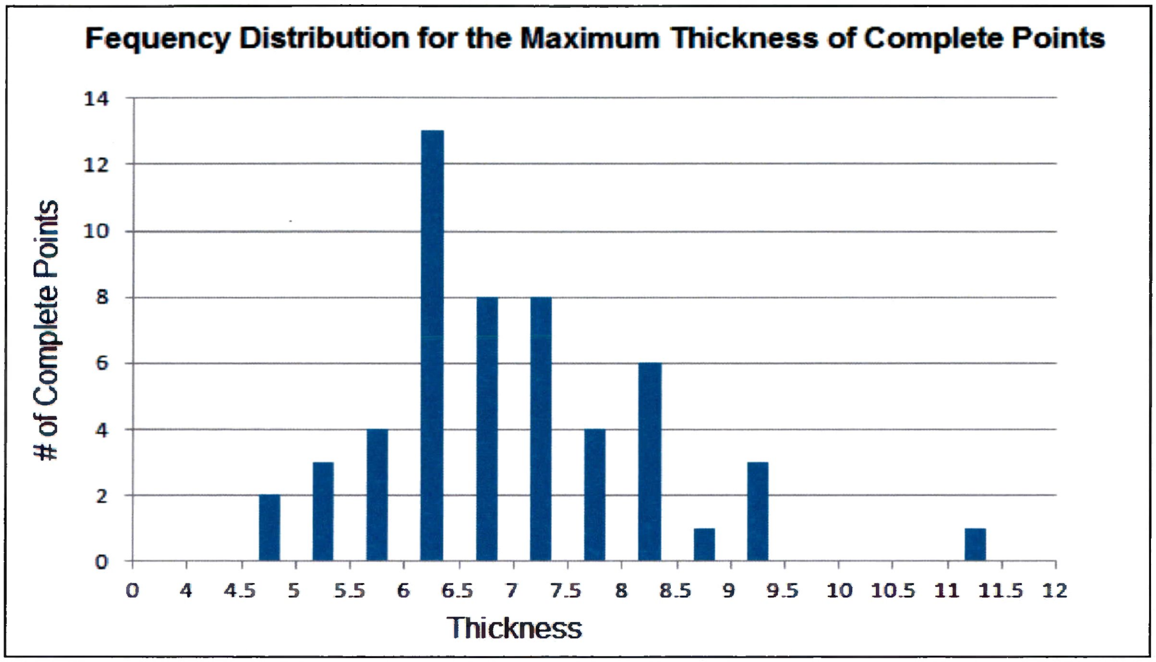

Figure 6.4: Histogram of the distribution of maximum thickness measurements for complete points.

The number of basal thinning flakes removed from each face of the projectile points ranged from zero (displaying no thinning flakes) up to ten. The length of the thinning flakes also varied widely. There are some specimens that exhibit thinning flake scars that extend as long as 22mm (WHS-P-05974 & 05058). Eleven complete projectile points demonstrate at least one thinning flake scar that is over 10 mm in length.

Length to width ratios range between 2:1 and 5:1, with the majority of specimens falling between a length/width ratio of 2.5:1 to 3.5:1 (Figure 6.5). The projectile points appear to be long compared to their width. The location of the maximum width in relation to the maximum length of the complete points varies, with the majority of specimens demonstrating maximum width between 30% to 40%, and 45% to 55% of the length. The maximum width occurs at an average location of 44% of the overall length of the projectile points, measured from the proximal end. These data indicate that for the majority of the projectile points in the assemblage, the maximum width is located just below half way to one third up from the proximal end of the projectile point.

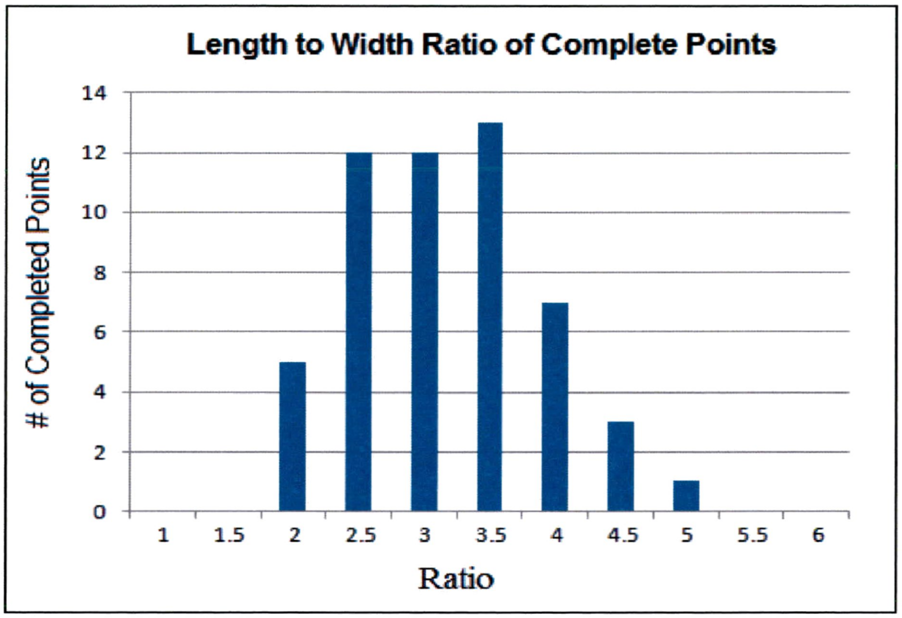

Figure 6.5: Length to width ratio distribution for complete points.

6.2.2 Basal Fragments

The maximum length of the basal fragments ranges between 107.2 mm (WHS-P-06499 & 21045) and 12 mm (ear fragment; WHS-P-05401) with an average length of 35.8 mm. The specimens suggest a bimodial distribution clustered approximately on the mean, from 12 to 55 mm, with the second mode between 55 and 85 mm (Figure 6.6). There is one outlier that is longer than the two main clusters of specimens. Approximately half of the basal fragments (n=58) exibit a length that is clustered between 20 and 35 mm. It is evident in observing the frequency distribution that more basal fragments fall within the shorter end of the spectrum. This pattern indicates that most projectile points broke closer to the base, evident in the majority of specimens represented to the left of the graph (Figure 6.5), while the remaining specimens, represented by a small group, break closer to the tip. It is likely that the majority of specimens demonstrate a transverse break closer to the base because the portion of the blade distal to the hafting zone is consistently exposed to the greatest impact stress. This could be indicative of breakage patterns during hunting and the high recovery of shorter basal fragments could suggest re-hafting efforts within a base camp (see Discussion).

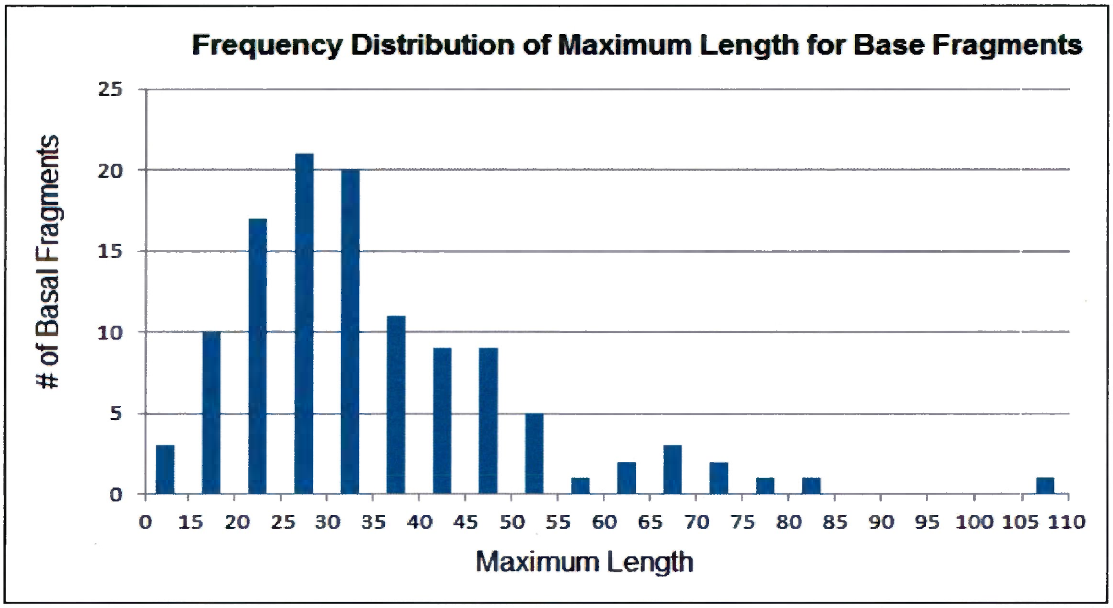

Figure 6.6: Histogram demonstrating the distribution of the maximum length for the basal fragments.

The maximum width of the basal fragments ranges from 36.7 (WHS-P-05567) to 8.3 mm (WHS-P-08496) with an average of 24.5 mm. The majority of the specimens cluster on the mean but demonstrate a significant divergence from that mean (Figure 6.7). There are 95 specimens that measure between 19.5 to 30 mm. There are several outlier specimens that are both wider and narrower than the main cluster around the average value.

The average basal width of the base fragments is 20.2 mm with a range of widths from 33.1 (WHS-P-23558) to 9.9 mm (WHS-P-04329). The majority of the specimens cluster on the mean value, but are relatively spread out across the range (Figure 6.8). The largest cluster of 95 specimens is plotted between 15 and 26.5 mm with outliers that are both more narrow and wide. More specifically, there are a large number (n=35) between 19.5 and 21.5 mm.

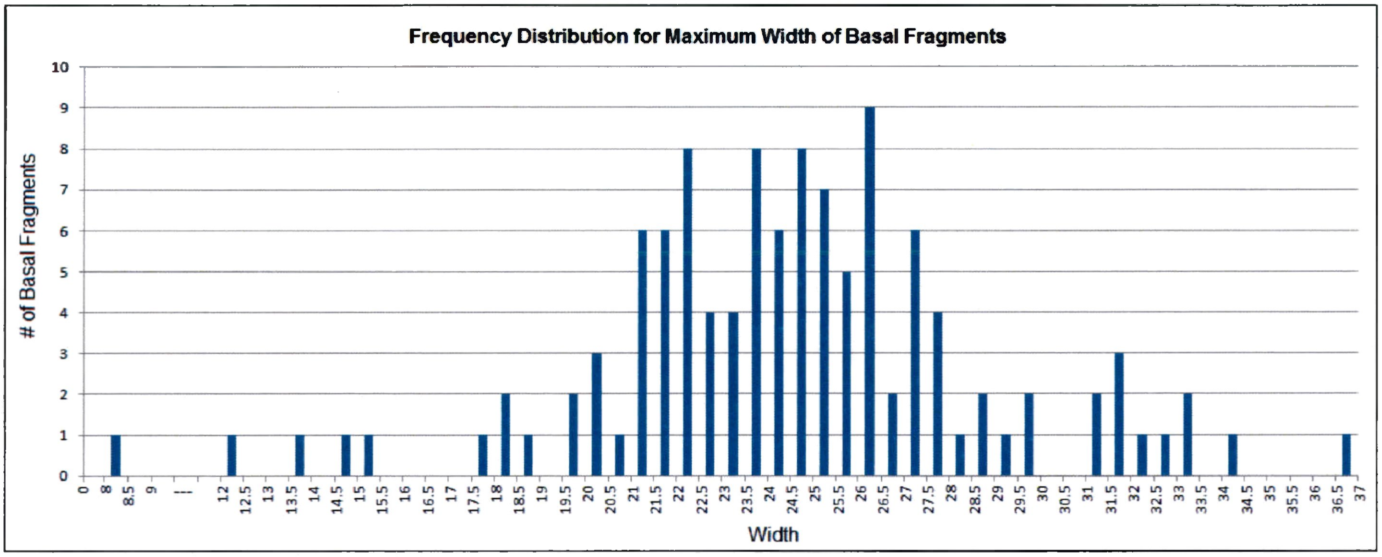

Figure 6.7: Frequency distribution illustrated in a histogram demonstrating the maximum width of the basal fragments.

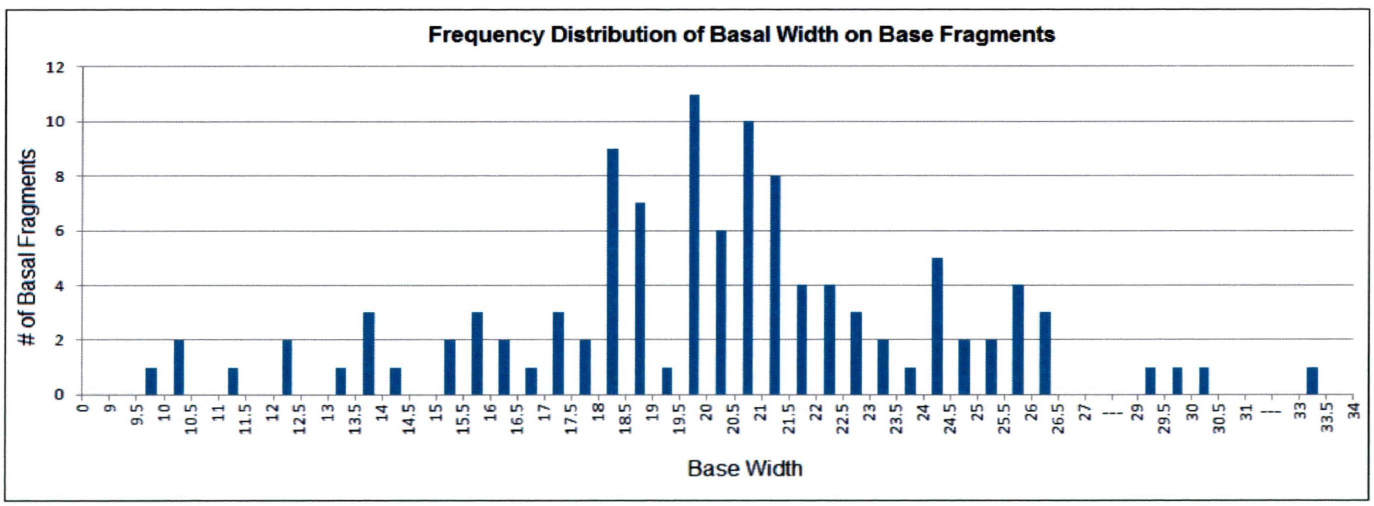

Figure 6.8: Distribution of the basal width of the basal fragments illustrated in a histogram.

The maximum thickness measurement of the base fragments yielded an average of 6.4 mm obtained from a range of measurements from 10.5 mm (WHS-P-18810) to 3.7 mm (WHS-P-

07246). When plotted on a histogram, the specimens create a unimodal distribution, where 50 specimens are centred on the mean value between 5.5 and 6.5 mm (Figure 6.9).

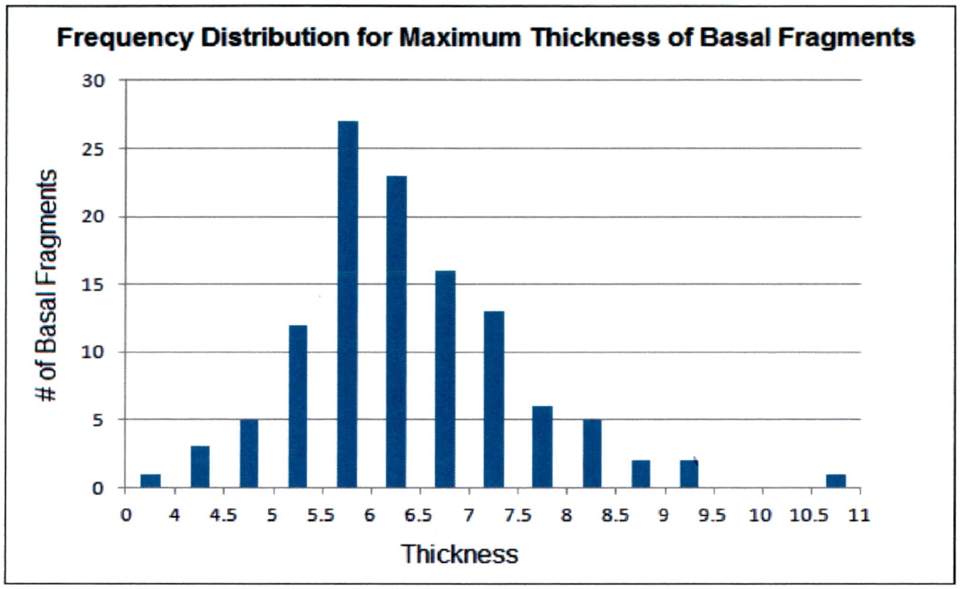

Figure 6.9: Histogram demonstrating the distribution of the maximum thickness of the basal fragments.

As with the complete projectile points, the basal fragments also demonstrate a range of thinning flakes, from zero to ten depending on the specimen with a range of flake scar lengths from zero to 26 mm (WHS-P-04949). There are twenty five basal fragments that have thinning flake scars that are 10 mm or greater in length.

Through the exercise of collecting the metric data, it became evident that the variation in the basic dimensions is rather dramatic (length especially). The range of variation within each metric dimension demonstrated that the dimensions vary independently of the morphological variation; there are short and long versions of the same lateral edge types. This observation led the analyst to focus more analytical attention to the non-metric attributes for characterizing the morphological character of the assemblage (see Chapter 5 for rational in choosing an attribute based approach).

6.3 SUMMARY OF THE RAW MATERIALS PRESENT

Material deriving from the Gunflint Formation (taconite (jasper taconite) and Gunflint Silica) make up the majority of the point assemblage, representing 85% of the total. Siltstone contributes 5% to the assemblage, mostly Knife Lake Siltstone (KLS). However there are also some unidentifiable pieces of siltstone. Identification of KLS was conducted macroscopically, on the basis of texture, colour, and amount of silica, and is consistent with the generalizations about materials from Knife Lake reported by Nelson (1992) and Ross (2012 pers. comm.). Hixton Silicified Sandstone (Hixton, HSS) from central Wisconsin makes up about 2% of the point assemblage. HSS was also identified macroscopically, being readily identifiable by texture, grain size, and comparatively narrow range of color expression (Carr, 2005). The identification of HSS within the assemblage indicates that the tool producers either travelled to that area for lithic procurement or possibly engaged in a trade relationship with other Paleoindian groups located to the south. There is only one specimen made of HSS that is stylistically distinctive from the balance of the assemblage (collateral flaking with a diamond cross section). The implications of this specimen are addressed more fully in Chapter 7 and 8. Other raw materials represented in small quantities within the assemblage include Hudson Bay Lowland Chert (HBL), and unidentifiable rhyolite (possibly available locally), quartz, quartzite, Dog Lake Mudstone, and some other as yet unidentified raw materials.

6.4 RESULTS: MACKENZIE 1 ATTRIBUTE ANALYSIS

Of the 380 projectile point specimens recovered, 53 are complete (16 refits), 116 are base fragments, 80 are midsections, and 116 are tip portions. Five points were reworked into scrapers and five appear to be pseudo-notched. Based on the specific attribute states present, these pseudo-notched specimens are believed to represent a specific stage in the manufacturing process as opposed to representing an Archaic trait (see Chapter 7 for an explanation of the pseudo-notching attribute). There are also six unanalyzable specimens due to the degree of fragmentation. Those six are included in the complete and basal overall totals, but are not included in the attribute analysis. Two of the six specimens consist of minute ear fragments, and the remaining four specimens represent morphological outliers from the other specimens making up the assemblage (see below, and the Discussion).

Outlined below is the breakdown of the 163 complete points and those basal fragments complete enough to permit analysis (excluding the six unknowns, the five scrapers and the five notched projectile points, discussed below). Morphological groups were identified based on the co-occurrences of attribute states, and demonstrate a surprisingly narrow range of variability. However, the tip and midsection fragments provide supplemental data useful for confirming the importance of the selected attributes, and are discussed separately below.

Each attribute (lateral edge shape, basal concavity, flaking pattern, cross section and grinding) and the attribute states will be considered independently to illustrate the variation within the assemblage. Once each attribute has been discussed, the definition of types based on the co-occurrences of specific traits will be presented, while also addressing the degree of variation revealed within each type. Dendrograms were created as visual heuristic devices to aid in clarifying the discussion of types.

6.4.1 Lateral Basal Shape (Hafting Portion)

The proximal lateral edge shape of projectile points is typologically important because it reflects efforts at hafting the tool to a spear shaft, and has proved informative in addressing temporal and geographical considerations associated with late Paleoindian material culture (Cheshier and Kelly, 2006; Flenniken and Raymond, 1986; Ford, 1962; Kooyman, 2000;

O'Brien et al., 2010). There are three major categories of lateral edge shapes identified in the assemblage, and are described as constricting, parallel and stemmed. The constricting category has two sub-categories: eared and fishtail (Figure 6.10). Two other categories were created to account for the anomalies (discussed in detail below); side notched and points that were reworked into scrapers. These specimens will be addressed separately.

A) Constricting

The constricting group consists of ninety five specimens. These were identified based on the fact that the basal width is the minimum width proximal to the maximum width of the point that usually occurred in mid-shaft. The constricting type represents the majority (58%) of the assemblage, establishing a noticeable visual trend within the collection.

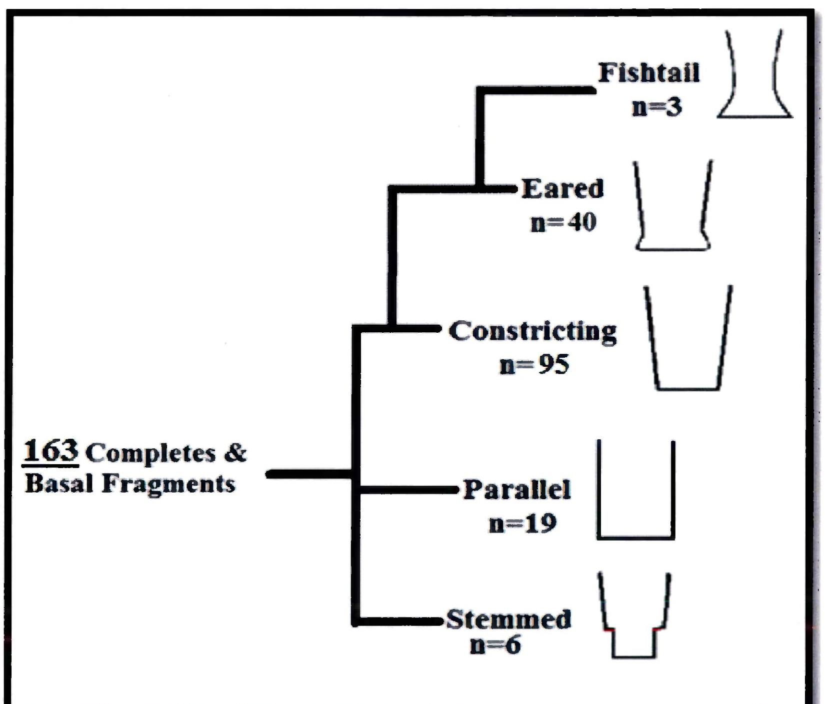

Figure 6.10: A dendrogram illustrating a breakdown of the 163 projectile point specimens into three groups (constricting, parallel, and stemmed) and two subgroups (eared and fishtail).

B) Ears

The eared subgroup of the constricting variety is defined by lateral edges that constrict towards the base. They are considered a subgroup because the minimum width proximal to the maximum width is not the base in this case, but is just above the base, which creates ear-like lateral protrusions. Forty specimens exhibit this trait.

C) Fishtails

The fishtail subgroup of the constricting variety is defined by lateral edges that constrict towards the proximal end. Similar to the eared group, the base is not the minimum width proximal to the maximum width, but it occurs above the base. The fishtail group consists of three specimens that are separated from the eared group because the lateral edges severely recurve, creating a long 'waisted' appearance. Further distinctions between the fishtailed and the eared categories of projectile points are discussed below.

D) Parallel

The parallel group has lateral edges that are parallel to each other, demonstrating a box-like basal portion. Nineteen points make up this group. This attribute state is generally readily identifiable, but some of the smaller basal fragments potentially could be confused with fragmentary sections of the stemmed variety. Small basal fragments that do not demonstrate the characteristic shoulders associated with the stemmed variety are subsumed into the parallel sided category. For some specimens, the widest part of the point is at the base and the lateral edges constrict towards the tip.

E) Stemmed

The stemmed group demonstrates a slight shoulder where the blade meets the haft portion. This feature is in some cases subtle, and more obvious in others. Six points from the Mackenzie assemblage display a slight shoulder where the blade meets the haft. One specimen (WHS-P-06455) also demonstrates ear-like protrusions at the base of the stem. Stemmed specimens exhibiting basal ear-like protrusions are known to occur in some stemmed specimens elsewhere.

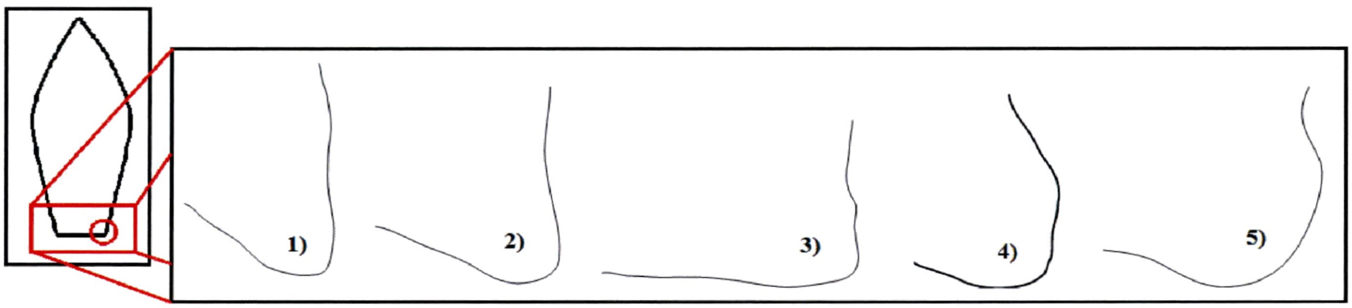

Figure 6.11: On the left is demonstrating what part of the projectile point is being evaluated. On the right is a series of 'eared' categories measuring the most pointy ears (#1) to the most rounded ears (#5). This diagram was used as a scale for determining the degree of "pointy-ness" of the projectile points in the eared category.

The eared category was difficult to address because of the wide variation observed in the points where the base was not the minimum width. The fishtailed group also falls under this category of eared points because as stated above, the base is not the minimum width. There are visual differences between the eared group and the fishtailed group, but quantitatively identifying the trait to effectively distinguish between them is difficult. Thus, a technique was developed to explain the 'degree of fishtail-ness' that was required to differentiate them from the 'eared' specimens. When examining the lateral basal protrusions, it was evident that the ears reflect a combination of attributes that contribute to trait expression. These traits vary continuously, and a series of template outlines were used to express degree of 'fishtail' (Figure 6.11: #1) versus the rounded/blunted ears (Figure 6.11: #5). The attributes that combine to create the effect are lateral edge constriction (waistedness), basal concavity and the degree to which the basal ears protrude.

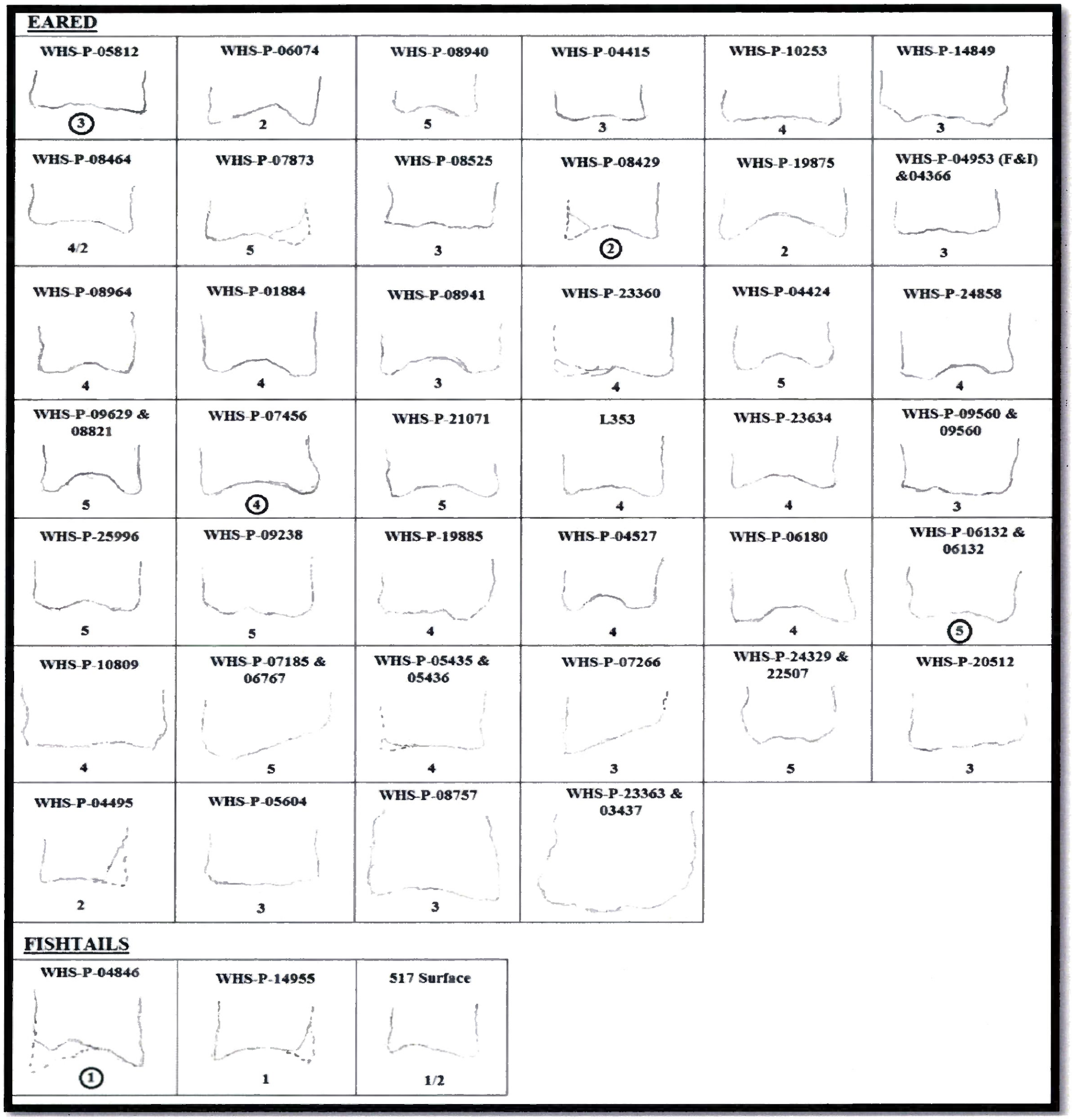

Figure 6.12: Sketches of the lateral basal protrusions of the Eared and Fishtail types. Each basal portion has been applied a number from 1 to 5, using the degrees of 'ear type' established in Figure 57. This number represents the 'pointy-ness' of the ears. The circled numbers are the specimens used as the 'ear type' illustrated in the Figure 57 scale. There is a noticeable difference between the numbers assigned to the Fishtails versus the Eared types, where the Fishtails represent 1-2, and the Ears represent 2-5. There is no #1's in within the Eared type (Note: these sketches only capture the lower basal portion of the projectile point. See Appendix 1 for pictures of both of the groups).

The lateral basal protrusions of five eared specimens that demonstrated the extremes of the combinations of attributes were traced. There are pointy ears, (Figure 6.11: #1) where the lateral constriction (or waistedness) occurs higher up on the specimen, just below the widest part of the point. At the other end of the spectrum are the 'eared' specimens (blunted or rounded) (Figure 6.11: #5) demonstrating a lateral constriction occurring closer to the base. Each projectile point in the eared and fishtail groups were subjected to this scale and assigned a number (1 through 5) representing the "pointy-ness" of the lateral basal protrusions (Figure 6.12).

6.4.2 Degree of Basal Concavity

The second attribute examined was the degree of basal concavity, with attribute states represented as follows: deep concavity, shallow concavity, straight and convex (Table 6.1). Each of the categories defined by basal lateral shape may contain specimens reflecting all four of

	Straight	Low	Deep	Convex	Total
Constricting	20	23	40	12	95
Eared	10	10	19	1	40
Fishtail	-	1	2	-	3
Parallel	9	5	3	2	19
Stemmed	3	2	1	-	6
Total	42	41	65	15	163

Table 6.1: This chart demonstrates the basal concavities for each of the groups defined by the respective characteristic lateral edge shape.

the basal definitions. Metric data collected from the concavities was used to establish the critical limits of each of the four basal concavity attribute states (i.e., deep, shallow, straight and convex). Basal indentations that measure 0 to 1 millimetre, demonstrating little to no basal concavity, are treated as a straight basal shape. A shallow concavity defines projectile points with basal indentations between 1.01 and 1.99 millimetres. A deep concavity represents basal indentation of 2 millimetres and greater. Points revealing a slightly convex or rounded base define the final category.

There is an obvious trend in the Mackenzie assemblage for deep basal concavities, representing 40% of the total assemblage. The straight basal concavity represents 26% of the assemblage, and the low concavity represents 25%. Notably, the convex category only represents 9% of the assemblage. The hafting technique required to haft a convex base is somewhat different than those associated with a basal indentation. This basal finishing technique is also apparent on Agate Basin projectile points where hafting is thought to have been achieved within a socket (Frison and Stanford, 1982) (see Chapter 7).

Figure 6.13: Examples of specimens from each group missing a lateral basal protrusion. The image demonstrates the reconstructed lateral protrusions, as indicated by the black dashed line. Top left to right: WHS-P-04402 (constricting), WHS-P-04495 (eared), WHS-P-12743 (parallel sided). Bottom: WHS-P-04846 (fishtail).

The majority of the projectile points included in the five types defined by lateral edge shape demonstrated low and deep basal concavities versus straight or convex basal configurations. There is an obvious trend for some degree of basal concavity on the projectile points. For the incomplete bases (e.g., one ear or lower lateral edge was broken), measurements of the basal concavities were estimated after first attempting to reconstruct the broken form on the basis of extrapolation from the existing portion (Figure 6.13).

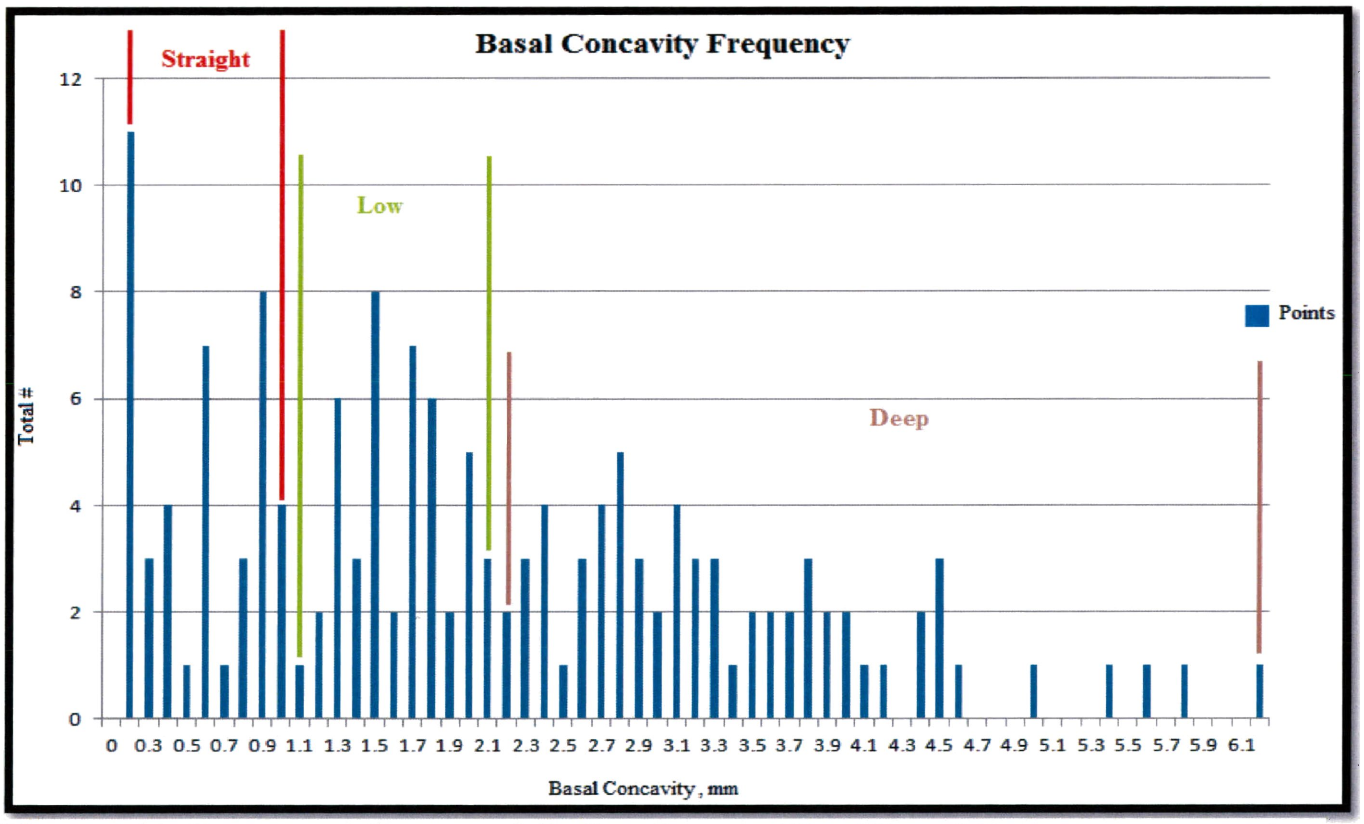

Figure 6.14: Frequency diagram of the basal concavities. The arbitrary measurements for each degree of basal concavity were added to demonstrate the consistency between the arbitrarily chosen values and the actual frequency.

The ordinal values that represent the degree of basal concavity (straight, low, deep) were chosen arbitrarily by the author at the beginning of data collection (see Chapter 5: Methods), and then evaluated with the metric data to validate the attribute states chosen. This validation process is represented in a frequency graph (Figure 6.14). The depth of basal concavity demonstrate that there is considerable variability in the expression of the straight group, a relatively normal modal distribution with those described as exhibiting low concavity, and a wide range of variation in specimens exhibiting a deep basal concavity (Figure 6.14). There is, however, some weakly expressed sense of ‘natural breaks’ at the boundaries of the three categories, revealing the validity of those arbitrarily chosen boundaries.

6.4.3 Flaking Pattern

The flaking pattern observed in the Mackenzie assemblage reflects a strong trend towards the parallel oblique pattern, with other flaking patterns being rare in the assemblage. Parallel oblique is highly represented and different variations of the parallel oblique pattern are seen consistently on the complete, base, midsection and tip specimens.

The flaking pattern was not treated as a primary attribute because it does not directly contribute to projectile point morphology. However, since it is widely expressed within the assemblage, it clearly was an important consideration for the original artisans.

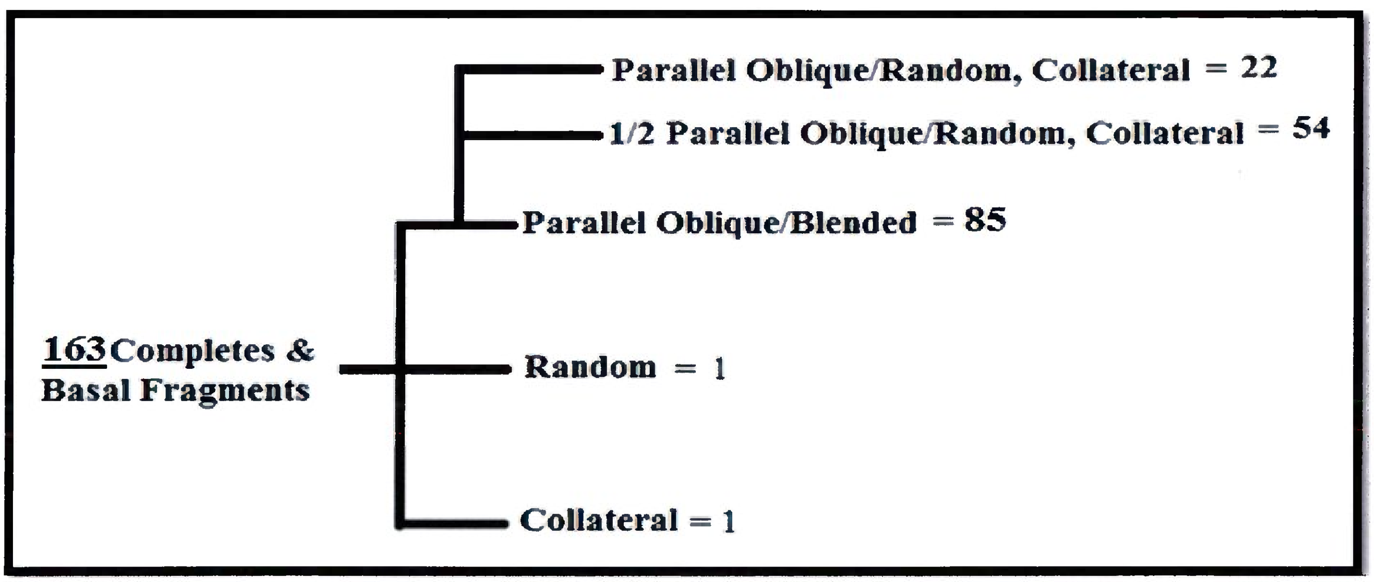

Figure 6.15: Dendrogram illustrating the categories of flaking pattern demonstrated in the Mackenzie assemblage and the total number of projectile points exhibiting the respective flaking patterns. Though very similar, this dendrogram does not reflect the primary morphological types but is the same dendrogram metaphor applied to the attribute states of the flaking pattern.

Nearly all of the projectile points from the Mackenzie Site demonstrate the blended parallel oblique flaking pattern. For visual purposes, a dendrogram was created to demonstrate the narrow range of variation of the flaking pattern present in the assemblage, where representations of random, collateral, and parallel oblique flaking patterns are evident (Figure 6.15). The parallel oblique pattern is executed with various success rates (as discussed in the Methods chapter), and while perfectly blended parallel oblique is found on the majority of the projectile points (85 of the total 163), there are many that exhibit variations of the parallel oblique pattern (Figure 6.15 and Table 6.2). As the success rate of the perfectly blended parallel

		PO	PO/R/PO	PO/C/PO	PO/R	PO/C	R	C	Total
Constricting	Deep	20	11	3	6	–	–	–	40
	Low	11	3	3	4	2	–	–	24
	Straight	9	3	7	–	1	–	–	20
	Convex	3	2	4	1	2	–	–	12
Eared	Deep	12	6	–	–	–	1	–	19
	Low	4	4	2	–	–	–	–	10
	Straight	8	–	–	2	–	–	–	10
	Convex	1	–	–	–	–	–	–	1
Fishtail	Deep	2	–	–	–	–	–	–	2
	Low	1	–	–	–	–	–	–	1
Parallel	Deep	2	–	1	–	–	–	–	3
	Low	4	1	–	–	–	–	–	4
	Straight	5	1	1	1	1	–	–	9
	Convex	2	–	–	–	–	–	–	2
Stem	Deep	–	–	1	–	–	–	–	1
	Low	–	–	–	2	–	–	–	2
	Straight	1	–	1	–	–	–	1	3
Total		85	31	23	16	6	1	1	163

Table 6.2: **Chart illustrating the breakdown of the flaking pattern in regards to the groups created from the two primary attributes (lateral edge shape and basal concavity). PO=parallel oblique; PO/R/PO and PO/C/PO=one face parallel oblique, the other parallel oblique with random or collateral; PO/R and PO/C=mix of parallel oblique and random or collateral on both faces.**

oblique technique decreases, there is an observable increase in the appearance of hinge fractures in the flake scar path.

The subcategory of the parallel oblique pattern that exhibits blended parallel oblique on one face and a mix of parallel oblique and either random or collateral flaking includes fifty four specimens. Out of this total demonstrating the parallel oblique pattern, thirty one are characterized as exhibiting some random scars, while the remaining twenty three exhibit scars that resemble a more collateral pattern (Table 6.2).

The second subcategory of the parallel oblique pattern exhibits a mix of both parallel oblique and either random or collateral flakes on both faces. There are twenty two projectile points and base fragments that demonstrate this variety. Sixteen specimens are a mix of parallel oblique and random flaking, and six exhibit a mix of parallel oblique and collateral flaking.

Figure 6.16: Pictures of the only two randomly flaked specimens (left: WHS-P-10256, in the *Unknown* type; right: WHS-P-19875), both basal fragments. They are made from possibly a mudstone or siltstone; a raw material more easily weathered then taconite. Taphonomic processes have nearly obliterated the flaking pattern. Both also exhibit rounded edges, indicating some sort of weathering or erosion of the entire specimen.

Finally, there is one specimen that exhibits a random flake pattern that has a lateral edge shape conforming to the eared definition (Figure 6.16). The flaking pattern on this specimen is not entirely clear as the surface is eroded, subsequently obliterating the flaking pattern. This could be due to natural exfoliation of the raw material, or possibly water tumbling. The other randomly flaked specimen is included within the Unknown group, which is discussed in more detail below. There is one entirely collaterally flaked specimen in the assemblage which has a stemmed lateral edge shape (WHS-P-06455) (Figure 6.17). It has a clearly defined medial ridge where flake scars terminate at the centre of the blade face, and there is no blending of flake scars.

Figure 6.17: Picture of the only collaterally flaked specimen in the entire assemblage (WHS-P-06455), made from Hixton Silicified Sandstone.

6.4.4 Cross Section

Three categories of tool cross section are evident in the assemblage: lenticular, diamond and a lens-shaped ('D' shape). The lenticular category forms the major one, but is quite variable because the combined effort of method of manufacture and the flaking style that contribute to varying degrees of twisting among the specimens.

The diamond cross-section occurs in cases where collateral flaking is utilized, creating a medial ridge where the flake scars terminate. There is one projectile point in the assemblage exhibiting a diamond cross section, WHS-P-06455 (Figure 6.17). This is also the specimen in the stemmed group of the lateral edge shapes that has small, protruding ears at the base. This specimen is a significant outlier typologically from the balance of the collection (see Discussion).

The lens-shaped, or 'D' cross section refers to specimens whose cross section may be a product of knapping considerations deriving the challenges associated with the raw material used. Taconite is very brittle and because of its high iron content, it is not as malleable as some other materials. In this case, one face (ventral) of the specimen began flat, and remained that way with flakes being removed in the parallel oblique pattern. The opposite (dorsal) face is rounded ('low dome'), occasionally displaying a slight medial ridge obscured by the long parallel oblique flakes. This can also occur when certain types of flake blanks are chosen at the procurement stage of the manufacture process of projectile points that already display this cross section (see Discussion).

6.4.5 Grinding

The Mackenzie assemblage contains points exhibit varying degrees of lateral and basal grinding. Evaluation of the lateral and basal grinding was part of the metric analysis and that information was incorporated to illustrate the variation displayed in the assemblage.

The complete specimens, including the refits, represent 30% (sixteen of fifty three) of the total sample that show evidence of lateral grinding; three only have lateral grinding on one side. Of those sixteen, eleven have no basal grinding; the remaining five lack lateral grinding but basal grinding is present. There is one out of the total complete sample (fifty three) that has no basal grinding, but lateral grinding is present (WHS-P-09560). In summary, eleven (21%) complete specimens are lacking both lateral and basal grinding.

The base fragments also demonstrate variations on the degree of grinding. Thirty one of the 116 base fragments have no lateral grinding (27%). Of the thirty one with no lateral grinding, three demonstrate grinding only on one side, and six that have no lateral grinding have basal grinding present. Four of the total 116 bases have no basal grinding but lateral grinding is present. In summary, 22 of the 116 (19%) base fragments lack both lateral and basal grinding. This information will become important in the following chapter where the data is explored fully, which provides implications for the definition of the 'completeness' of the projectile points (see Discussion).

6.5 OVERALL TRENDS OF THE ATTRIBUTE ANALYSIS RESULTS

This analysis sought to characterize the patterned morphological variability within the Mackenzie assemblage, leading to the development of a taxonomy of the projectile points. This enabled classification into morphological variants that shared attributes. A surprisingly narrow range of two attributes and attribute states was sufficient to characterize the projectile points. The co-occurrences of trait expression in lateral edge shape and degree of basal concavity demonstrate the relatively narrow range represented in the Mackenzie assemblage (Figure 6.18).

For visual purposes, a cladistic dendrogram is used to demonstrate the morphological groups created (Figure 6.18). The remaining attributes and the associated states are not included here because they are widely expressed throughout the site assemblage, and do not directly contribute to the projectile point shape. Of particular note is that the parallel oblique pattern (in various degrees of expression) occurs on 99% of the assemblage. The cross section attribute is considered a reflection on the material chosen, and the process by which the artisan was reducing the larger pieces into formal tools. The last non-metric attribute consists of the presence or absence of lateral and/or basal grinding, and may reflect secondary use-wear, edge preparation during production or hafting considerations. These considerations are addressed more fully in the Discussion chapter.

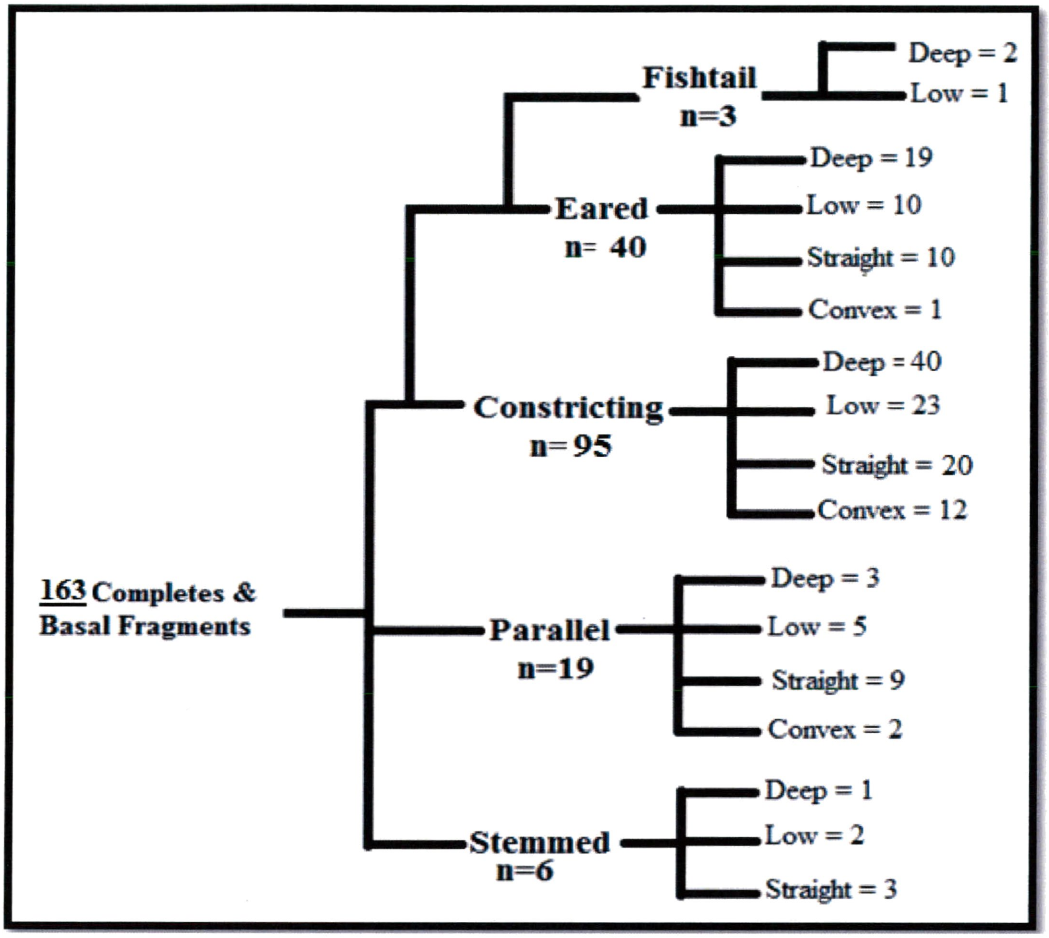

Figure 6.18: Dendrogram illustrating the combination of lateral edge shape and degree of basal concavity. These groups demonstrate the relatively narrow range of variability in the Mackenzie assemblage.

6.6 ADDITIONAL DATA FROM THE COMPLETE PROJECTILE POINTS AND BASAL FRAGMENTS

Observation of other traits on the complete projectile points reveals other trends and patterns (Figure 6.19). There are three complete projectile points that suggest the presence of ochre, also known as hematite (Fe_2O_3), on one or both specimen faces (WHS-P-20565, 07873, 09560). On three complete specimens (WHS-P-19887 & 19885, 04274 & 03997, 25996), a burin spall is present. These are commonly found on broken Paleoindian projectile points and there is a high number present in the Mackenzie assemblage. Several of the points exhibit burin spall-like removals originating at thick snaps and other breaks, due to either deliberate creation of graving edges (e.g., Epstein, 1963; Tomášková, 2005), or an accidental by-product of breakage in use (e.g., Dockall, 1997). These possibilities will be evaluated in a later section (see Discussion, Figure 7.19 and 7.20). There are six complete projectile points that exhibit potlids, as a result of some form of extensive or severe heat exposure or other taphonomic process such as cryoturbation (WHS-P-09569, 10195, 05435 & 05436, 06453 & 04449, 10256 & 08582, 13603).

Figure 6.19: **Image demonstrating the presence of ochre (left), burin spall (middle) and potlids (right). (From left to right: WHS-P-09560, WHS-P-19887 & 19885, WHS-P-13603).**

These traits (ochre, burin spalls and potlids) have also been observed on the 116 basal fragments (Figure 6.20). Four specimens display possible ochre (WHS-P-09376, 08757, 08464, 23793), and five broken basal fragments exhibit burin spalls (WHS-P-04415, 08464, 08429, 24264, 24005, 06566). There are a rather large number of basal fragments (n=15) that display one or more potlids, which may indicate exposure to severe temperature (WHS-P-08448, 05816, 01884, 01943, 04937, 05829, 08464, 07499, 08496, 06566, 06581 & 06498, 06767 & 07185, 15397, 23375, 23360).

Figure 6.20: Image with examples of basal fragments that exhibit possible ochre (left: WHS-P-09376), burin spall (middle: WHS-P-08429), and a potlid (right: WHS-P-05829).

6.7 ANALYSIS OF THE MIDSECTION FRAGMENTS

The analysis of the midsection fragments yielded some data that compliments the attribute analysis executed on the complete and basal fragments, particularly in the evaluation of the flaking pattern. The eighty midsection fragments exhibit variations of the parallel oblique flaking pattern, with the exception of one specimen that demonstrates random flaking. The frequency of expression of this trait in the mid-sections may be due to the fact that little retouch is generally done to the lateral edges. However, edge retouch would be more common on the tip fragments from re-sharpening. Basal portions may also demonstrate retouch during use to facilitate hafting in the event that a minor break occurred, however, because of the crucial function the base

Figure 6.21: A picture of the only randomly flaked midsection (WHS-P-11173). The small fragment appears to have retained one of the original flake scars from initial reduction of the raw material.

performs, adding stylistic attributes may have been considered secondary to the functional purpose of the base. The single midsection specimen that is an exception to the dominating parallel oblique pattern demonstrates random flaking that appears to have retained one of the original flake scars from the initial procurement of the material (Figure 6.21).

The midsection fragments were also evaluated based on the lateral edge shape yielding four groups described as constricting, parallel sided, middle and lateral edge (Figure 6.22). There are twenty five midsections that demonstrate a constriction of the lateral edges, either towards the base or tip. Forty three specimens demonstrate lateral edges that are parallel sided. The fragments do not demonstrate any lateral constriction to aid in determining the orientation on a complete specimen, but the parallel lateral edges indicate they do represent the middle of a projectile point. There are three midsection fragments that constrict at both ends but lack the basal configuration and the tip portion, indicating that the majority of the length of the projectile point is present. Finally, there are nine specimens in the assemblage that represent lateral edge fragments.

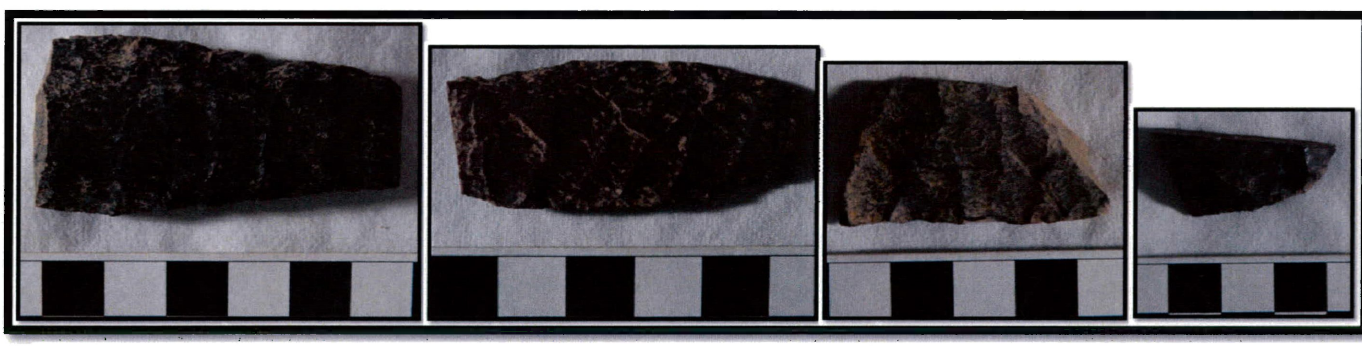

Figure 6.22: Examples of the midsections representing the four groups based on the lateral edge configuration. From left to right, constricting edges (WHS-P-19788), middle (WHS-P-05419), parallel sided (WHS-P-13773), and lateral edge fragment (WHS-P-05485).

The majority of the midsection fragments are made of taconite, consisting of 90% of the total midsection assemblage (72 of 80). There are six midsection fragments made from siltstone, two of which can be identified as Knife Lake Siltstone (sometimes referred to as Lake of the Woods Chert; see Discussion). Finally, there are two lateral edge fragments that are made from milky quartz.

The lenticular cross section is most prominent among the midsection fragments, making up 84% of the assemblage (67 of 80). This variety is common because of the material used and the process of manufacture, specifically the flaking pattern employed. Ten midsection fragments exhibit a lens-shaped, or 'D' cross section and three cannot be evaluated because they represent fragments of lateral edges.

During data collection from the midsection fragments, nine refits were identified; eight refit to another midsection fragment and one involved two lateral edge fragments. The analysis of the midsection fragments yielded other significant data that has been observed on other specimens in the assemblage. There are ten midsection fragments that demonstrate potlids as a possible result of some form of severe temperature exposure (WHS-P-06618, 05625, 07278, 01987, 06667, 07257, 04915, 15432, 06567 & 06074, 01939 A, B & C) (Figure 6.23). Burin spalls are also commonly found on broken Paleoindian projectile points (as discussed above), and one midsection demonstrates evidence of a burin-like removal/spalling in this assemblage (WHS-P-04953H) (Figure 6.23). There is one specimen demonstrating edge reworking on one of the broken ends that resembles a scraper (WHS-P-05051). The broken edge is reworked to indicate a secondary use after breakage; however it is difficult to say if it was intended to be used specifically as a scraper. An important characteristic that may be present on the midsection fragments is the original tabular platform on the proximal or distal end, which may indicate the stage of the manufacturing process that is represented (WHS-P-06667, 10341, 18738; Figure 6.23) (see Chapter 7).

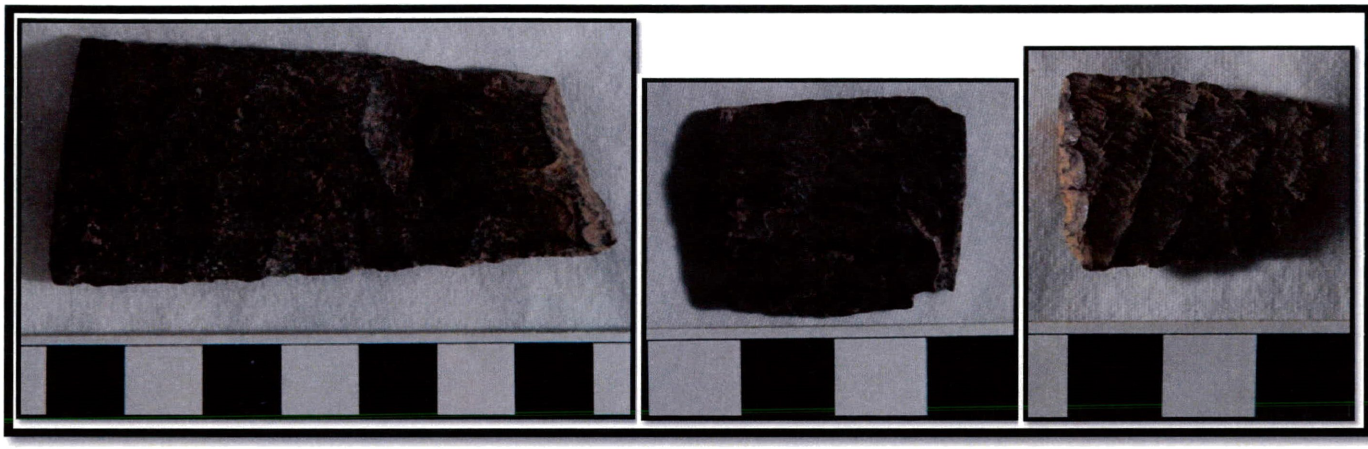

Figure 6.23: Examples of specimens of interest. From left to right: evidence of potlids and initial platform (WHS-P-06667), burin spall (WHS-P-04953H) and a midsection reworked, possibly into a scraper (WHS-P-05051).

There was evidence of lateral grinding in the assemblage of eighty midsections. Lateral grinding was present on eight of the specimens, which accounts for 11% of the midsections. Two of the eight demonstrating lateral edge grinding only have grinding on one edge. The evidence of lateral edge grinding on some of the midsection fragments indicates the specimens were broken near the base, where grinding is expected to occur. Four midsection fragments demonstrating grinding were discovered on midsections that constrict (WHS-P-07098, 05122, 19788, 01006), two specimens display grinding from the midsections with parallel lateral edges (WHS-P-04953, 20364), and one midsection was ground in both groups made of middle midsection fragments (WHS-P-05419) and lateral edges (WHS-P-08552 & 04391).

6.8 ANALYSIS OF THE TIP FRAGMENTS

The significant patterns discovered in the tip fragment data are consistent with the information collected for the complete and base fragments. Most significant is the flaking pattern present on the tip fragments. There is only one fragment demonstrating a random flaking pattern (WHS-P-14673), the remaining majority exhibit the parallel oblique pattern. The single tip specimen with random flaking is a fragmentary piece made from siltstone displaying heavy patination (Figure 6.24). The dominance of the parallel oblique pattern within the tip fragments has significant implications for the overall assemblage (see Discussion).

Figure 6.24: The only tip specimen (WHS-P-14673) demonstrating a random flaking pattern. It is made of siltstone with a heavy patina on both faces.

The tip specimens are predominantly taconite (100 of the total of 116) representing 86% of the tip assemblage. Other raw materials representing the remaining tip fragments consist of siltstone, Hixton and HBL chert (Figure 6.25). There are ten siltstone pieces, some identifiable Knife Lake Siltstone specimens, while others are identified as a generic siltstone based on the heavy patina on the surface. Of the remaining tip fragments, three are made of Hixton, and three are made of HBL chert.

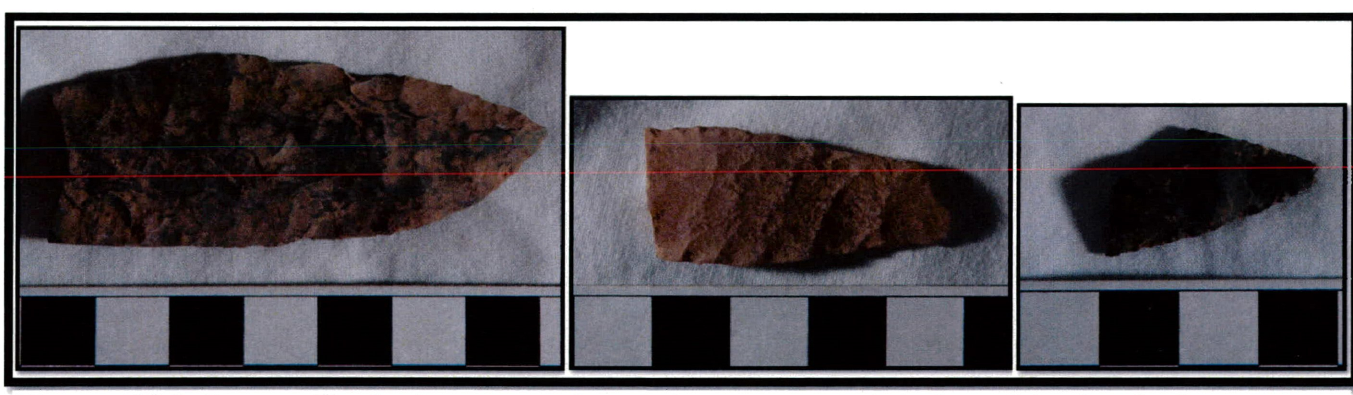

Figure 6.25: Image displaying examples of the raw materials found in the tip fragments. From left to right: Knife Lake Siltstone (WHS-P-23737), Hixton Silicified Sandstone (WHS-P-00773), and a chert sample, probably HBL (WHS-P-24326).

The lenticular cross section variety dominated the collection of tip fragments, representing the majority of specimens (105). The tip fragment that demonstrates the random flaking mentioned above (WHS-P-14673), has a lenticular cross section with a slight medial ridge, creating a slight diamond character. It is still, however within the range of variability for the lenticular category (see Chapter 5: Methods). There are eleven tip specimens representing 9% of the assemblage that demonstrate a 'D' cross section, where the ventral face is flat and the dorsal face is rounded (see Chapter 5: Methods).

A noteworthy observation made about the tip fragments is that eighty seven of the total tip fragments (116) are symmetrical in nature, whereby both sides are bisected on the lenticular axis and two symmetrical sides are produced (Figure 6.26). There are twenty eight demonstrating the opposite effect, and are asymmetrical along the lenticular axis. This asymmetrical nature of the tip fragment generally occurs in tip fragments where one side is relatively thick, possibly as a result of the specific manufacture process required to execute the parallel oblique flaking pattern (Figure 6.26). A single tip fragment could not be identified as either symmetrical or asymmetrical because of the fragmentation of one lateral edge (WHS-P-06074).

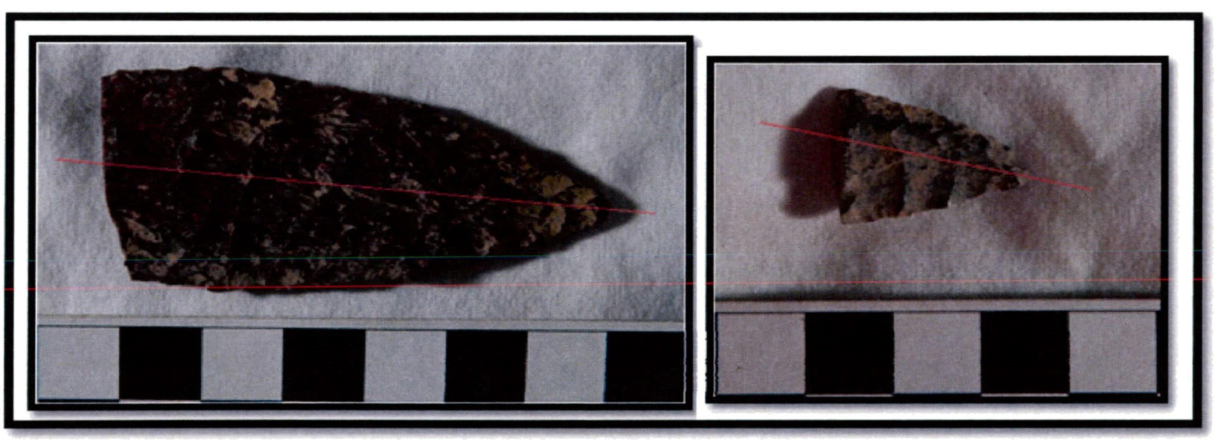

Figure 6.26: Projectile point tip fragments, on the left (WHS-P-03699) demonstrating the symmetrical nature of the lenticular axis. The specimen on the right demonstrates a tip fragment (WHS-P-20481) with an asymmetrical lenticular axis. The lenticular axis is represented by the red line.

The analysis of the assemblage of tip fragments lead to the discovery of ten tips that refit with midsection fragments. There are tips that represent interesting examples of specimens including two with possible evidence of red ochre (WHS-P-06652, 06189 & 16012), two exhibiting burin spalls (WHS-P-03642, 03699), and ten with potlids demonstrating evidence of exposure to temperature fluctuations (WHS-P-10059, 05585, 10256, 00812 & 00811, 04367 & 05844, 08728 & 08726 & 10056, 19526, 23591, 19013 (L3 & L4), L87) (Figure 6.27).

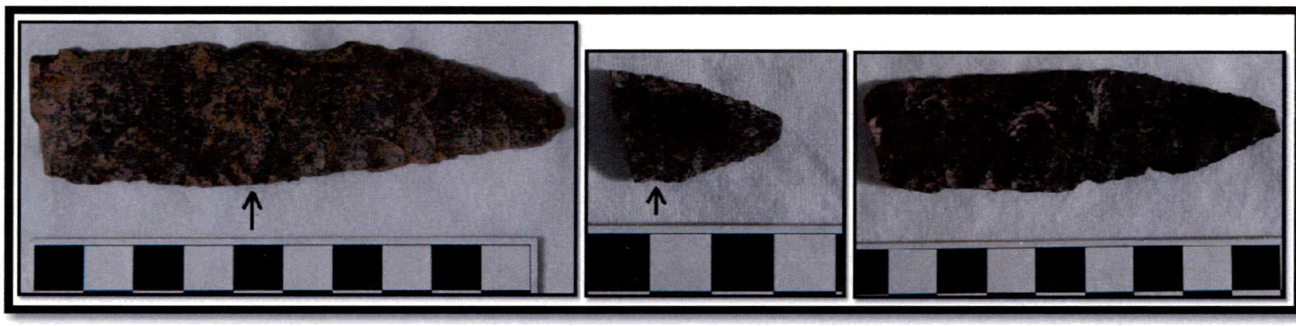

Figure 6.27: Projectile point tip fragments demonstrating the interesting examples of data collected. From left to right: a tip fragment with possible evidence of red ochre (WHS-P-06189 & 16012), a burin spall (WHS-P-03642), and potlids (WHS-P-00812 & 00811).

The presence of lateral edge grinding on the tip fragments is expectedly low. Of the total number of tip fragments (116), four demonstrate lateral grinding (one of the four specimens exhibits grinding on one side only) making up 3% of the tip sample. The tip specimens demonstrating lateral grinding are four longer fragments, which suggests that the tips broke off relatively close to the basal portion of the projectile point where grinding is expected to facilitate hafting.

6.9 UNIQUE EXAMPLES

There are specimens within the assemblage that are considered unique since they do not conform to any of the rules defining the primary typological groupings. They are considered un-analyzable because they cannot be confined to any of the definitions created for the shape of the lateral basal morphology and the basal concavity. The unique specimens include six questionable examples: five points that have been reworked into scrapers, five chisel shaped tools, and five pseudo-notched specimens.

6.9.1 Unknown/Un-analyzable

The six unknown specimens could not be placed into any of the types created using the lateral basal morphology and the basal concavity. Two of these specimens are small portions of basal ears that are too fragmentary to analyze. One is made of taconite (WHS-P-05401) demonstrating lateral and basal grinding, while the other (WHS-P-07246) is made of a grey variation of HBL chert demonstrating lateral edge grinding (Figure 6.28).

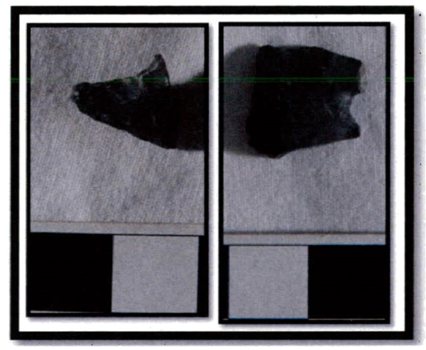

Figure 6.28: Two ear fragments, left WHS-P-05401, right WHS-P-07246.

Another unique specimen exhibits an unfinished basal portion that is wider at the base and constricts towards the tip (WHS-P-15397). The basal portion is also quite thick, demonstrating no basal or lateral grinding, and appears heavily retouched towards the midsection where it broke (Figure 6.29).

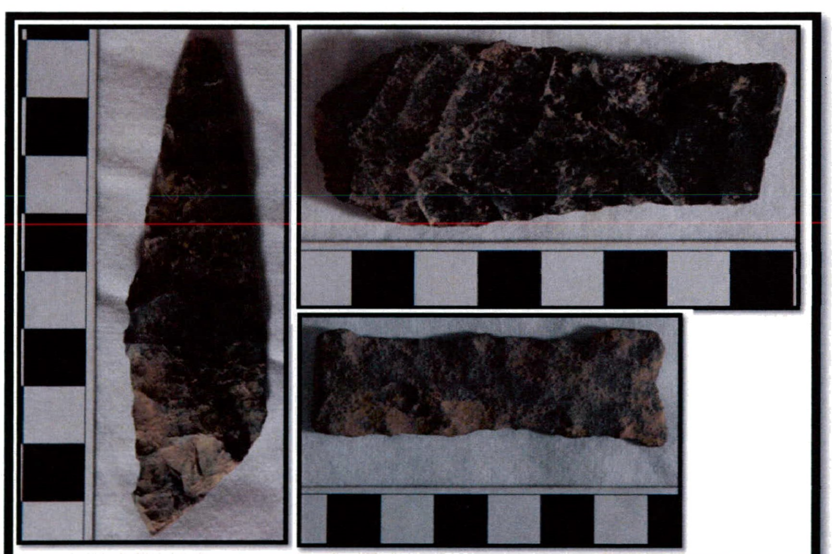

Figure 6.29: Pictures of unique specimens that do not fit into the groups created from the attribute analysis. From left to lower right: WHS-P-08800, WHS-P-15397 and WHS-P-10256.

The fourth specimen is made of taconite, exhibiting isolated lateral grinding on both sides, and an incomplete base (WHS-P-08800). There is evidence of slight thinning flake scars on the base, but it is far from complete, especially because of its thickness. The base is unique because it appears that it broke at a 45 degree angle; however that surface demonstrates a flat fault plane commonly found in the material. This piece exhibits extensive reworking using the parallel oblique blending technique, constricting drastically from base to tip (Figure 6.29).

An unidentifiable specimen made from a softer material than taconite, possibly mudstone or siltstone is the fifth unique point fragment; the piece demonstrates the effect of severe post-depositional taphonomic processes (WHS-P-10256). The surface of the fragment has been eroded away and/or it demonstrates fluvial reworking, resulting in the rounding of all the edges. There were no other lithic specimens demonstrating evidence of the same effect in the immediate vicinity of the location of this specimen. The specimen would conform to the lateral basal shape of the eared variety because of the extensive removal of the material from the edges (Figure 6.29). However, it is difficult to determine if the point base exhibits that characteristic because of the taphonomic processes after deposition or because it was fashioned to resemble the eared type, or possibly a combination of both hypotheses (see Discussion).

Without question, the most unique specimen in the entire assemblage is a large piece of West Patricia Recrystalized Chert which consists of three pieces that all refit (WHS-P-16400 & 10056) (Figure 6.30). This material is known to originate from Manitoba, but also resembles material from the Greenstone belt north of Dryden (Jill Taylor-Hollings, pers. comm., 2012; Gary Wowchuk, pers. comm., 2012; Bill Ross, pers. comm., 2011). The top blade portion is heavily reworked into a formal point blade, while the bottom third remained thicker and wider characteristic of a preform, yet they refit perfectly. The top blade portion was broken with a shovel during excavation. The bottom third does not appear to be finished, exhibiting no basal or lateral grinding. The flaking pattern is consistent with the rest of the assemblage; it demonstrates parallel oblique flaking with some subtle blending of the flake scars. In comparison, the flake scars on the bottom third of the specimen are slightly wider than the flake scars on the top blade portion.

Figure 6.30: Picture of WHS-P-16400 & 10056 possibly made from West Patricia Recrystalized Chert. This is a strange piece that refits; there is a significant difference in thickness and the reduction occurred from one lateral edge only.

6.9.2 Scrapers

The projectile point assemblage from the Mackenzie site also included five projectile points that were reworked into scrapers (WHS-P-03224, 07264, 20441, 04832, 05345). Four of the specimens are basal fragments of projectile points that demonstrate reworking on the distal end, and the remaining specimen is a tip fragment that has been reworked on the proximal end. Lateral and basal grinding is absent on two of the reworked points (WHS-P-05345 & 07264). A noteworthy characteristic present on one of the specimens is a base fragment exhibiting a break longitudinally following an internal fault in the material, creating a flat, right lateral edge (WHS-P-20441) (Figure 6.31). The presence of projectile points altered to create other expedient or formal tools is an indication of the wide range of activities occurring at the Mackenzie site (see Discussion).

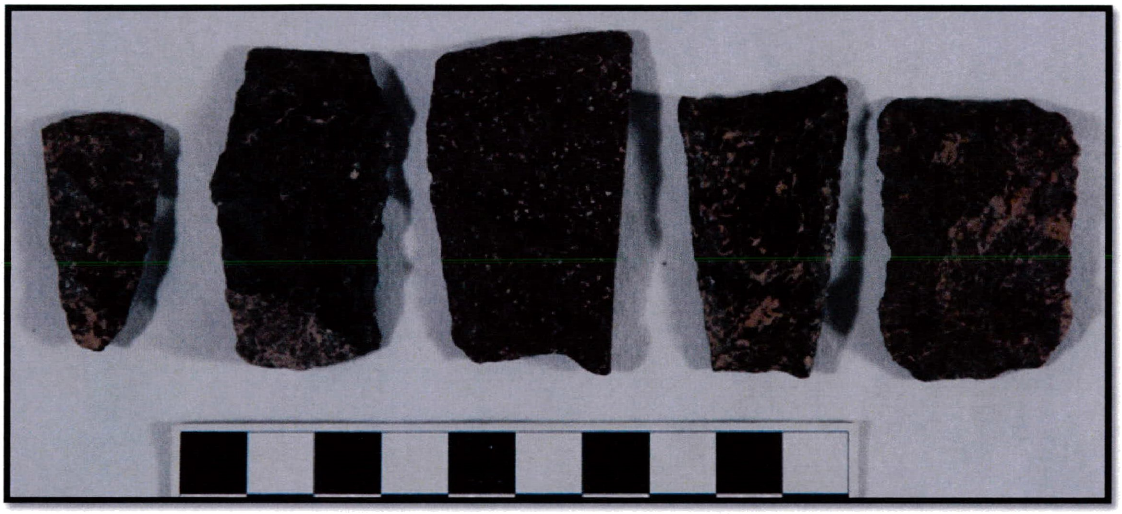

Figure 6.31: Picture of the five projectile points that have been reworked into scrapers. From left to right: WHS-P-03224, 07264, 20441, 04832, 05345.

6.9.3 Chisels

This group of unique tools consists of five projectile point specimens that exhibit a characteristic proximal end that resembles a chisel (Figure 6.32). The basal configuration demonstrates a distinguishing "scoop" edge similar to modern chisel tools. Three of these

Figure 6.32: Image of the chisel specimens. From top left to bottom right: WHS-P- L122, 25881, 13287, 20393, and 06667 & 06074. Three are made of taconite (two on the left and the top right specimen) and two from an unknown siltstone (two on the bottom right).

specimens are made of taconite (WHS-P-25881, 13287, L122) and two are made of a siltstone (WHS-P-20393, 06667 & 06074). All five specimens demonstrate a pronounced "D" shaped cross section and the flaking pattern consists of the parallel oblique blending technique, although it is not as prominent as observed in the rest of the assemblage. All of the chisel specimens are substantially wider and thicker in comparison to the other projectile points in the assemblage.

6.9.4 Notched

The notched specimens are lanceolate shaped points with two slight notches removed from the lateral edge or the bottom corner of the point (Figure 6.33). The base portion on all of them is relatively thick and does not have any evidence of thinning. They all display the parallel oblique flaking pattern with the blending technique, similar to the rest of the assemblage (see Discussion).

Figure 6.33: Image of the five 'notched' specimens. The notching may not be for hafting purposes. From left to right: WHS-P-13399 & 13398, 05061 & 08545, 18742, 22153, 23419.

6.10 SUMMARY

The attribute analysis conducted on the Mackenzie 1 projectile point assemblage yielded three categories and two subcategories of lateral edge shape; constricting, eared, fishtailed, parallel, and stemmed. Varying degrees of basal concavities, cross section and grinding were also recorded. The parallel oblique flaking pattern is present on 99% of the assemblage indicating its importance in projectile point manufacture at the Mackenzie site. This specific flaking pattern is present on all of the lateral edge types listed above. The two primary attributes, lateral edge shape and basal concavity, account for the variation observed in the projectile point assemblage. The co-occurrences of lateral edge shape and degree of basal concavity provide a series of groups that demonstrate the relatively narrow range represented in the Mackenzie assemblage.

A general summary of the metric analysis of the projectile points was included. It appears that the artisans were primarily constrained by the raw material chosen for the creation of the projectile points in regards to the distribution of the basic dimensions. The projectile points were discovered in the archaeological record as the last form in which the people occupying the site discarded them, whether that was the idealized projectile point or not is difficult to say.

The majority of projectile points are made from a local raw material from the Gunflint Formation, called taconite. Hixton Silicified Sandstone, Knife Lake Siltstone, Hudson's Bay Lowland chert and possibly other cherts, mudstone and rhyolite make up the rest of the assemblage. The projectile points also exhibit evidence of possible potlids, possible ochre, and burin spalls.

CHAPTER 7

INTERPRETATIONS OF THE MACKENZIE 1 PROJECITLE POINT ASSEMBLAGE

7. 1 DISCUSSION OF RESULTS: VARIABLITY OBSERVED IN THE MACKENZIE 1 ASSEMBLAGE

This chapter interprets of the results of the Mackenzie 1 projectile point analysis, and then places the analysis within a broader theoretical and cultural historical context. The analysis revealed a surprisingly narrow range of morphological variability in the Mackenzie projectile point assemblage. This consistency of form occurred in spite of considerable variability in the metric attributes measured. Variation in attribute states observed in lateral edge shape and the degree of basal concavity proved sufficient to address morphological variation within most of the collection. Discussion of the typological groups created in the Results chapter are discussed in more detail below (Figure 7.1).

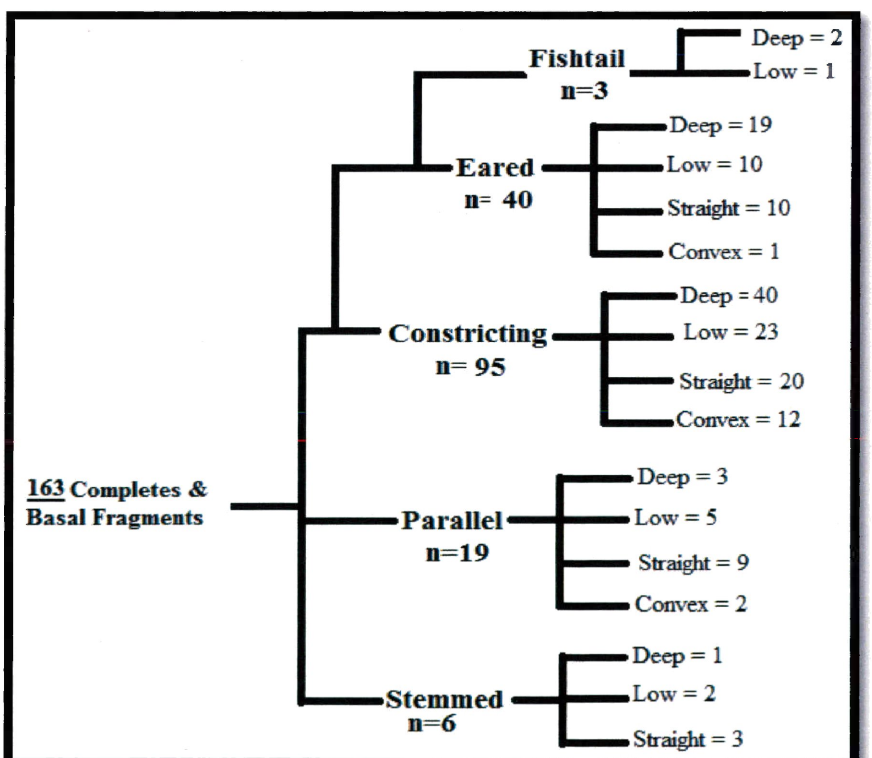

Figure 7.1: Results of the Mackenzie 1 analysis demonstrating the groups created based on the primary attributes; lateral edge shape and basal configuration (see Results).

7.1.1 Lateral Basal Shape (Hafting Portion)

Five major projectile point types (totalling 17 subtypes) were differentiated using basic morphological shapes, and are generally consistent with those used in classical typological analyses found in the literature (Figure 7.2). While these similarities guided interpretation of the general shapes observed, care was taken to not use the typological names deriving from the published literature since their established temporal and spatial meaning is not yet demonstrated in the region under study.

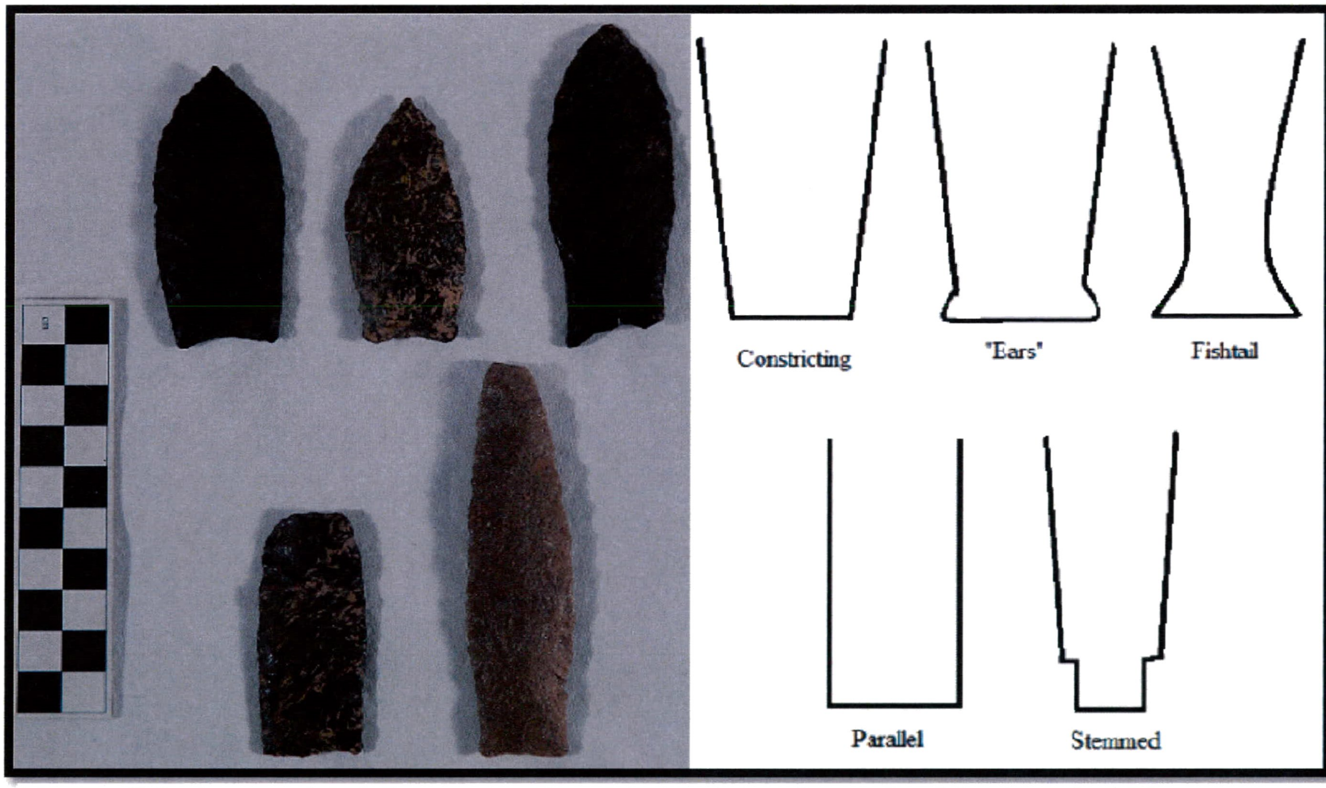

Figure 7.2: A sample of the projectile points (right) from the Mackenzie 1 site demonstrating the variation of lateral basal edge shape, with a schematic drawing (left) introduced in Chapter 6: Results.

The lateral edge configuration of the projectile points exhibits technological attributes consistent with finds from both eastern and western North America. The constricting and the stemmed varieties are more commonly associated with Paleoindian projectile point types found in the west. Constricting lateral edges are present on some varieties of Goshen, Plainview, Agate Basin, Hell Gap, Dalton and Jimmy Allen points (see Chapter 3). The stemmed lateral configuration is observed mainly in Scottsbluff and Eden across North America, extending as far northeast as Wisconsin where the "Eastern Scottsbluff variety" was identified, and called Minocqua (Salzer, 1974).

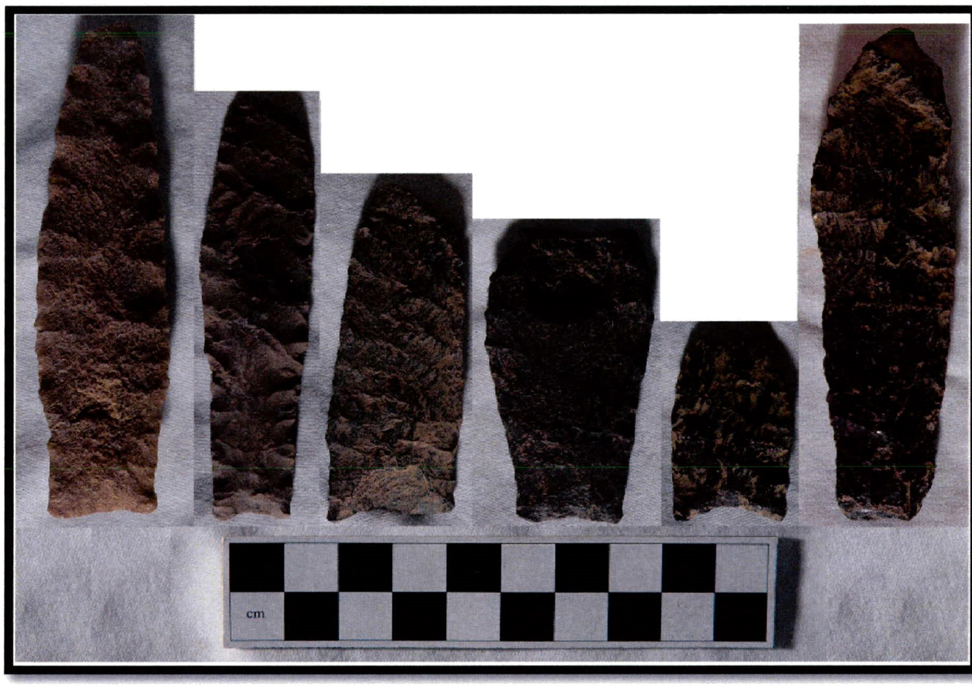

Figure 7.3: Image demonstrating examples of the different lateral edge shapes found in the Mackenzie assemblage. Left to right: WHS-P-06455 (DSCN1050), WHS-P-20565 (DSCN2185), WHS-P-05118 (DSCN1294), WHS-P-09569 (DSCN1144), WHS-P-08940 (DSCN1280), and WHS-P-00179 (DSCN2624).

Eastern influences observed in the lateral edge shape are also present within the assemblage. The eared subcategory of the constricting group demonstrates similarities to Dalton and Holcombe types (Figure 7.3). The fishtail subcategory of the constricting group is similar to eastern types such as Dalton, Simpson and Suwannee from the Southeast, Cumberland points from the midcontinent, and the Parkhill Complex Barnes points from the lower Great Lakes. The fishtail morphological shape has not been previously observed at any of the Paleoindian sites in northwestern Ontario; there were only three discovered at Mackenzie. There are two specimens present within the Reservoir Lakes Complex that conform to the fishtail morphological shape as the fishtail variety that was not previously mentioned in the literature, and is discussed in the following chapter (Interpretations).

The analysis demonstrates local expression of morphological characteristics common in both eastern and western North America. The challenge then becomes attempting to consider the Mackenzie 1 assemblage in the established typology of North American projectile point types. This problem is exacerbated by the lack of absolute dates in understudied regions.

Hafting

The hafting portion of a projectile point is the most important functionally and typologically. The primary difference between types of projectile points is the way their bases are configured to fit into a haft of a fore-shaft or spear. Different basal configurations reflect different hafting techniques, so that the changes in projectile point types may reflect changes in the functional efficiency of hafting a stone tip to a spear (see Chapter 1) (Dixon, 1999). A split shaft is used for many types like Clovis, Folsom and other lanceolate points; the projectile point is inserted into a slot that was carved in the shaft built to receive the basal portion (Dixon, 1999). The second configuration is a socket haft; this requires oval shaped holes or beds carved into the end of the shaft for projectile points that predominantly exhibit tapering lateral edges or stems. This technique eliminates the binding from the edge of the projectile point and places more surface area of the shaft in contact with the projectile point providing a greater surface area to absorb impact (see Chapter 1) (Dixon, 1999). Both of these hafting techniques could have been utilized at the same time, or the same tool could have been hafted in different ways.

The hafting technique employed on the constricting, parallel and stemmed categories is somewhat obvious; the eared and fishtailed categories are slightly different. The constricting and parallel sided categories were probably inserted into a split-shaft haft configuration, while the stemmed category was likely inserted into a socket haft (see Chapter 2; Gary Wowchuk, pers. comm., 2012). The eared and fishtailed categories demonstrate a presence of basal lateral protrusions which renders those projectile points unsuitable for a socket haft, so they were most likely hafted using a split-shaft configuration (Dixon, 1999; Frison, 1989; 1998; Kornfeld et al., 2010). It is likely that the basal lateral protrusion stuck out of the edge of the shaft to varying degrees, and could have potentially facilitated binding the projectile point to the fore-shaft or spear. These hafting techniques could have varied for a number of reasons (see Kornfeld et al., 2010).

7.1.2 Basal Concavity

The treatment of the basal portion of the projectile point reveals variation that might reflect both functional and stylistic considerations (Figure 7.4). There are various degrees of basal thinning, the most extreme is the flute observed on Clovis and Folsom projectile points. There is no evidence of fluting on the Mackenzie assemblage, though an argument could be made that the same general technique of removing basal thinning flakes could apply to the Mackenzie assemblage. There is evidence of large, single flakes being removed from the basal portion of some specimens (see Chapter 6). Such basal thinning is challenging given the brittle nature of the taconite raw material. Attempting to remove large flute-like thinning flakes would have most likely resulted in projectile point breakage.

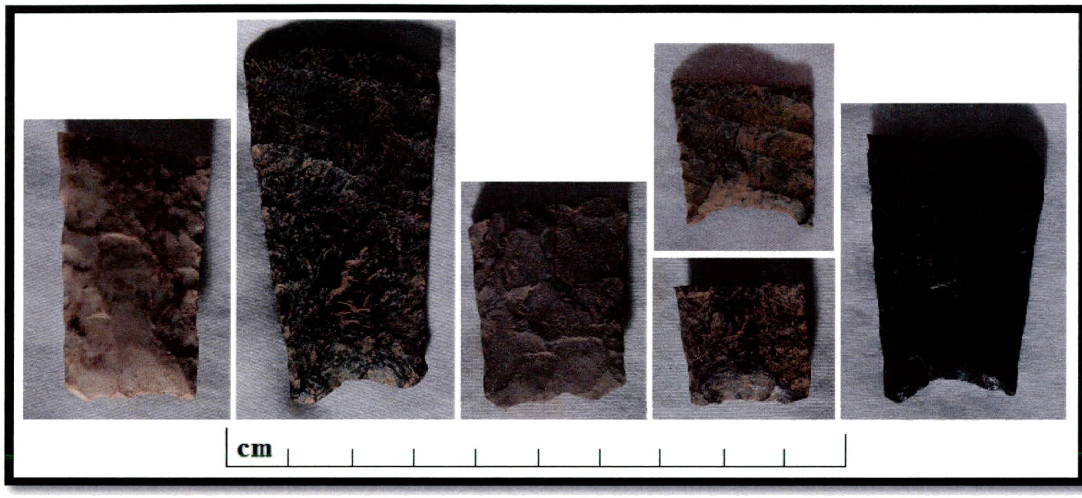

Figure 7.4: Examples of the varying degree of basal thinning executed at the Mackenzie 1 site. The first specimen on the left is made of siltstone (and has the longest basal thinning flake within the assemblage), the third from the left is Dog Lake Mudstone, and the rest are taconite. Variations include multiple, small basal flakes being removed, to larger, single flakes with minimal retouch. Left to right: WHS-P-04949, WHS-P-01884, WHS-P-09238, bottom WHS-P-09347, top WHS-P-24087, and WHS-P-04489.

The question then becomes, what degree of basal thinning constitutes a fluted specimen versus a basally thinned specimen? The thinning technique employed by Clovis and Folsom people consisted of the creation of a nipple within the basal concavity, where-upon the artisan would strike the nipple, directing the force of impact up the midline of the blade and subsequently removing one large flake (Figure 7.5) (Callahan, 1979; Flenniken, 1978). If this technique was utilized, there would be some evidence on broken specimens or performs (i.e., the residual evidence of a nipple in the basal concavity). There is no evidence that would indicate the technique was utilized at the Mackenzie site. The lack of evidence for the Clovis/Folsom technique for basal thinning suggests that the Mackenzie site occupants employed a different, more efficient method for basal thinning. Such innovation might be a function of the technological challenges associated with working with taconite.

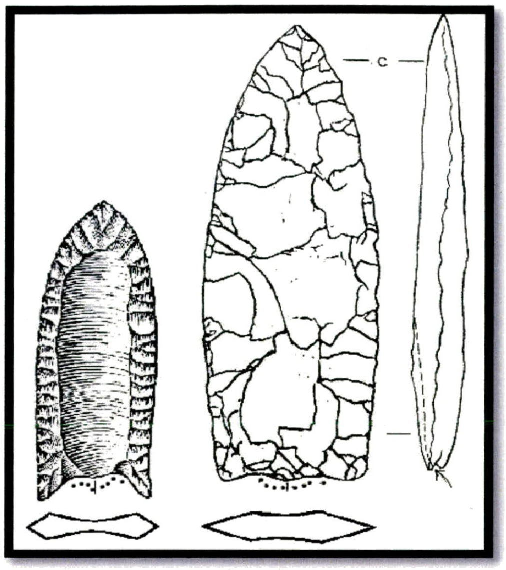

Figure 7.5: Examples of the residual 'nipple' created during the fluting process and platform preparation on the basal portion of the projectile points, demonstrated on Folsom (left) and Clovis (right) specimens. Modified from Bradford, 1976: p15 (left), and Callahan, 1979: Figure 67: p155 (right).

As stated in the Results chapter, a combination of traits is necessary to create the morphological shape of the eared and fishtailed categories. The degree of the basal concavity exhibited on specific specimens seems to condition whether the lateral ears appear blunted or pointed. It is unclear if the lateral ears were a desired trait or an accidental outcome, however the relatively high representation of the lateral protrusions (n=43, including both eared and fishtailed varieties) would suggest some stylistic or functional preference.

An obvious trend apparent in the constricting categories, including the two subcategories (eared and fishtailed), is a tendency for deep basal concavities. In contrast, the other two lateral edge shape categories (parallel and stemmed) exhibit preferences for a straight basal configuration (see Chapter 6, Table 6.1). This may indicate the technique in which each specific shape was hafted to a spear. The same trend is observed in the parallel category; parallel lateral edges generally exhibit straight basal configurations in the literature.

The presence or absence of a basal concavity is usually the result of the basal thinning process. A well thought out platform is required in order to initiate basal thinning flakes. When each side of the projectile point blade is struck, material is removed to create the basal scars.

Each artisan likely had a culturally learned 'mental template' regarding the required steps needed to reach the preferred end product (Andrefsky, 1998; Whittaker, 1994). Basal thinning of the projectile point is a crucial step in the sequence, which can result in differing degrees of basal concavities, depending on the techniques employed (Figure 7.6). The majority (n=106, or 65%) of the Mackenzie 1 assemblage exhibits some form of basal concavity, either low or deep. But there is a large representation of specimens that exhibit straight bases (n=42). This suggests the hafting techniques employed at the site varied, and the primary function of a basal concavity was to remove basal thinning flakes. The advantage to a concave base would be the ability to thin the specimen that would make the point more secure in the haft. Further experimental research would be beneficial to determine what haft configuration would be more advantageous for the types of material found at Mackenzie 1.

Figure 7.6: Examples of varying basal concavities: (from left to right) deep (>2.1mm), low (1-2mm), straight (0-0.09mm), and convex. This image also demonstrates the use of raw materials, (L to R) KLS, Hixton, HBL, and rhyolite.

The hafting required to secure the eared and fishtailed specimens to a spear shaft is interesting to consider; it is possible that hafting was the primary reason for the appearance of the eared protrusions during manufacture. The eared protrusions are a product of the combination of the two traits considered in great detail in this research, lateral edge shape and basal concavity. The eared specimens are well represented in the sample; it is the second highest lateral edge shape present. The ears likely protruded out of a split shaft, making their existence counterproductive. However, the ears could potentially act as pseudo-notches to aid in securing the sinew wrap. If this were the case, numerous examples of broken ear fragments in the assemblage would be expected; there are two present. It could also be possible that the broken ears were lost at the hunting site, where the point broke when it struck or missed the target. In the Mackenzie 1 assemblage there are a considerable number of broken eared specimens; five eared, two fishtailed, one parallel sided, and thirteen constricting specimens (see Chapter 6). The broken projectile points could have then been brought back to the Mackenzie campsite and rejuvenated, which may account for the presence of specimens that are not entirely symmetrical (i.e., one-eared specimens) (Figure 7.7). Downward protruding ears extending down the sides of the end of a split shaft to keep the point from twisting on impact and centered on the shaft end. The eared specimens could also represent a post-hafting function. This would suggest that the projectile points were altered or rejuvenated after the initial breakage from use (Towner and Warburton, 1990). As a result, this would inevitably change the shape of the point and the attributes visible, with the possibility of creating a new type altogether, overlapping with a previously defined type in the literature. An example of this is demonstrated in Flenniken and Raymond (1986). A third possibility to explain the presence of the eared protrusions could be that they acted as barbs or hooks once the projectile point penetrated the body of the prey animal.

The eared protrusion would then catch inside the prey and prevent the projectile point and spear from slipping out, causing more damage.

Figure 7.7: Examples of projectile points that have a broken lateral basal protrusion, or ear fragment. All are made from taconite, except for the Hixton point third from the left on the bottom, and the two siltstone points on the far left (bottom and middle). Top row, left to right: WHS-P-04495, 04402, L247, top 04527, bottom 25873. Bottom row, left to right: WHS-P-04846, 14955, 07873, 08429.

7.1.3 Flaking Pattern

The most intriguing attribute is the parallel oblique flaking pattern because of the very high representation of this trait; it is present (to varying degrees) on 99% of the entire Mackenzie 1 projectile point assemblage. The variation with which this specific attribute state is expressed is quite narrow and reflects the considerable skill of the artisan(s) who produced them. The flakes are consistently thin and parallel across the face of the projectile point, demonstrating little deviation from that pattern. The parallel oblique flaking pattern is exhibited on other point types and is referred to in the early archaeological literature as 'ripple flaking' in assemblages from

Brown's Valley, the Ray Long Site and the James Allen Site (Figure 7.8) (Jenks, 1937; Wormington, 1957). In the late 20[th] century literature this flaking pattern referred to as 'parallel oblique flaking', describing Goshen, Jimmy Allen/Frederick and Angostura types (Bradley and Frison, 1996; Hannus, 1986; Pitblado, 1997). The flaking pattern present on all of these types generally consists of highly controlled serial flaking (three or more parallel flake scars occurring together) (Bradley and Frison, 1996) that vary from collateral to transverse flake scars, and are executed with a pressure flaking technique (Bradley and Frison, 1996; Hannus, 1986; Irwin-Williams et al., 1973; Jenks, 1937; Pitblado, 1997; Wormington, 1957). As discussed in more detail in the next chapter, this trait appears over an expansive geographical area. It is evident that the parallel oblique flaking pattern is heavily favoured in the Mackenzie assemblage and is executed, to give the appearance that they are transverse scars.

Figure 7.8: Examples of the flaking pattern on (left to right) a Brown's Valley specimen, a point from the Jimmy Allen site, an Angostura point from the Ray Long site, and a point from the Mackenzie 1 site (WHS-P-04274 & 03997). Modified from (left to right) Jenks, 1937: Figure 2; Mulloy, 1959: Figure 1; and Wheeler, 1957 cited in Hannus, 1986: Figure 10.

At one end of the spectrum of the observable parallel oblique pattern is where two flake scars blend ½ to 2/3rd of the way across the face of the projectile point (see Chapter 6). This technique has also been referred to as feathering (Dan Wendt, pers. comm., 2011). This occurs when one flake scar is removed with an orientation that originates from the right lower side, and extends towards the upper left side, and terminates just over half way across the face of the projectile point in a step fracture. This termination often coincides with an internal flaw in the material, or where the force applied is dissipated. A second flake is then removed, originating from the upper left lateral edge and oriented so that it meets the original flake scar that originated from the bottom right. This then resembles a flake scar that is transverse in orientation, going from one edge of the projectile point to the other. The step fracture within the channel of the original flake scar ended is generally not removed with the second, blending flake, but is where the second flake also terminates. This was attempted with varying degrees of success on all of the projectile points recovered. The varying degrees of success in producing the parallel oblique flaking pattern accounts for the other categories of the specific pattern (i.e., PO/R, PO/C, PO/PO/R, and PO/PO/C) presented in the Chapter 6.

The blending technique could be a product of the thinning process during projectile point manufacture, which also contributes to the longitudinal twisting of the specimens. A possible functional explanation for this parallel oblique technique would not imply a difference in hunting success but rather a specific technique designed to attain a desired projectile point thickness. The blending scars could also be a technique utilized to minimize the appearance of the step fractures in the middle of the projectile point; a technique developed to remove part of the step fracture from the opposite angle. The parallel oblique flaking pattern was also observed on other artifacts from the site (e.g., bifaces and scrapers) indicating it is not only employed in the manufacture of projectile points (Figure 7.9). The stylistic explanation of the flaking pattern may indicate a choice to produce tools with this specific pattern either as an indication of the collective cultural norms in tool production, or as an individual maker's mark. The former seems more likely based on the total number of tools with the expression of parallel oblique at the site. The flaking pattern could also be a combination of both functional and stylistic representation.

Figure 7.9: Other tools from Mackenzie 1 demonstrating the parallel oblique flaking pattern. From left to right, a large biface (WHS-P-20344 & 20345), scraper (WHS-P-04138), drill fragment (WHS-P-13694), KLS scraper (WHS-P-01915), and a multi-tool (WHS-P-16047).

The numeric dominance of this specific flaking style strongly suggests that it reflects an 'ideal' or 'preferred' outcome. This preference indicates the presence of some form of 'rules' required for point creation. This may indicate a system of enforced social rules or common learning within a larger population. Research on this aspect of Paleoindian material culture is inherently difficult, and the conformation of such stylistic regulation will be elusive.

Experiments with taconite by two experienced flintknappers, Dan Wendt and Gary Wowchuk, have been unsuccessful in producing the consistent, blended parallel oblique (ripple appearance) pattern. Both pressure and percussion techniques have been attempted to remove the parallel flakes but they have been unable to replicate the Mackenzie pattern on various samples of taconite. It has been suggested that the parallel oblique pattern was achieved by two person indirect percussion (Bill Ross, pers. comm., 2011), direct percussion (Gary Wowchuk, pers. comm., 2012), and pressure flaking (Dan Wendt, pers. comm., 2011). It is most likely that indirect percussion is required to create the thin, narrow, serial parallel oblique flake scars that extend across the face of the projectile point.

The flaking pattern was obviously a desired 'end effect' because it is also observed on early stage bifaces and preforms. The flaking pattern is generally assumed to be a finishing technique on projectile points (Callahan, 1979), but at Mackenzie it appears very early in the manufacture process; parallel oblique flaking occurs as early as an example of a Stage 3 and 4 biface (Stage 3=L274) (Gjende Bennett, pers. comm., 2013; Hinshelwood and Weber, 1987). Reworking and rejuvenation of the projectile points by removing small retouch flakes from the lateral edges overlap the original flake scars. These smaller flake scars along the lateral edges can obscure the area where the parallel flake scars meet, making the blending difficult to distinguish.

The two other flaking styles present include random and collateral, but occur in surprisingly low frequencies in the collection. With the amount of retouch and retooling occurring at a camp site, random retouching would be expected at higher frequencies. This assemblage is uniquely dominated by parallel oblique flaking, and it appears the retouch and resharpening activities were conducted with this pattern in mind also. Collateral flaking is common in many assemblages in the south-western Plains, characteristically making up the Scottsbluff and Eden projectile point types. The nearest sites where collateral flaking is observed at high frequencies is Shawano County, Wisconsin (Ray Reser, pers. comm., 2012), the Renier site in Wisconsin (Mason and Irwin, 1960) and the Gorto site in Northern Michigan (Buckmaster and Paquette, 1988).

7.1.4 Cross Section Implications: Manufacture Process

The cross-section exhibited in the Mackenzie point assemblage is influenced in large part by the material utilized and the manufacturing process used to create the desired projectile point shape. The majority of projectile points exhibit a lenticular cross section that has a wide range of variation (see Chapter 6); other cross sections identified diamond and lens-shaped ('D') cross sections. The method of manufacture had a large influence on the lenticular category, demonstrating a wide range of variability (see Chapter 6). The initial stage of manufacture is marked by procurement of raw materials that can be obtained from flake blanks or tabular blocks of material. The projectile points from the Mackenzie 1 site appear to be made from both flake blanks and tabular blocks (Gjende Bennett, pers. comm., 2012). A flake blank is produced by striking a relatively small, thin flake from a larger tabular piece by means of percussion (see Chapter 4). This flake blank will exhibit a warp or twist deriving from the concoidal fracture of the original spall flake, and the importance of this reduction technique is evident in the fact that the majority of specimens exhibit some degree of warping/twisting (Figure 7.10). The twist derives from the nature of the concoidal breakage arising from the initial detachment using hard hammer percussion, and persists into the late stage of biface reduction and finishing. The lateral margin twists from base to tip, and the knapper is unlikely to be able to correct this twisting effect because the degree of bifacial flaking required to achieve symmetry in the blank. During the manufacturing process a considerable amount of material is discarded which causes an overall reduction in size (length, width, thickness). The lack of finishing techniques executed on the projectile points and later stage bifaces may be a result of the high risk of biface failure due to the hardness of the material (brittleness) and internal flaws (Gary Wowchuk, pers. comm., 2012).

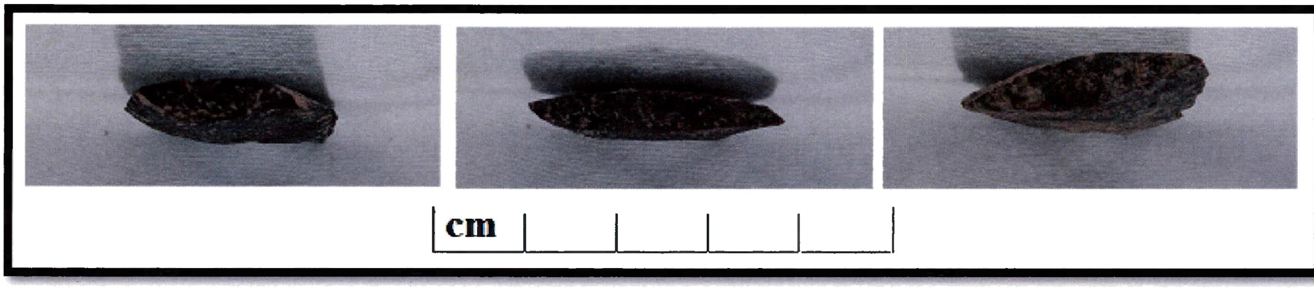

Figure 7.10: Photos demonstrating the range in cross sections within the Mackenzie 1 assemblage; also observe the degree of twist or warp evident on the specimens. From left to right: WHS-P-09376 (50 mm long), WHS-P-09376 (30 mm long), and WHS-P-CF (45 mm long).

The lens-shaped, or "D" shaped cross section is likely a remnant 'artifact' reflecting the nature of the flake blank. This shape would occur if a flintknapper began flaking one side where there is a natural platform/bevel or internal fault plane causing the flakes to hinge and break off the other lateral edge. This simultaneously creates a platform/bevel for flake removal for the opposite face, but also results in the loss of overall preform width. Generally, a wider blank will allow for a thinner end product (Figure 7.11) (Callahan, 1979). The ventral surface of the flake blank already appeared flat so the artisan could utilize that as a natural platform/bevel for flake removal. The opposite face is rounded with a slight ridge, producing flake scars that did not travel transversely over the blade. The result is a "D" shaped cross section because the rounded face is nearly impossible to remove/thin without breaking the specimen.

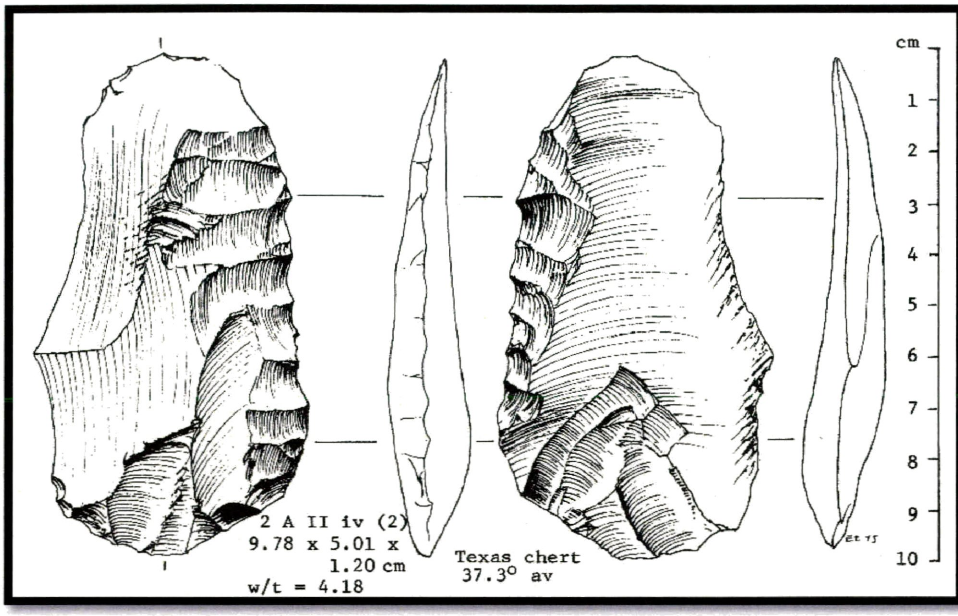

Figure 7.11: An illustration of a Stage 2 biface (in a Clovis reduction sequence) demonstrating the alternating edge thinning. The lateral profile view of the biface also exhibits the apparent warp trait characteristic of a flake blank. Modified from Callahan, 1979, Figure 22: 72.

The thickness of the projectile points also affects the appearance of the cross section and may contribute to the wide range in specimen thickness, especially during manufacture (Figure 7.12). The maximum thickness of the projectile points consistently occurs near the basal portion. This is suggested to be a product of the manufacture process because it is possible that the tip and the base were developed as a last step in point production (Gary Wowchuk, pers. comm., 2012), as there was an obvious focus on demonstrating the preferred flaking pattern that runs transversely across both the dorsal and ventral surfaces. In this scenario, the thicker end would have sufficed as the basal portion, regardless of the orientation of the transverse flake scars. This however, does not coincide with the general flaking pattern that demonstrates a consistent bottom right to top left flake scar orientation. The fact that the majority of the projectile points demonstrate the same flake scar orientation (transversely from bottom right to top left) could indicate a premeditated determination of which portion would become the tip versus the base according to the orientation of the flake pattern. This is significant because it emphasizes the apparent social valuation of consistency in the appearance of the projectile points that supercedes obvious morphological characteristics (isochrestic style as per Sackett, 1973; 1977; 1982; see Chapter 4). It is evident that extensive premeditation would have been required to execute this specific manufacture process consistently during the construction of each projectile point, producing points with a narrow range of variation in the design parameters and also the flaking pattern. This implies the strength of the 'cultural rules', preferences or behavioural norms regarding tool production evident within the group(s) of people occupying the Mackenzie 1 site.

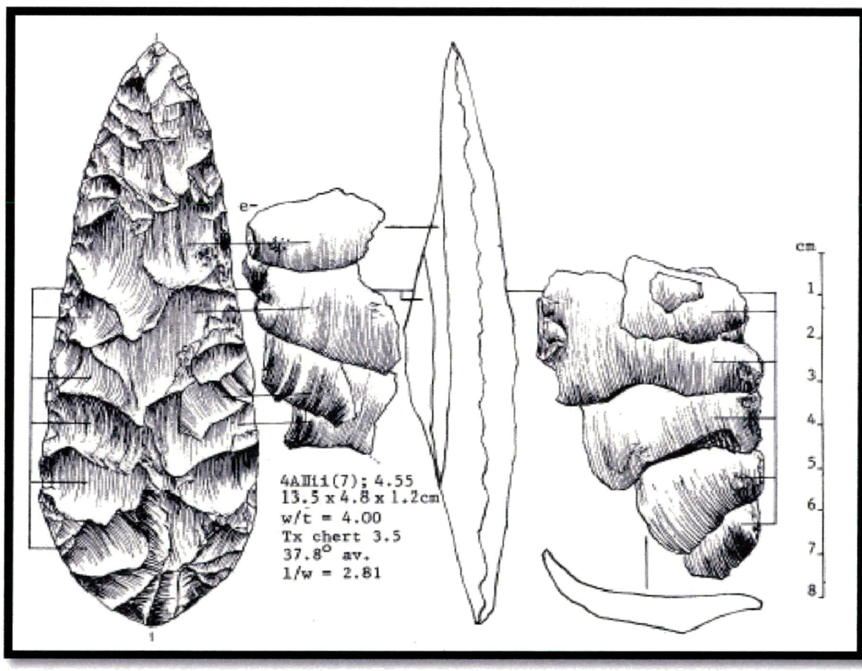

Figure 7.12: This image demonstrates the lateral thinning technique removing flakes to thin a biface (Stage 4 in the Clovis reduction sequence) while attempting to maintain the width. Also illustrated is the cross section orientation of the flake scars as they are removed (lower right). Note the wavy appearance of the longitudinal axis of the biface (middle) during this process. Modified from Callahan, 1979, Figure 54: 127.

The lateral edges of the projectile points demonstrate the complex flaking sequence used in the manufacture process. Some projectile points reveal the dorsal and ventral surfaces are mirror images of one another. On the ventral surface, one lateral side has been steeply flaked to produce a bevelled edge, while the other side exhibits an acute-angled and jagged edge. These bevelled edges are used as a secure striking platform for the removal of flakes (Figure 7.13). The dorsal surface reveals the reverse pattern, with a bevelled lateral edge being found on the side that had not been bevelled on the ventral surface, flipping the projectile point 180 degrees (side to side), the side with the jagged edge visible on the ventral surface now exhibits the bevelled striking platform on the dorsal surface. This flaking strategy creates the off center, lenticular cross section that dominates the assemblage. This also creates the appearance of a twist down the face of the blade that is apparent when the projectile point is orientated endwise to observe the cross section. This indicates the importance placed on thinning the specimen without losing width in the process of manufacture. The residual bevels on the projectile points are the result of the platform preparation for removing the parallel oblique scars (Figure 7.13).

These observations led to the interpretation that the people creating the projectile points did not correct for, or remove the bevel created for platform preparation. The unpredictability of the material dictated some of the morphological characteristics that appeared within the assemblage. As a result, once the tool manufacturer achieved the desired shape, width or thickness, it appears the process abruptly stopped. The final product could represent the desired outcome or possibly represents the most appropriate or efficient phase during the manufacture process where the nature of the material impedes further reduction or finishing attempts.

Figure 7.13: The photo on the left is the lateral view of a midsection fragment (WHS-P-10051) from the Mackenzie 1 site, demonstrating the 'wavy' appearance of the platform as a result of the removal of flakes. On the right is a schematic exaggeration to illustrate the effect this style of execution of flaking pattern has on the projectile points. DSCN4069.

The apparent 'twist' in the projectile point cross sections begs questions whether it might have had some effect upon the aerodynamic effectiveness of the projectile point. While no experimental work has been done by launching replicas of projectile points exhibiting this twist, it is assumed that if it impacted flight efficiency, the knapper(s) would have continued the flaking sequence to correct the asymmetry as a logical final step in the production process.

7.1.5 Grinding

The previous typologies in the literature treat grinding as a final stage that served as a prelude to hafting the tip on the spear shaft, and therefore reflected the relative completeness of a projectile point (see Chapter 5). In contrast, grinding observed during the Mackenzie 1 analysis was utilized to determine the stage of use-life the projectile point represented. Projectile point assemblages recovered from large habitation sites represent a variety of activities occurring during the manufacture, use and discard of the tools (Figure 7.14). Grinding the lateral edges was the last step before attaching the projectile point to a spear or fore-shaft, so the freshly manufactured points may not have been ground immediately for a variety of reasons (e.g., caching and surplus, those broken and discarded in production, or utilized as a different tool initially). It does not appear to be typologically significant, other than implying a specific process of manufacture characteristic to Paleoindian assemblages. The edge wear on the lower lateral edges (that is not hafting related) might also reflect use-wear from use as an expedient cutting tool until it is mounted on a spear to undertake its primary function.

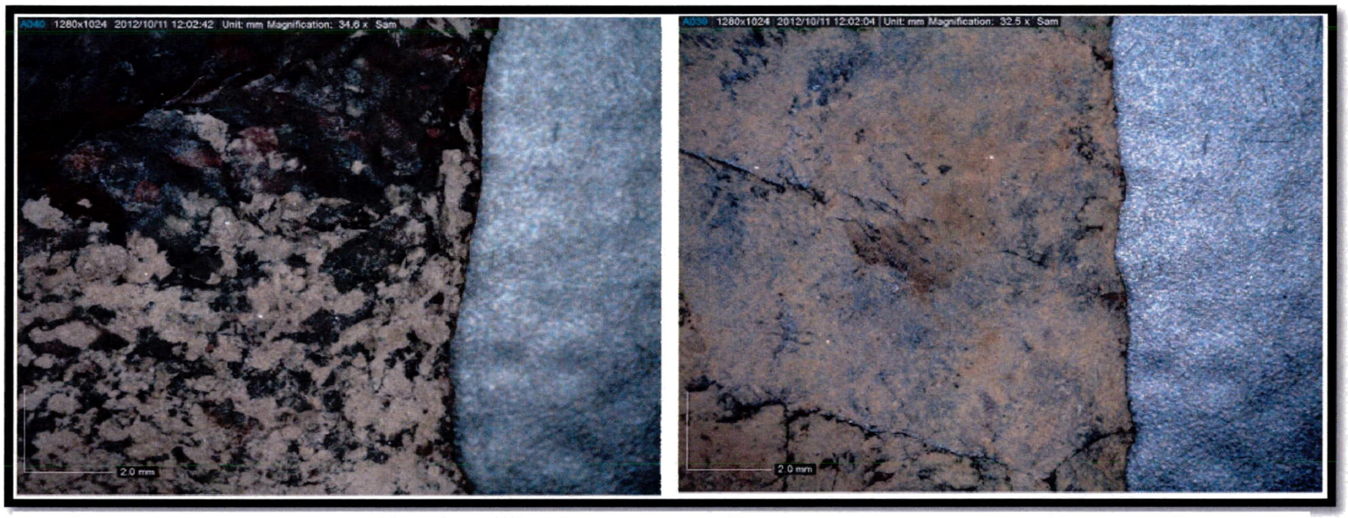

Figure 7.14: Images obtained utilizing a Dino-Cam to demonstrate the microscopic presence of lateral basal grinding (left; WHS-P-12096) and absence of lateral basal grinding (right; WHS-P-24087) on taconite basal fragments. The presence or absence of grinding was determined using macro-level analysis, however this exhibits the microscopic effects of grinding on taconite; the edges appear dull (left) versus sharp (right).

A small percentage of the complete projectile points and basal fragments in the Mackenzie 1 assemblage lack lateral grinding (28%) and basal grinding (10%). There is no grinding present on 11 out of 53 (21%) complete projectile points, and 22 of 116 (19%) basal fragments demonstrate no grinding. Interestingly, a higher relative frequency of the complete specimens lack lateral grinding (21%), which could suggest that the projectile points were used as expedient cutting tools before being hafted on spears. Significant to note is that of the 11 lacking grinding, six are refit specimens that could have broken during manufacture and discarded. The basal fragments lacking grinding suggest they represent specimens that broke during the manufacture process (that is before they were prepared for hafting) and were discarded. It is also possible that the absence of lateral grinding on some specimens may indicate a hafting choice that did not require grinding to prevent cutting of the binding (i.e., socket hafting). However, because the Mackenzie site likely represents a habitation or large-scale camp site, the projectile points are expected to reflect multiple activities conducted during occupation (e.g., creation of projectile points, the hafting and retooling of projectile points after breakage). The absence of basal grinding could indicate a specific hafting technique, in a scenario where the binding does not fasten around the basal portion of the projectile point (similar to the socket haft binding, but within a split shaft), so the dulling of the base is not required because it is positioned directly within the wooden spear.

7.2 DISCUSSION OF TRENDS OBSERVED IN ATTRIBUTE STATES

As outlined in the Results chapter, variation in lateral edge shape and basal concavity account for the majority of variation observed in the Mackenzie assemblage. These two traits define the morphological shape of the projectile points, which has implications regarding the cultural influence and behaviour of the individuals producing the projectile points. For this analysis those main attributes were specifically chosen because they reveal information about the manufacture process (i.e., influences and perceived cultural norms) and hafting techniques utilized at the site.

The narrow range of variation of morphological shapes of the projectile points discovered at the Mackenzie 1 site likely demonstrates a consistent expression of culturally influenced stylistic choices. There are five general morphological shapes with varying degrees of basal concavity that are reminiscent of several Plano configurations, but all exhibiting a parallel oblique flaking pattern. This indicates a specific preference for a premeditated stylistic trend that was executed on the majority of recovered specimens (see below).

The difficulty of modifying the wooden spear and/or fore-shaft effectively makes it more expedient or efficient to construct projectile points to fit the wooden shaft; it is more efficient to modify the stone tool rather than the wooden spear and/or fore-shaft (Gary Wowchuk, pers. comm., 2012). The hafting technique for the constricting and parallel shaped points may have required a split shaft, while the stemmed specimens may have required a socket haft.

While lateral edge shape and basal concavity are the two primary attributes utilized to demonstrate variability in the Mackenzie assemblage, other attributes are also important, and have regional typological implications. Flaking pattern, cross section and presence or absence of grinding does not necessarily provide further information about a descriptive taxonomy of the Mackenzie assemblage, but contributes to discovering the overall stylistic preferences and functional necessities in creating these projectile points. These latter attributes are not trivial. The significance lies in mechanical considerations for hafting (lateral edge grinding) and possible overarching social-symbolic meaning (flaking pattern) that the creators deliberately executed through learned behaviour. For those reasons, the secondary traits were included in this analysis, to demonstrate the stylistic and mechanical choices taken during the creation of the projectile points at Mackenzie 1.

The parallel oblique flaking pattern is a site-wide attribute state and is present on 99% of the projectile points discovered at the Mackenzie site (Figure 7.15). This indicates it had significant intra-site importance, which could suggest the occupants might have represented a discrete social unit. It is unclear what specific purpose the parallel oblique flaking pattern served, however it was obviously represented a significant preference for the occupants. It may have larger implications for regional and geographical comparisons to other Paleoindian assemblages, which are discussed in the following chapter.

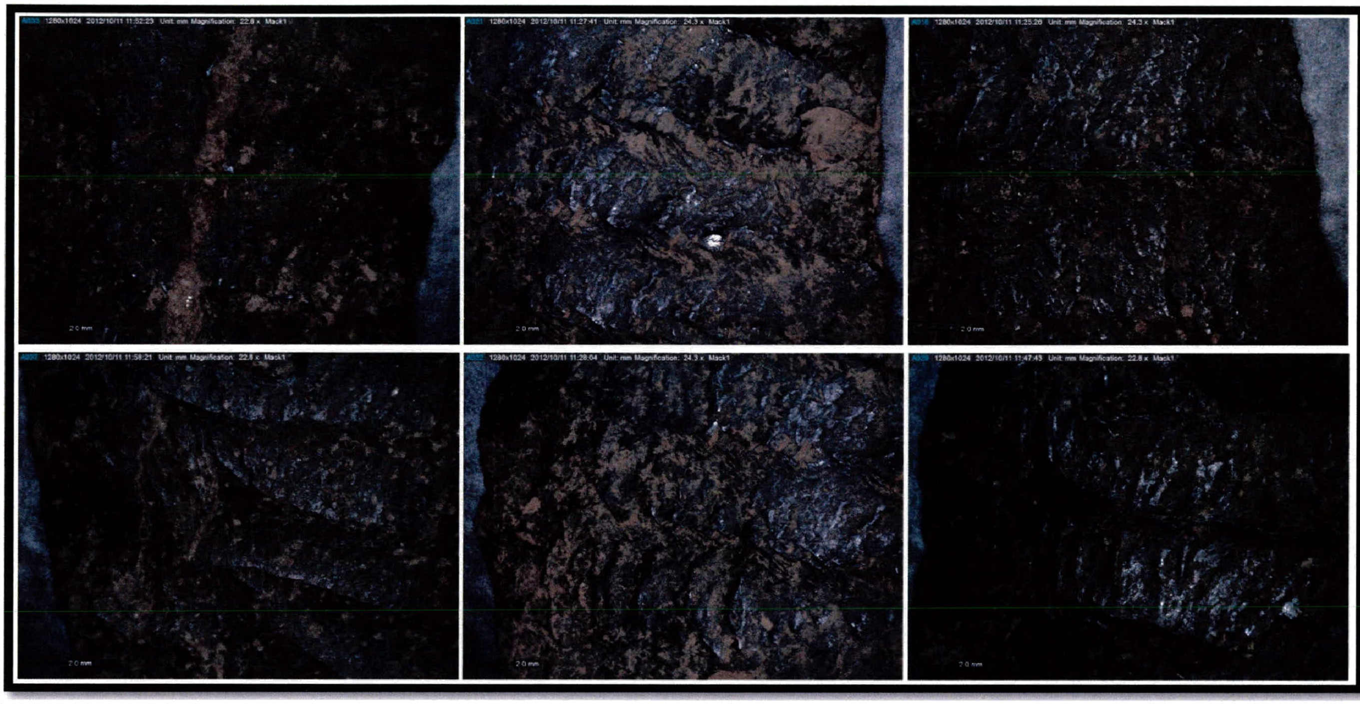

Figure 7.15: Images obtained from a Dino-Cam demonstrating the serial flaking pattern of the parallel oblique technique. The blending technique characteristically executed on the left side is demonstrated on the bottom row of examples. Top, left to right: WHS-P-04524 (note the flaking goes through the internal fault), WHS-P-04309 (midsection exhibiting serial flaking), WHS-P-19788 (midsection example). Bottom, left to right: WHS-P-01860 (picture #2; blending on left side, hinging of flake scars from the right), WHS-P-04309 (picture #2; midsection showing hinging on left side), WHS-P-04846 (fishtail specimen demonstrating the blending on the left side, & slight ridge where flake scars from the right terminate).

The flaking pattern likely represents a trait that may have social or symbolic meaning, rather than a mechanical trait (production and use). In considering not only the projectile points, but all of the formal and expedient tools from the Mackenzie site, casual observation indicates that the parallel oblique flaking pattern is present on a proportion of all of the other formal tool types (It was beyond the scope of this thesis to examine every tool; therefore, further research to determine the extent of the flaking pattern on other tool forms should be conducted). This suggests significance, not only in projectile point creation and style, but is built into the underlying traditions of the people occupying the site.

The variability represented in the cross section attribute states (as discussed above) exhibited on the projectile points derive from the manufacture process, specifically the reduction sequence during manufacture required to compensate for the challenging material. The cross section was not included as a primary attribute in the analysis because the majority of the variation in the Mackenzie assemblage is represented by the lenticular variety. A particularly noteworthy exception is the single projectile point that exhibits both a diamond cross section and a collateral flaking pattern (Figure 7.16: WHS-P-06455). This specimen is a stylistic outlier whose importance is further emphasized by the fact that it is made from Hixton Silicified Sandstone. While this specimen is stylistically different from the balance of the assemblage, it is important to note that other specimens produced from the non-local Hixton raw material display the characteristic parallel oblique flaking pattern. It implies that the one stylistic outlier might reflect the trade/exchange of finished products, or movement of individuals from one region to another (discussed in the following chapter).

The parallel oblique flaking pattern appears to be universal in this assemblage despite morphological variability, excluding the one specimen that demonstrates collateral flaking and the two randomly flaked specimens. The stylistic and technological similarities and the relatedness to other Paleoindian groups in the surrounding regions will be discussed in detail in the following chapter.

Figure 7.16: Photos of the stylistically different Hixton Silicified Sandstone projectile point. The collateral flaking, pronounced medial ridge, and diamond cross section are traits that do not commonly appear on the Mackenzie 1 projectile point assemblage. This specimen also exhibits lateral basal protrusions or ears on the stemmed haft portion. Left to right: dorsal view (DSCN1050), lateral view (DSCN4030), and ventral view (DSCN1053).

Presence or absence of grinding on the specimens is a result of the choice to haft the stone projectile point to a spear or fore-shaft. At a large scale habitation site, like Mackenzie 1, it would be typical to find projectile points in many stages of manufacture (biface stages) as well as finished projectile points that were curated and utilized for different purposes (e.g., the sharp edges would easily cut or pierce hide and/or meat). The recovery of projectile points representing various life-stages is consistent of expectations of a site of this magnitude. That is, hunters likely engaged in tool production (with associated production failures), caching against further need, expedient use of unhafted points, and finally, retooling and/or discard of broken stone tips on spears (Figure 7.17).

The complex trajectory of the manufacture, use, and discard of projectile points is illustrated in a figure by Kooyman (2000; Figure 7.17). During the manufacture of tools, shaped implements can be used expediently, while modified, rejuvenated and worn implements can all be used or reused as points also. The maintenance and modification of tools on a daily basis contribute to the process of rejuvenation, but this may also have secondary consequences in changing the overall shape or morphology of the projectile point. Once projectile points are discarded, or are no longer used as spear tips, if they are not broken they can be recycled and utilized again as expedient tools. There is an apparent preference for recycling formal tools for many different jobs as expedient tools at Mackenzie 1 rather than simply discarding them after breakage. The trajectory of projectile point use through many life-stages is evident in the discovery of projectile points employed as scrapers after breakage, even though copious amounts of raw material were readily available.

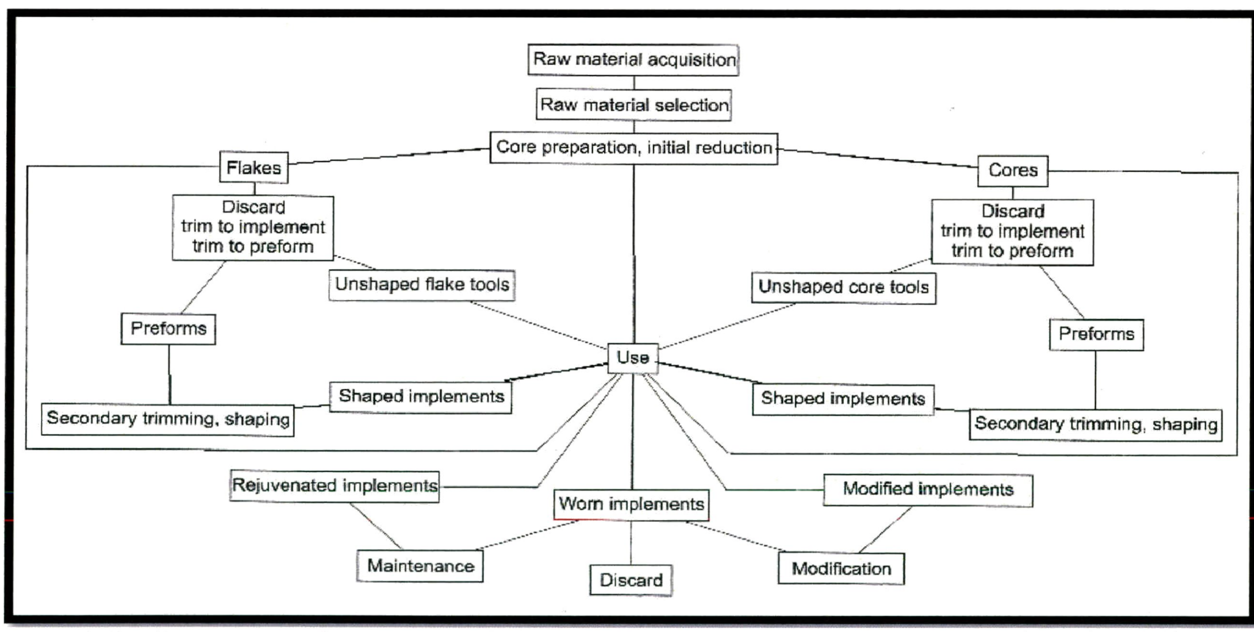

Figure 7.17: Diagram of an example of a reduction model, demonstrating the different stages of use-life a lithic tool may go through from the procurement of raw materials, use, reuse, and discard. Important for this analysis is the bottom portion of the diagram, where it is illustrated how implements can be used, modified, rejuvenated, maintained and modified all before being discarded. Image from Kooyman, 2000, Figure 28: 46 (modified by Kooyman from Collins, 1975).

7.2.1 Potlids

It has been suggested that Paleoindians were actively altering taconite by heating the material in an attempt to improve the quality, making it more amenable for tool production (Fox, 1975; Hinshelwood and Webber, 1987). As a result, experiments have been conducted to address the possibility of thermal alteration of taconite to improve its knappability. Dan Wendt heated taconite to between 450°F and 550°°F and saw no improvement in knappability; at 800F there was observable deterioration of the structural integrity of the piece (Dan Wendt, pers. comm., 2011). Tony Romano also participated in heating taconite to 500°F and also saw no benefit (Dan Wendt, pers. comm., 2011). Gary Wowchuk heated taconite specimens to 400°F and saw no improvement in the material, but did observe that thicker pieces "would spall and become almost dehydrated" because it could not withstand the shock of the heat treatment (Gary Wowchuk, pers. comm., 2012).

These experiments demonstrate that the heat treatment of taconite does not improve the quality of the material. Hinshelwood and Webber (1987: 45) suggest that the appearance of a shiny polish (vitrification) on a taconite specimen from the Biloski site is "indicative of intentional thermal alteration". However it has been observed by the author in the field (during excavation of Mackenzie 1 and personal observation at quarry sites, such as the Cummins and Irene sites) and in the lab that naturally occurring polish does occur on some taconite fragments. This strongly indicates that the polish is not indicative of intentional heat treatment. It is unlikely that vitrification was an indication of thermal alteration because it would be expected to appear on the entire surface of the taconite flake chosen as an example from Biloski, not only occurring in an isolated pocket (characteristic of the presence of the shiny polish on taconite). The experiments conducted by Wendt, Romero and Wowchuk all indicate that taconite becomes dull after heat treatment, further negating the hypothesis that the appearance of "polish" on taconite fragments is indicative of heat treatment (Note: it was difficult to capture this effect with a photo because of the reflection of the light).

The evidence of potlids present on the surface of some projectile points suggests some form of post-depositional modification (e.g., cryoturbation, forest fire). As mentioned above, heat treatment does not improve the quality of the material, so it is unlikely that thermal alteration was part of the manufacture process.

7.2.2 Ochre

With the large amount of underlying rock in the area that is made up primarily of iron, it would be expected that the soils contain a large amount of iron oxide compounds, also known as ochre. Besides appearing naturally, ochre was found in association with artifacts at the Mackenzie 1 site, both debitage and formal tools. Ochre associated with Paleoindian artifacts is unusual in this area and has not been discovered previously (Bill Ross, pers. comm., 2012). As a result of the lack of previous archaeological observation of ochre, it is likely that its presence on the Mackenzie 1 projectile points is a result of some natural, taphonomic process (e.g., the weathering of taconite) and does not represent intentional application to the projectile points.

7.2.3 Burin Spalls

The presence of burin-faceted projectile points in the Mackenzie assemblage is common, as in the case with many Paleoindian projectile point assemblages across North America (Bradley, 1982; Dockall, 1997; Epstein, 1963; Frison, 1974). Burins were first observed in some Lower and Middle Paleolithic assemblages at Old World sites where they functioned as gravers. However, controversy is noted in the literature about the analysts' ability to determine accidental versus intentional presence of such spalls on projectile points (Epstien, 1963; Gary Wowchuk, pers. comm., 2012). Projectile points are vulnerable to accidental burin blows as a result of impact, implying burin facets should not always be considered intentional. Accidental burin spalls occur when projectile points come into contact with hard surfaces, resulting in impact damage that resembles a burin spall on the distal or proximal end. Accidentally broken edges would exhibit a "slightly" rolled surface, with one edge demonstrating a sharp lip or depression as a result of the two pieces hinging apart (Epstein, 1963). Intentional burin blows are commonly found on the distal portion of the projectile point, with a negative bulb of percussion just below the transverse breakage. The striking point can be observed on the lip of the transverse breakage of the projectile point, demonstrating sharp edges and a slightly concave surface (Figure 7.18). If the burin spalls were intentional, this effect would be duplicated on multiple specimens in the assemblage (Epstein, 1963).

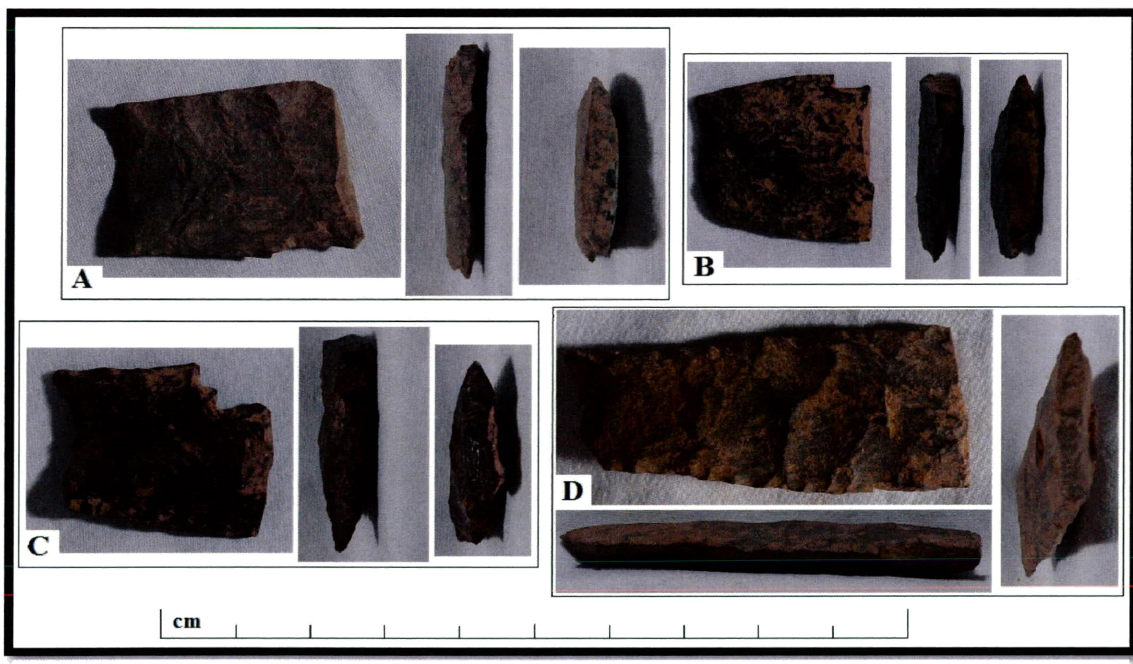

Figure 7.18: Four examples of projectile point base fragments exhibiting burin spalls. Each example has a lateral view and a cross section view from overhead. Three (A, C, D) of the four examples provided may have some retouch along the edge that could indicate they were utilized as burins after the projectile point broke. WHS-P-08464 (A), WHS-P-24005 (B), WHS-P-06566 (C), and WHS-P-08429 (D).

There are twelve burin spalls present in the Mackenzie assemblage; three complete specimens, six on basal fragments, one on a midsection fragment, and two on tip fragments. The burin facets of the five basal fragments are all located on the distal break. There is also a refitted complete specimen (WHS-P-08582 & 10256, Figure 7.19) that demonstrates a similar breakage pattern that could be considered a burin spall. Attached to the tip portion is the lateral fragment representing the 'missing' material that refits into the basal portion where the "burin spall" was located. If the tip was not present, a burin facet would have been identified on the basal portion. This provides evidence to demonstrate that the burin spalls on most of the projectile points are probably the result of impact damage, breakage during manufacture or retouch/rejuvenation activities. Secondary wear pattern analysis is needed to determine if these spall surfaces demonstrate any kind of wear patter, secondary retouch or polish to confirm deliberate secondary use as burins.

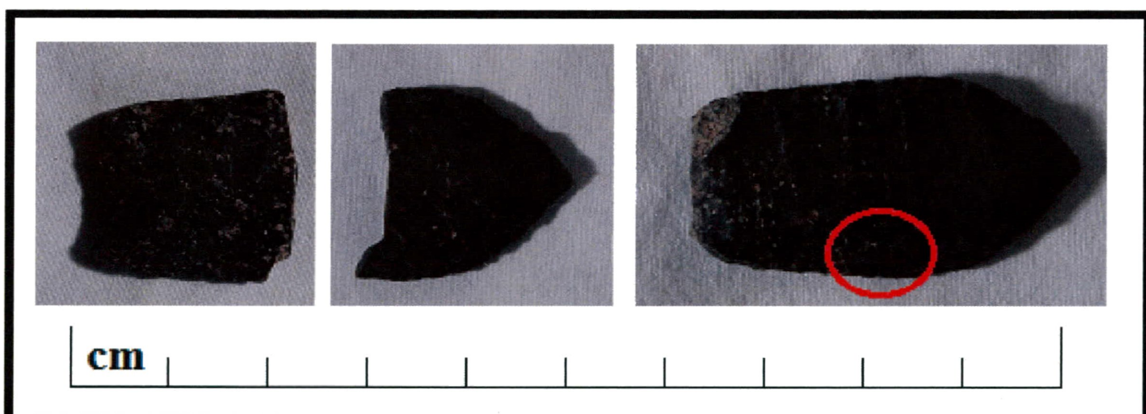

Figure 7.19: Burin spalls are most likely accidental at the Mackenzie 1 site, representing the brittleness of taconite. This refit specimen consists of a base (left: WHS-P-08582) and tip (middle: WHS-P-10256); considering the base alone, it would appear as though it exhibits a burin spall consistent with Epstein's (1963) characteristics. However, the two pieces refit flawlessly, with the tip revealing the breakage pattern that could be considered a burin spall (red circle on the right). It is likely taconite behaves differently when subjected to stress as a result of an impact. (Photos, left to right: DSCN1513, DSCN4105, DSCN4134).

7.2.4 Notched Specimens

The five specimens from Mackenzie 1 that appear to have side/corner notches would typically imply Archaic hafting technologies. The recovery of unequivocally notched specimens from Paleoindian sites in the Thunder Bay region has been reported by Hinshelwood (2004) and indicates Archaic reoccupation of some such sites. These observations are, however, characterized by very distinctively flaked side or corner notched points discovered on sites that also yield Paleoindian artifacts. However, the specimens recovered from the Mackenzie 1 site do not reflect the same degree of deliberate production of notching to facilitate hafting as described by Hinshelwood (2004). The specimens found at the Mackenzie site exhibit the parallel oblique flaking pattern common to the rest of the overtly Paleoindian assemblage. An alternative theory is that Archaic cultures migrating through the area at a later time discovered these projectile points on the surface and intentionally altered them to suit the Archaic hafting techniques (Bill Ross, pers. comm., 2011). One specimen does have evidence of grinding within the notches (Figure 7.20: WHS-P-13399 & 13398); however it is unusually thick along the base, suggesting that it was not finished and yet was prepared for hafting. The remaining four are thinner and narrower, but still do not demonstrate a characteristically thinned base that can be properly hafted, either on a spear or an arrow. The glacial lake strandlines that attracted the Paleoindian groups would have also appealed to Archaic groups serving as high and dry migration highways, likely interacting with old Paleoindian sites, reoccupying the area and/or finding tools scattered across the surface. However, an Archaic reoccupation is unlikely at the Mackenzie 1 site, because there is a lack of evidence to support this claim. If an Archaic reoccupation of Mackenzie 1 occurred, the recovery of diagnostic Archaic projectile points would be expected.

Figure 7.20: Image of a specimen (WHS-P-13399 & 13398) demonstrating ground notches, and a thick basal portion with no evidence of basal thinning, which would not have been conducive to hafting. Top, dorsal view (DSCN2908); bottom, ventral view (DSCN2905).

A more likely explanation for the appearance of the "notches" is that they reflect the reduction sequence during the manufacture process of the projectile points (Figure 7.21). The notches present on characteristically Paleoindian projectile points could represent an attempt to shape the proximal and distal ends; if the parallel oblique flaking pattern was carried out first, followed by the creation of the tip and base, these five pseudo-notched specimens could represent the stage in the manufacture process where the artisan would slowly chip away at the sides/corners to thin the basal portion, resulting in the appearance of the pseudo-notches (Gary Wowchuk, pers. comm., 2012). On four of the five specimens, the proximal end is too thick to facilitate hafting. By removing small flakes from alternating lateral edges, the artisan removed the unusable/undesirable end(s) of the fragment and narrowed the end for thinning. This theory assumes a great deal about the manufacture process, specifically that the tip and base are created after the flaking pattern has been applied. These specimens could represent the stage at which the manufacture process was abandoned; projectile points, or preforms abandoned within the middle of the process. However, if this were the case, more of these examples would be present at a site where the primary creation of projectile points is occurring. There are only four examples from the Mackenzie site and this technique is not demonstrated on later stage bifaces either.

It is plausible that this pseudo-notching technique could represent a way to begin the thinning process of the specimen to make the tip/base more easily workable considering the nature of the material. It is less likely (though possible) that these notched projectile points represent an Archaic reoccupation of the Mackenzie site.

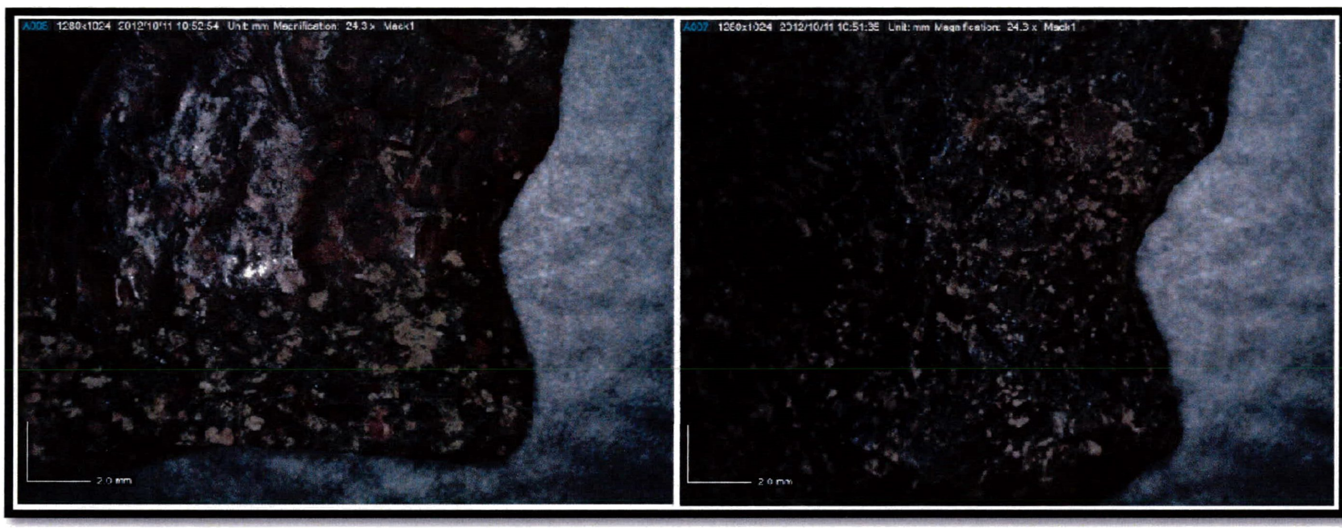

Figure 7.21: Microscopic photos of two of the pseudo-notched specimens, both orientated to demonstrate the right notch. This could represent a technique to create a platform in order to thin the basal portion, or could be residual evidence of a failed attempt at the parallel oblique flaking. The notches could also represent an Archaic reoccupation, though unlikely because of the consistent parallel oblique flaking pattern. Left, WHS-P-22153 and right, WHS-P-18742.

7.2.5 Scrapers and Chisels

Several scrapers were recovered that demonstrate the process of 're-purposing' of broken projectile points (see Chapter 6, Figure 6.31). The broken distal end of projectile point would be easy to rework because of the naturally formed platforms generated from the impact. They also have been laterally ground for hafting purposes. It likely would have been more efficient to rework a sufficiently thinned and shaped broken specimen if available then create a new special-purpose scraper from a rough piece of raw material.

The chisel specimens could represent unfinished bifaces that were abandoned in the process of being basally thinned. The chisels demonstrate a distinguishing 'scoop' edge similar to modern chisels (see Chapter 6, Figure 6.32). A second possibility is that these specimens represent a broken basal portion that was reused as a different tool. The fact that the specimens remained fairly thick compared to the width indicates that the thinning process was likely ongoing, resulting in a late stage preform or a tool utilized for a different purpose. This unique shape created would have been ideal for the application as a chisel, ideally for woodworking activities. Based on the presence of an adze in the Mackenzie site assemblage, it is possible to suggest woodworking activities at the site (Gjende Bennett, pers. comm., 2013; Bennett, *n.d.*). The morphology of these chisel-like specimens may suggest further woodworking activities at the Mackenzie 1 site. Further use-wear analysis on the chisel-like 'scoop' is required to identify if this was actually the case.

7.2.6 Projectile Point Interpretation: Breakage Patterns

The manufacture, use, and discard processes associated with stone tools are evident in the abrasive and fracture damage on the edges and tips of tools. This can be used to formulate interpretations of tools throughout their lifespan. Breakage patterns in projectile points are characterized as either abrasive or fatigue wear (Dockall, 1997). Abrasive wear consists of the presence of polish, dulling, striation, while fatigue wear causes mechanical failure and breakage. Fracture patterns indicative of impact damage have a wider degree of variability because the implements are subject to many potential angles of impact, force used, projectile point surface topography, flaking pattern and fracture initiation (Dockall, 1997). When a projectile point hits a target, a number of potential fracture patterns can occur; longitudinal/shearing and/or lateral macro-fracture, transverse/bending, and crushing fractures (Figure 7.22) (Dockall, 1997; Titmus and Woods, 1986). Longitudinal macro-fractures occur when there is a failure at the distal end of the projectile point, or the tip, and a large flake scar or multiple scars are removed with a longitudinal orientation; resembles a basal flute, but originating from the tip. Lateral macro-fractures occur when the mode of damage involves removal of a flake scar from the tip down one of the lateral edges, resembling a burin spall. Transverse fractures occur when the force applied on impact results in transverse bending (or snap) fracture, which can happen during manufacture or use. The transverse fracture can occur at any portion of the blade, either splitting the projectile point in half, breaking off the tip or base. The force of the impact is directed into the interior of the point and is dissipated before removal of a larger flake can occur, resulting in confinement of the damage to the tip (Dockall, 1997; Titmus and Woods, 1986). Variation in the damage inflicted by impact can also be the result of the contact material (hide, bone, soil, stones, wood, etc.), angle of contact (perpendicular, parallel, oblique to long axis), and forces in operation during impact (conchoidal, bending, compression) (Figure 7.22; Dockall, 1997).

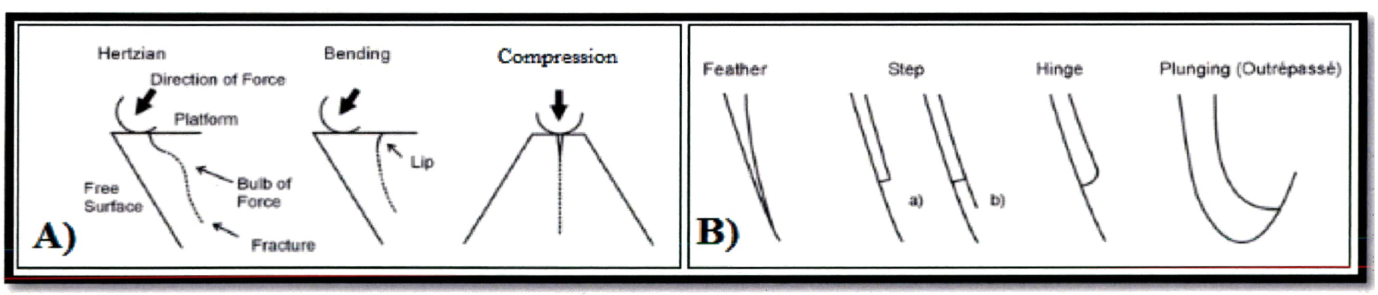

Figure 7.22: Types of features characteristic of fracture initiation (A) and termination (B). Modified after Andrefsky (1998), and Cotterell and Kamminga (1987).

The majority of projectile points recovered from the Mackenzie 1 site demonstrate some form of transverse breakage. This is indicative of breakage during manufacturing or during use.

The large number of basal fragments and completed points in various life-stages indicates that the Mackenzie 1 site probably functioned as a base-camp or habitation site, where a wide range of activities occurred. The large number of point bases (116) exhibiting mid-line transverse fractures suggests discard of broken projectile points while retooling spear shafts after a hunt. After a projectile point broke while hafted to the spear, the hunter would bring the spear and the broken projectile lodged in the spear back to the main camp. The broken proximal end is discarded, and a new projectile point is mounted on the spear.

7.3 RAW MATERIALS

There is a wide range of materials used at the Mackenzie site, but 85% of the raw material used for point creation is locally available materials deriving from the Gunflint Formation. This raw material selection may reflect functional or stylistic choice, but may also reflect expedient use of locally available materials. Hixton (HSS) and KLS are present at the

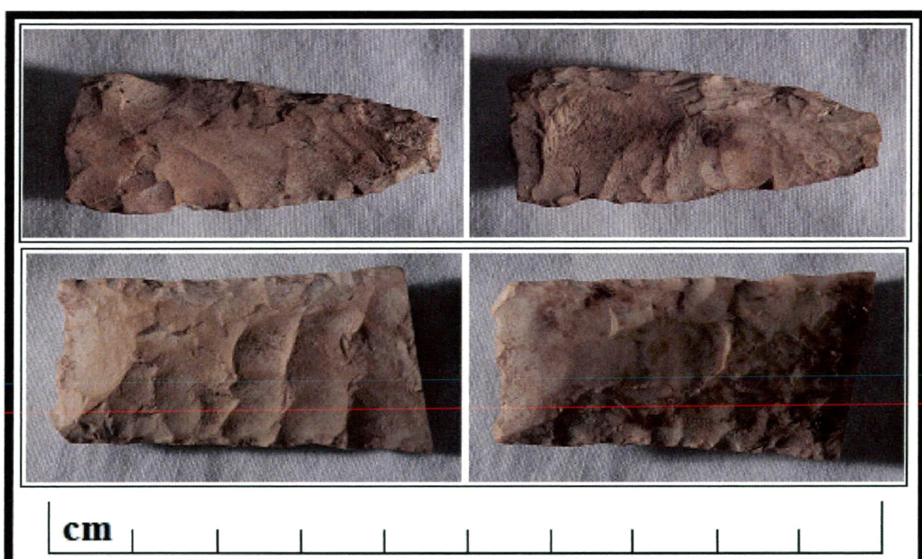

Figure 7.23: Photos of two white specimens that are likely Knife Lake Siltstone, however the heavy patina on both faces makes a positive identification difficult. Top, WHS-P-14673 (DSCN0730, 0727), and bottom, WHS-P-04949 (DSCN1267, 1264).

other Paleoindian sites in the Lakehead Complex which conforms to Ross' (1995) position that the Paleoindians were utilizing these lithic sources to some degree. The presence of quartz/quartzite specimens are interesting because no other quartz point has been found at the Thunder Bay sites, but are quite prevalent in northern Minnesota and two isolated surface finds from Rainey Lake (Lake of the Woods) and International Falls (Reid, 1980; Mulholland, 2006; Bill Ross, pers. comm., 2012).

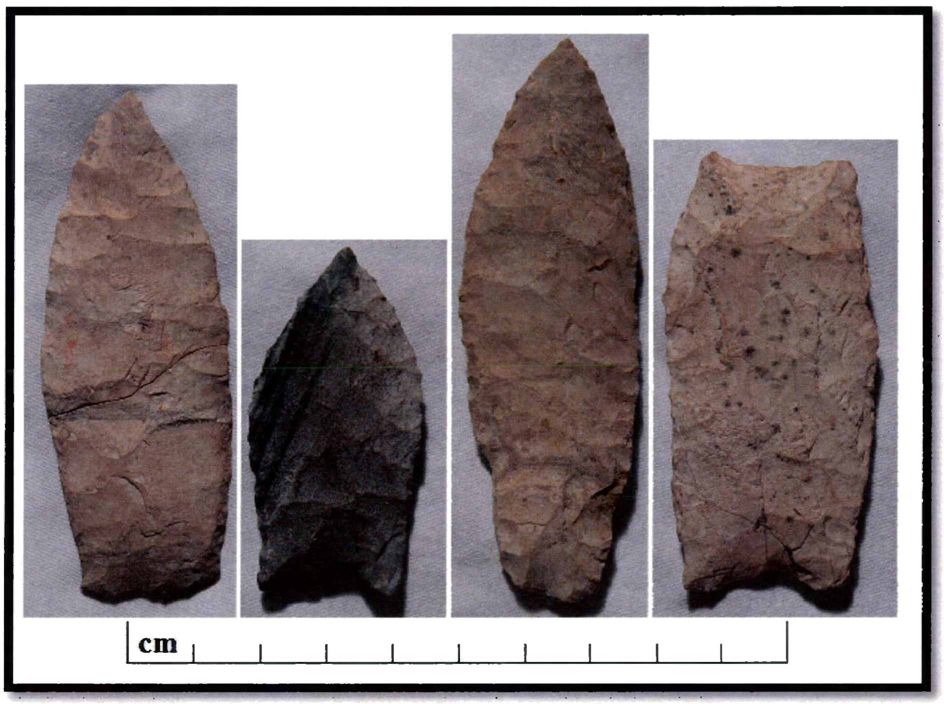

Figure 7.24: Photos of projectile points made from other unidentified siltstones or rhyolites. There are a number of possible locations these materials could have originated from (see text). These specimens also demonstrate the parallel oblique flaking, albeit among the variation of the flaking pattern because it is not to the extent observed on other taconite specimens. Left to right: WHS-P-09560 & 09560 (DSCN0956), WHS-P-0674 (DSCN1407), WHS-P-06988 (DSCN1411), and WHS-P-09119 (DSCN1272).

There are six specimens that are an unidentifiable white/yellow material. Two specimens are most likely some kind of siltstone with heavy patina present, inhibiting specific identification (Figure 7.23: WHS-P-14673, 04949). On the remaining four (WHS-P-09560, 06074, 06988, 09119), it is difficult to determine if patina is present, or if that is actually the surface of the material (Figure 7.24). There have been two suggestions regarding where this material may originate; it resembles stone found throughout the Niagara Escarpment, or a rhyolite/chert outcrop from the Thunder Bay region (Figure 7.25). The Niagara Escarpment is a limestone and dolomite erosion-resistant outcrop that enters Canada at Niagara Falls and continues around the Lake Michigan Basin (Bill Ross, pers. comm., 2012; Ray Reser, pers. comm., 2012; Natural Resources Canada, accessed August 2012). The rhyolite/chert outcrop is found in the Sibley Formation where it is exposed on Agate Point and the Sibley Peninsula (Dr. Pete Hollings, pers. comm., 2012). One of these specimens is worth mentioning because it actually appears double-ended (WHS-P-09119); a result of the breakage of the tip portion of the projectile point. This specimen was in the process of being reworked, either into another tool or in order to repair the tip. It is a unique shape with a convex break and the material is white/yellow with some dark inclusions, puzzling most who try to identify the source.

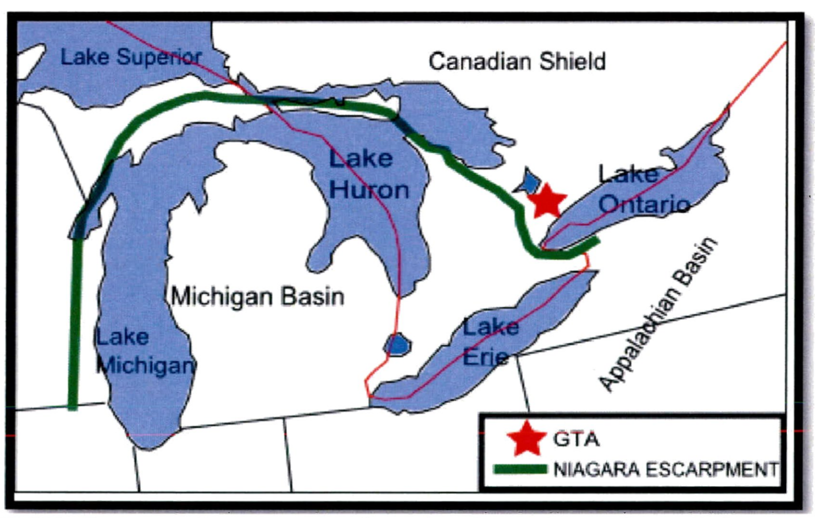

Figure 7.25: Image demonstrating the location of the Niagara Escarpment where it is thought some of the material found at Mackenzie 1 may originate from (see text). Modified from Natural Resources Canada, http://www.nrcan.gc.ca/earth, accessed August, 2011.

Figure 7.26: Three specimens believed to be made from West Patricia Recrystalized Chert. Top left to right: WHS-P-05390 (DSCN0861), WHS-P-09563 (DSCN1316), and WHS-P-16400 & 10056 (DSCN3290). The image on the bottom left is a microscopic image of the surface outlined in black on the large reworked projectile point to the right.

There are three specimens in the Mackenzie assemblage that are slightly translucent and green in color (Figure 7.26: WHS-P-16400 & 10056, 05390, 09563). It is most likely West Patricia Recrysalized Chert from the Manitoba/Ontario border (Jill Taylor-Hollings, pers. comm., 2012; Gary Wowchuk, pers. comm., 2012). Bill Ross (pers. comm., 2011) has also suggested this resembles a material from the Green Stone belt north of Dryden, Ontario. A geologist at Lakehead University suggested the material resembled a “non-metamorphosed” chert, the whereabouts of the outcrop is unknown (Phil Fralick, pers. comm., 2010).

The raw materials utilized at the Mackenzie 1 site all demonstrate some variation of the parallel oblique flaking pattern, including the exotic materials. If complete projectile points are being traded or carried to the Mackenzie site, the expected result would be styles that resemble the area in which the raw material originated. Alternatively, if blanks or larger tabular pieces of the raw material are being transported from the quarry source, that possibly indicates migration to that specific area to obtain that raw material, possibly in a seasonal round migration pattern.

One interesting exception to the above observation is the one Hixton point that has a stem and is collaterally flaked with a diamond cross section (as mentioned above) (Figure 7.27). The

Figure 7.27: All of the projectile points and fragments made from Hixton Silicified Sandstone from the Mackenzie 1 site. They all demonstrate some variation of parallel oblique flaking, except for the complete projectile point on the far left that is collaterally flaked. Left to right: WHS-P-06455, WHS-P-06053 & 13937, WHS-P-01670 & 00640, WHS-P-06017, WHS-P-16016, WHS-P-13941, WHS-P-00773, and WHS-P-07873.

other Hixton specimens in this assemblage all demonstrate the characteristic parallel oblique flaking pattern and lenticular cross section found at Mackenzie. This could indicate that both of the above hypotheses were occurring in this area: people were trading for completed points that resemble projectile point styles from the area surrounding the quarry, and larger pieces of the raw material were obtained and points were manufactured in the same fashion as all the taconite specimens.

7.4 PREFORMS

7.4.1 Reduction Sequence

The creation of projectile points follows a fairly specific trajectory, from acquisition of the raw material to the finished product (i.e., projectile points). To expand further on the technological aspect of variability observed in stone tools, Andrefsky's five stages of biface manufacture are demonstrated (1998; also echoed in Callahan, 1979 and Whittaker, 1994). The five stages of biface reduction consist of: Stage 1 = Flake Blank, Stage 2 = Edged Biface, Stage 3 = Thinned Biface, Stage 4 = Preform and, Stage 5 = Finished Point. These stages of the manufacture process can be useful to determine functional and stylistic choices in the mind of the person who created the tools. Within the larger discussion, the stages of manufacture are significant when conducting a descriptive taxonomic analysis on stone tools, such as projectile points, to understand the initial establishment of the subtle attribute states that are present in the finished product to determine why and how they appear on tools, in this case, specifically on projectile points.

The raw material choice has been discussed above, and reflects choices such as width, thickness and quality that are decided upon by the maker (Callahan, 1979; Whittaker, 1994). The goal is to obtain a flake blank acceptable for the makers desired outcome for the end product (Andrefsky, 1998; Callahan, 1979; Whittaker, 1994). Stage 1 is a blank created from a piece of raw material and can be a flake, cobble, or chunk of stone (Andrefsky, 1998). The edged blank (Stage 2) consists of creating the striking platforms for the preform manufacture and removes any irregular edges by chipping the circumference on both sides (Andrefsky, 1998; Callahan, 1979; Whittaker, 1994). During stage 3 there is an emphasis on thinning the biface and removing irregularities in the material or shape, with flake scars travelling at least to the centre of the blade face (Andrefsky, 1998; Callahan, 1979; Whittaker, 1994). At this stage, the waste removal (cortex) is done and it is a compact, versatile form easy for transport or to further reduce (Whittaker, 1994). A preform produced during stage 4 consists of continuing to thin each face with longer, sometimes patterned flake patterns, extending at least half way across the face of each side creating a flatter cross section (secondary thinning). At this stage there should be a focus to obtain a specific general shape of the finished product (Andrefsky, 1998; Callahan, 1979; Whittaker, 1994). By stage 5 the finished product is now obvious with finishing flakes perfecting the edges to complete the shape before notching or hafting (Andrefsky, 1998; Callahan, 1979; Whittaker, 1994).

The focus of the analysis for this thesis was on the end product in the later stages of production, the projectile points. The significance of when the attribute states appear in the reduction sequence at the Mackenzie 1 site is crucial for determining the meaning of the morphological variability within the projectile point assemblage. This preform discussion is necessary to indicate the series of choices during the manufacture of the projectile points (Bennett, *n.d.*). The appearance of the parallel oblique flaking pattern occurs relatively early in the manufacture trajectory, at approximately stage 4. It is interesting to note that taconite does not always appear to conform to these reduction stages (Gjende Bennett, pers. comm., 2012). Some projectile point specimens demonstrate cortex, which is intended to be removed during the production of a stage 3 biface. However, some Mackenzie 1 projectile points appear finished and utilized (evidence of retouch) that demonstrate the parallel oblique flaking pattern while cortex is still present.

7.4.2 Mackenzie 1 Preforms

Examples drawn from the biface preform assemblage are included in this analysis to illustrate aspects of the manufacturing process that culminates in the creation of a projectile point. Raw material choice is a particularly important factor influencing the manufacturing process from acquisition of the material to the end product. Taconite is a difficult material to manipulate because it is characteristically brittle, has highly variable silica content, and contains many internal flaws that are generally not visible on the exterior surface of the cobble or stone slab. The difficulty in working this raw material has been outlined above by citing observations made by flintknappers seeking to replicate the attributes evident in the Mackenzie 1 site assemblage. It is difficult to attain an adequate sample of taconite to work with; bedrock outcrops are in the form of tabular pieces containing varying degrees of silica and chert and many internal flaws. A great deal of skill, planning and preparation are required in order to reduce a tabular piece down to a biface.

The spalls (flake blanks) detached by percussion from the tabular slabs generally display a twist, or warp, which reflects the outcome of hard hammer percussion on taconite. Efforts to work the challenging taconite material involve a process of intense edge preparation. This platform preparation is particularly important to execute the parallel oblique flaking pattern (Gary Wowchuk, pers. comm., 2010). This platform preparation is required to ensure a solid striking platform that will not fail while trying to detach thinning flakes that run a reasonable distance across the ventral and dorsal face.

Through this analysis, it was demonstrated that some of the traits observed on the projectile points are also apparent in the preforms. The appearance of the parallel oblique flaking pattern during the preform stages is particularly noteworthy because it implies an ideal final outcome is driving the choices made during manufacture (isochrestic style). Attribute states analyzed in the projectile points are directly related to the reduction sequence (Bennett, *n.d.*). The irregular shape, the appearance of a severe twist, and the parallel oblique flaking pattern are all initiated in the early biface production stages.

It is unclear if the site occupants obtained the exotic raw material through a seasonal round or through exchange. If the Hixton Silicified Sandstone or Knife Lake Siltstone is coming into the region as blank specimens, there should be an appreciable amount of debitage. If the material was coming north into the region as fairly advanced biface preforms, then excess mass is removed, and projectile points could be generated without inordinate amounts of waste debitage. The later is likely the case, because the majority of the debitage recovered from the Mackenzie 1 site (98% of the total site artifact assemblage consists of debitage) was from the Gunflint Formation (95%). Debitage of Hixton (0.07%) and KLS (1%) are present indicating some form of reduction or resharpening was occurring, but the majority of Hixton flakes are tertiary flakes (flakes created during resharpening or finishing). This implies that the people would have had to visit the sources of the raw material, or trade pieces that have gone through a similar stage reduction sequence to produce the same general shape and express the same degree of twisting, which is apparent on the projectile points produced from Hixton and KLS.

7.5 SUMMARY

The primary goal for the point analysis is to document the variability seen in the Mackenzie point assemblage. The general shape morphology of the points is lanceolate in configuration, indicating a late Paleoindian age, with a lenticular cross section and display morphological diversity in haft shape (lateral edge configuration, degree of basal indentation) and lateral and basal grinding. They display a range of basal concavity from convex to deeply concave on many different styles. Particularly compelling is the strong numeric dominance of projectile points exhibiting the parallel oblique flaking pattern. This challenging flaking technique is undertaken upon very challenging raw material, but it does not appear to have any clear 'functional' purpose. Nonetheless, its numeric dominance demonstrates that it represents an important culturally conditioned 'rule' evident at Mackenzie 1. At issue is whether this trait is also strongly evident in other Lakehead Complex and Interlakes Composite assemblages, and how it compares with other late Paleoindian types defined in the archaeological literature.

After conducting this attribute analysis to define the variability observed in the Mackenzie assemblage, two research questions can now be answered. First, the Mackenzie 1 assemblage does demonstrate favoured technological and stylistic attributes that are observed across the entire assemblage. The projectile points all demonstrate a consistent parallel oblique flaking pattern implying a certain cultural continuity of this attribute that requires a specific technique for manufacture. This flaking pattern also offers a stylistic representation suggesting a specific template for a desired projectile point at this site. Different technological choices are also demonstrated in the appearance of the lateral edge shape and the basal concavities. There are three categories and two subcategories that represent the variation of the lateral edge shape indicating the range of variation of the general morphology is relatively narrow for the number of specimens discovered. These shapes have implications for accurate and efficient hafting techniques required to fasten the projectile points to spears or foreshafts. The configuration that accounts for the majority of the assemblage is the constricting lateral edge shape with a deep basal concavity. The constricting lateral edge shape would logically be the most efficient shape to create and match to the corresponding haft portion of the spear.

Second, it was possible to determine the range of variation present in the Mackenzie assemblage. In assessing the degree of variability of the Mackenzie 1 projectile point assemblage by conducting an attribute analysis, it is evident the range of variation is surprisingly narrow considering the large sample size. For the lateral edge shape attribute, there are three categories and two subcategories that define the entire assemblage. The basal concavities are wide in range, simply because every possible basal configuration is present in the assemblage. The co-occurrence of those attribute states provide seventeen groups of projectile point styles.

The raw material utilized at the site also indicates the variation observed in the assemblage. The majority of the projectile points were made from taconite and siltstone. This is not surprising given the ready availability of this material in bedrock exposures in the area. Hixton Silicified Sandstone is also present in this assemblage in higher relative abundance than is normally the case with other sites in the area. There are eight projectile points and fragments made from HSS, seven of which demonstrate the blending parallel oblique technique, while one is in the stemmed category with a diamond cross section and collateral flaking. This would indicate that almost all of the HSS specimens were created at Mackenzie or by the people who occupied it, because of the consistent flaking pattern. It is most likely that the material was brought north to this area as advanced biface preforms, indicating central Wisconsin would have been part of a migration pattern, possibly a seasonal round. The one specimen that is different could have been brought here in a completed state by a different group of people, or it could have been traded or exchanged at a time when two groups met along migration patterns. Regardless, Paleoindian people persistently utilized Hixton Silicified Sandstone throughout the Interlakes Composite region.

CHAPTER 8

DISCUSSION OF THE MACKENZIE 1 SITE AND REGIONAL IMPLICATIONS

8.1 REGIONAL RESEARCH OBJECTIVES

This chapter incorporates insight about the Mackenzie 1 projectile point assemblage into the previous Paleoindian research in the Thunder Bay region, and critically address the relationship between the Mackenzie 1 assemblage and other regional collections. This comparison is driven by a series of questions.

Firstly, do the traits that define the Mackenzie 1 projectile point assemblage appear in the other regional assemblages, suggesting that the large collection might serve as the type site for Lakehead Complex? Or are the Mackenzie 1 projectile points comparatively unique, suggesting complex technological influences affected the region?

Secondly, do the morphological types that have been defined in this thesis (see Chapter 7) have any relevance and practical application to evaluating the projectile point styles that define the Lakehead Complex (Fox, 1975; 1976), and/or the Interlakes Composite (Ross, 1995)? Addressing this question will help determine whether the Lakehead Complex has broader regional cultural historical meaning. In addressing this question, comparison of projectile points from the Minong shoreline sites with those recovered from inland sites will help address if there are sufficient consistencies in trait expression to link the assemblages into higher-level taxonomic units. This will be examined through the general comparison of Ross' (1995) Interlakes Composite, with its proposal that other regionally based complexes exist in the region (Quetico/Superior, Lake of the Woods/Rainy River, Reservoir Lakes, Lakehead).

Lastly, once the attribute-based taxonomy developed for the Mackenzie 1 assemblage has been compared regionally to Lakehead Complex and the Interlakes Composite, the author will compare the recoveries to the conventionally named Late Paleoindian projectile point types defined elsewhere in North America. Are there general affinities in the local collections that are useful for establishing technological relationships with the Late Paleoindian types defined elsewhere? Do those notions of affinity suggest influence from Late Paleoindian complexes to the southeast (Eastern Woodlands) or to the southwest (Great Plains), and can those patterns be observed in the assemblages recovered from the Upper Midwest where the local Paleoindian people likely travelled through?

In regions where comparatively limited work has been done, archaeologists still remain focused on constructing the foundations of archaeological understanding. In that spirit, the nature and contents of Mackenzie 1 enable exploration and normative definition of diagnostic tool forms used by Late Paleoindian pioneer migrants as they moved into an emerging early Holocene new landscape.

8.2 MACKENZIE 1 SITE INTERPRETATIONS

In light of the nature of the site, its uniquely large tool assemblages, and its large-scale investigation, the Mackenzie site provides an opportunity to begin thinking differently about boreal forest archaeology. With large-scale block excavation and better contextual control, analysts are in a better position to understand site formation and transformation processes, the spatial expanse of discrete artifact clusters, and the patterned variability of materials found across the site. The large number of projectile points (n=380) also enables more meaningful metric and non-metric analysis based upon a fuller comprehension of the range of variation and the numeric importance of certain attributes, allows evaluation of technological and/or stylistic trends to contribute to a better understanding of 'human decision making', and may offer insight into the larger questions of social and historical meaning of the Paleoindian occupation of the area.

8.2.1 Interpretations of the Projectile Point Metric Data

There are some trends that are apparent when considering the metric attributes observed on the complete specimens. The majority of the projectile points exhibit the maximum width just below half way up to one third the way up from the proximal end of the projectile point. This trend could be a functional reflection of the way in which hafting influences projectile point manufacture processes, reflecting the preferable shape chosen for efficiency in killing (dynamics of flight).

There is no apparent pattern to the length, width or basal width of the complete specimens, indicating that there appears to be no predefined set of size standards imposed during manufacturing and use of the projectile points (i.e., resharpening and rejuvenation). This suggests that makers were simply reacting to the unpredictable nature of taconite as a raw material.

Within the basal fragments, there are some trends apparent within the metric analysis. There is an obvious trend towards attaining a maximum point width between approximately 20 to 30 mm that may indicate a functional preference for hafting and/or efficiency in killing. The average basal width is similar to the maximum width in that, the loosely clustered majority of specimens may indicate some functional preference for hafting and/or a stylistic choice determining the overall morphological shape. Finally, while projectile point thickness is an important consideration when balancing weight considerations relative to killing efficiency it may also reflect pragmatic consideration of the limitations of the raw material.

8.2.2 Discussion of the Mackenzie 1 Archaeological Site

The Mackenzie 1 site is located along the south-facing flank of an upland that overlooks the current Lake Superior. During the early Holocene, this slope contained the much larger Glacial Lake Minong within the Lake Superior basin. In fact, the Mackenzie 1 site is located on one of a series of strand lines of Glacial Lake Minong. The site consists of a southern sloping strandline with intermittent berms and swales that may represent remnants of ancient storm beaches. Bedrock knobs protrude above the surface in various locations, notably the southeastern and the southern portion of the site, as well as in the northwest corner of the main excavation area (see Chapter 5, Figure 5.1). The high density of artifacts recovered from the area between exposed bedrock may imply settlement patterns evident at the site; the occupants may have preferred the leeward side of the bedrock which acted as a windbreak (see Chapter 5). The depositional pattern of artifacts suggests overlapping activity areas within the site.

It has been suggested by Shultis (2013) that Paleoindians following the lake levels of Lake Minong may have inhabited the northern portion of the site while river-mouth sediments were being actively deposited in the southern portion of the site. The southern portion of the site could then have been occupied as the lake levels receded (Shultis, 2013). The projectile point distribution data does not appear to indicate any evidence to support that claim. The projectile point recoveries from both portions of the site show a similar range of variation of types.

While the exact chronological sequence of events regarding deposition of the beach and occupation cannot be determined, evidence to suggest occupation occurred while lake levels were slightly lower than the Minong strandline is available. A sharp difference between weather conditions/ambient temperatures on the exposed storm beaches versus in the shelter of the vegetated backbeach area is evident while working on the shores of modern day Lake Superior

(Scott Hamilton, pers. comm., 2013). This appears as a series of ecological clines in vegetation, with relic arctic plants dominating the exposed storm beach, and mixed wood forest a short distance inland. It is assumed this ecological trend would have been similar while Lake Minong was occupying the Superior basin and the Paleoindian people would have preferred the protected, forested backbeach areas for encampments rather than the active storm beach. The Mackenzie 1 site likely represents this backbeach encampment area where the southern bedrock knob overlooks the escarpment edge, south of the modern day hydro-corridor. This escarpment edge could have acted as a heavily utilized game travel corridor, particularly in order to cross the Mackenzie River. There is material evidence for Paleoindian occupation just south of the Mackenzie site, where diagnostic tools were recovered. The modern day hydro-corridor has clearly been flattened, but there is a gentle break in slope running northwest to southeast just to the south of the bedrock at Mackenzie 1. There is also a major beach feature just south of the hydro-corridor. The materials from the Newton site were recovered just south of the southern bedrock knob of the Mackenzie 1 site, which could indicate this is an extension of the Mackenzie 1 occupation.

The Newton (DdJf-4) site yielded a projectile point from the surface during the initial survey in 1973 (Fox, 1975). It is heavily reworked, with a constricting lateral edge configuration and a straight base (Figure 8.1). There is a linear internal fault along one lateral edge of the projectile point that has been knapped successfully using a combination of parallel oblique and irregular flaking techniques. Other formal tools were also recovered from south of the Mackenzie 1 site within the push banks (surface) for an access road that was built parallel to the hydro-corridor to facilitate the construction of the bridge over the Mackenzie River in 2010. This material evidence indicates that the Mackenzie 1 site either extended south of the bedrock knob, or represents a secondary location along an active beach area. The Mackenzie 1 area would have been an advantageous campsite after the water level declined to levels that seem to be associated with some of the other sites in the region (such as the RLF site or the Electric Woodpeckers). Mackenzie 1 would have offered an advantageous viewpoint of the active beach, while located in an area likely sheltered and protected by vegetation. Thus, abandoned beaches might have been attractive ecologically even if the active beach was several metres away.

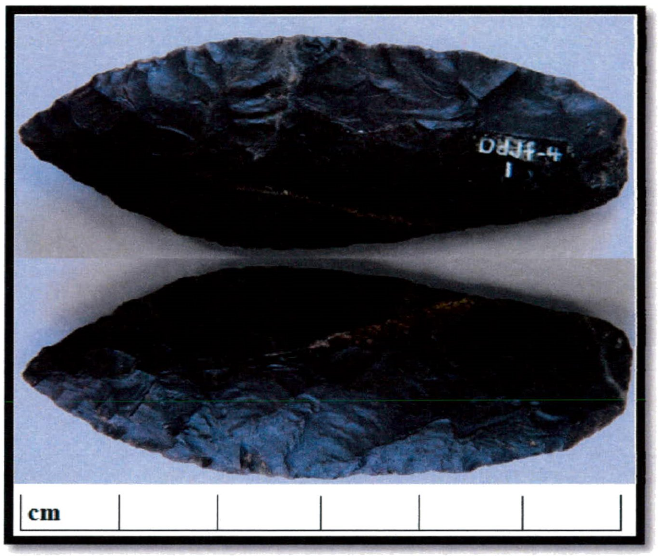

Figure 8.1: Projectile point recovered from the Newton site (DdJf-4) located south of the Mackenzie 1 site, beneath the Hydro Corridor (photo by author with the permission of the Ministry of Culture, Thunder Bay)

8.2.3 Mackenzie 1 Site Interpretations: Site Activities and Functions

After a brief examination of the distribution data, the pattern is similar to other multi-occupation Paleoindian sites where many styles of projectile points are present with no discernible pattern of spatially segregated types (e.g., on a smaller scale: Cummins (Julig, 1994), Brohm (Hinshelwood, 1990; MacNeish, 1952), Sinnock (Buchner, 1984)) (Important to note is that further research into the distribution data will be required to support these hypotheses). There are three site occupation scenarios: 1) the site was occupied repeatedly over a long period of time, perhaps by diverse hunting groups, each defined by a specific style of projectile point; 2) the site was simultaneously occupied by several different groups of people who met in this one specific area, over a undetermined amount of time; or 3) a combination of both of the first two hypotheses. Any of these perspectives carries the assumption that the morphological types defined in the assemblage reflect group-specific patterns of learned behaviour associated with projectile point manufacturing. While the morphological variety of projectile point styles could indicate different social groups (each associated with a distinctive morphological form), however, the consistent execution of the parallel oblique flaking pattern (99%) found on all five morphological types suggests otherwise. The widespread expression of this distinctive flaking style strongly suggests some common cultural affiliation or linkage that supersedes what is reflected by the morphological variability.

This issue is important to consider; if one group of people is responsible for the creation of the variety of projectile point styles represented in the assemblage, then the relationship between taxonomic variation in material culture and social organization might need reconsideration. Different types of projectile points are generally considered synonymous with different Paleoindian groups, assuming different attribute states reflect different socially-mediated rules for tool production. However, it is also important to note that social reproduction of hunting and gathering groups require some level of intergroup interaction, often occurring at appropriate times and in places when food supplies and group activities might attract autonomous units together. In such a situation of seasonal aggregation we might expect gatherings of disparate groups, each characterized by a distinctive style of tool production. In light of the limited stratigraphic and temporal controls over the Mackenzie 1 recoveries, the diversity of artifact forms might also suggest a succession of independent encampments by somewhat culturally related hunting bands over many decades or perhaps even centuries.

Superficial consideration of the horizontal and vertical spatial distribution of projectile points across the site does not provide any insight into activity areas when considered on a macro-level of analysis. The projectile point morphological types do not demonstrate any discernable spatial pattern; all types are scattered throughout the site. There is also no horizontal pattern in the distribution of complete versus basal fragments at the site. It is obvious that the majority of the projectile points were recovered from the eastern portion of the site. This may indicate a specific activity area, or an area that was favoured because of the proximity to the bedrock exposures. There are, however, several localized clusters of projectile point fragments that could suggest single camps or activity areas, and more comprehensive spatial analysis will be the subject of further study.

8.2.4 Implications of the Dates: Lake Minong and Timing of Occupation

The beginning of Glacial Lake Minong formation is tentatively dated to approximately 9,900 years B.P. (Shultis, 2013). Following the Marquette re-advance, Lake Beaver Bay was trapped between the northern margin of the Superior lobe and the high topography to the north of the study area. Once the lobe retreated after 10,000 years B.P., Lake Beaver Bay drained into the Superior basin reaching an elevation of 259 m asl, initiating the Minong phase of the basin (Phillips and Fralick, 1994; Stuart, 1993). Before this new evidence the retreat of the Superior lobe has been speculated to occur after approximately 9,500 years B.P. (Phillips and Fralick, 1994). However, the date obtained from Electric Woodpecker 2 (9,700-9,500 cal years B.P.) coupled with the recent stratigraphic work in the study area (Shultis, 2013) suggests the earliest and highest Minong level dates closer to the Marquette re-advance, approximately 9, 900 years B.P. Lake levels likely further receded to the Mackenzie 1 site at 250 m asl, depositing beach sediments in the northern portion of the site. The following interpretations are all speculative, and will require the analysis of the full data set from the site to fully justify any of these claims.

As mentioned previously (Chapter 5), it is impossible to confirm if the site was occupied during the deposition of the beach sediments because of disturbance of the stratigraphic context through bioturbation. The Electric Woodpecker 2 site (location of the earliest radiocarbon date) is located at a lower elevation, approximately 240 m asl. The radiocarbon date recovered from Electric Woodpecker 2 dates the deposition of the beach sediments, as well as some cultural event. However, it is important to note that this is at best a preliminary hypothesis based on incomplete data that will be examined with further research. It is possible that while the lake level was at the Electric Woodpecker elevation, people were occupying Mackenzie 1 simultaneously because it is located on a higher strandline.

The discrepancies in the dates can possibly be related to the boreal forest environment and all of the difficulties it produces with bioturbation, cryoturbation and forest fires. The available absolute dates suggest more recent occupation than is normally thought for Paleoindian, and might suggest Archaic period reoccupation of the Minong Beach features. Due to disturbance factors, these dates should be considered with caution. The context in which the dates were recovered is important. There are no associated diagnostic artifacts, associated with the loci being dated, and may not represent the "activity of interest" - the Paleoindian occupation at Mackenzie 1. The standard error associated with the OSL dates is also large, suggesting imprecision. When considered in this context, it is clear that the OSL dates are inconsistent with past Late Pleistocene history in the area (Shultis, 2013). More telling, the Paleoindian nature of the diagnostic artifacts indicates a predominantly Paleoindian occupation at Mackenzie 1, with no evidence of diagnostic technology dating to the Archaic period.

The radiocarbon date obtained from Electric Woodpecker 2 conforms to the archaeological assumption (occupation occurring on the Minong beach 9,500 years B.P.) while other OSL and AMS dates (from natural and cultural formations) are more recent then current expectations. The remaining theories include: 1) the possibility of Archaic-age occupation of an abandoned beach feature but with no evidence of Archaic technology, 2) persistence of Paleoindian technology thousands of years later than expected, with continued occupation of abandoned beaches high above Lake Houghton or Nipissing levels, 3) some sort of complex 'reset function' affecting the sediments, and/or 4) introduction of young carbon into Paleoindian deposits that result in artificially young AMS dates.

This is an ongoing controversy that is beyond the scope of this thesis. This section merely summarizes the controversy over absolute dating, and suggests how it might affect future interpretation of the site deposits.

8.3 REGIONAL IMPLICATIONS OF THE MACKENZIE 1 ASSEMBLAGE

The Mackenzie assemblage has significant implications for ongoing discussion over the analytical utility of the Lakehead Complex and the Interlakes Composite. This reflects the uniquely large sample size and somewhat better control over context and association of the recoveries.

The attribute analysis of the Mackenzie site assemblage enabled development of a morphological taxonomy consisting of five major 'groups' or 'types', with a series of subtypes, reflecting subtle variation in secondary traits. The lateral edge shape and basal concavity traits incorporate the most analytically useful morphological variability observed, and focused upon important hafting characteristics. These traits are also useful for characterizing recoveries from similar sites in the Thunder Bay region, and perhaps also other samples recovered from Northwestern Ontario, Manitoba as well as Minnesota and Wisconsin.

While these morphological traits identified reveal some inter-site commonality, the Mackenzie 1 assemblage is unique for its uncharacteristically high representation of parallel oblique flaking. This flaking pattern is present on all the projectile points, and also on other formal tools recovered. It is not clear whether this reflects a thinning strategy while addressing the technical challenges of dealing with taconite, or whether it reflects non-functional expression of 'style' in flaking. If the flaking pattern reflects technical considerations, then it is significant to note that it is much less frequently expressed in other Lakehead Complex sites where taconite is also the primary raw material. Regardless, the flaking pattern is present on all the projectile points, and through observation during excavation other formal tools also demonstrate this attribute. This could reflect the strong representation of taconite at this site, as well as the high frequency of formal tools recovered.

Comparison of the results from the Mackenzie site analysis is difficult to apply to the Interlakes Composite because most of the information regarding the latter is published in a single summary articles (Ross, 1995), with descriptive site reports deriving from small samples (Halverson, 1992; Haywood, 1989; Hinshelwood, 1990; Hinshelwood and Weber, 1987; Magner, 2001; Reid, 1980; Salzer, 1974; Steinbring, 1974). Each of the complexes comprising the Interlakes Composite has yielded a modest number of a variety of projectile point types Comparative analysis was conducted by examining (in most cases) poor quality photographs provided in the available publications, with the author having comparatively few opportunities to directly examine other collections.

Caution is imperative when conducting an attribute analysis, and offering comparisons to other sites. Processes involving reworking and rejuvenation of projectile points through their use-life can alter the general morphology from the initial form. The recovered projectile points could represent the intended finished product, a final failed step in a production sequence, a resharpened or rejuvinated projectile point, or a broken projectile point that was transformed into a different tool (i.e., projectile points reworked into scrapers). Tomaskova (2005: 87) emphasizes this point by noting that "[this] line of reasoning found resonance in studies that adopted the *chaine operatoire* approach and viewed artifacts through the lens of a production sequence rather than as an end product" (see also Bleed, 2001; Schiffer and Skibo, 1997). All of these processes alter the morphological shape and provide a layer of attributes or traits that may not have been intended during the initial manufacture of the projectile points. Caution should also be applied when an established type name is assigned to projectile points and point fragments on the basis of general morphology, particularly if they are recovered from surface scatters, single component sites or non-stratified, multi-component sites.

8.4 REGIONAL ARCHAEOLOGY: CONSIDERATIONS OF THE LAKEHEAD COMPLEX AND THE INTERLAKES COMPOSITE

Several trends emerge in the examination of the Lakehead Complex, Interlakes Composite and the related literature. Problematic topics related to the formulation of the Lakehead Complex and Interlakes Composite includes taxonomic terminology, sample size, and poor depositional control and temporal control. When inter-assemblage comparison is attempted between sites sharing similar problems, this ambiguity is compounded.

Also at issue is the implied meaning of variation in projectile point form. Do the various 'types' have discrete temporal meaning, or do they reflect discrete social entities that may overlap in time and space? Addressing these fundamental issues is not possible given the poorly stratified and undated archaeological sites that are currently available. This has forced analysts to offer comparisons to assemblages with more interpretable context that derive from distant archaeological sites, and to rely upon absolute dating estimates based upon those distant sites.

8.4.1 Lakehead Complex

Bill Fox (1975) defined the Lakehead Complex by considering all the Paleoindian sites in the Thunder Bay region within a single taxonomic unit. While this effectively drew attention to the regional similarities, it was necessarily vague because of the small and typologically diverse assemblages. This offered challenges for subsequent archaeologists who attempted to consider newly recovered assemblages within the same taxonomic unit. However, this is the nature of research in an under-studied area: propose as scenario and seek new data with which to evaluate the proposed organizational scheme (see discussion in Chapter 3).

In light of the poor organic preservation associated with virtually all Paleoindian sites thus far investigated, very little substantive information regarding the economy, antiquity and

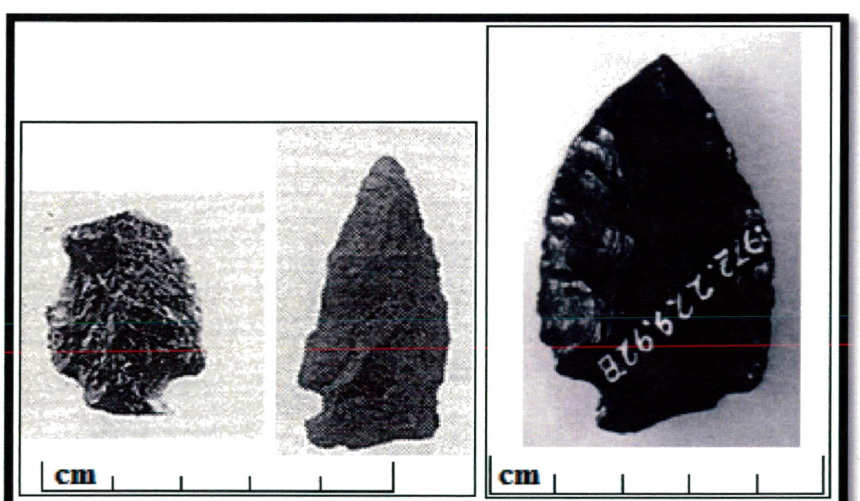

Figure 8.2: Examples of notched points from Cummins (left) and Brohm (right). These notched specimens may indicate an Archaic reoccupation of the Paleoindian sites. Left image modified from Julig, 1994: Figures 5.65 and 5.66; right image modified from Hinshelwood, 1990: Figure 19.

duration of Paleoindian occupation is available. Instead, the age of these sites has been estimated based upon their spatial association with the ancient beach ridge(s) of glacial Lake Minong (Fox, 1975; Julig, 1984, 1985, 1988; Ross, 1995). This does not provide a direct date of the 'event of interest', namely the timing of site occupation, but merely indicates that these beach ridges were a favoured settlement area at some point during or after their formation. These sites were obviously advantageous for settlement because there is material evidence of reoccupation during Archaic times, after the water levels had declined (e.g., two corner notched points found at Cummins) (Figure 8.2) (Hinshelwood, 2004). The demonstration of reoccupation by people later in time provides validity to the argument that the time of site occupation may not necessarily be contemporaneous with when the ancient beach ridge contained water at that level. However, the diagnostic artifacts recovered from the Mackenzie 1 site are all Paleoindian in nature therefore an Archaic reoccupation (while possible) is not indicated in the material culture (see Chapter 7). As addressed in Chapter 4, taxonomic systematic employed in defining Lakehead Complex (Fox, 1975) also demonstrate some inconsistency of application (Table 8.1).

	Constricting	Eared	Fishtails	Parallel	Stemmed
Mackenzie 1 (n=161)	X	X	X	X	X
Brohm (n=11)	X	X		X	
Cummins (n=9)	X	X			X
Biloski (n=4)	X				X
Dog Lake (n=25)	X	X		X	

Table 8.1: Demonstrating the variety of projectile point morphological shape within the Lakehead Complex. The numbers of projectile points representing each site is an approximation. This table draws attention to the common 'types' apparent at sites assigned to the Lakehead Complex compared to the Mackenzie 1 recoveries.

8.4.2 Projectile Point Comparisons: Lakehead Complex and the Mackenzie 1 Site

The projectile points recovered from sites used to define the Lakehead Complex were examined and evaluated using the morphological types defined for the Mackenzie 1 collection. Dawson (1983a) reports that nine points were recovered from the Cummins site, and are considered to represent Plainview, Angostura, Agate Basin and Minocqua types. Photographs these specimens reveal some of the morphological traits observed in the Mackenzie 1 assemblage (Figure 8.3), and include the constricting, stemmed and eared categories (defined in Chapter 5), exhibiting deep, low and straight basal indentation configurations. There is also evidence of parallel oblique flaking, especially on the specimens made from taconite. This is also evident at the Brohm, Biloski and Newton sites. These similarities indicate that some cultural

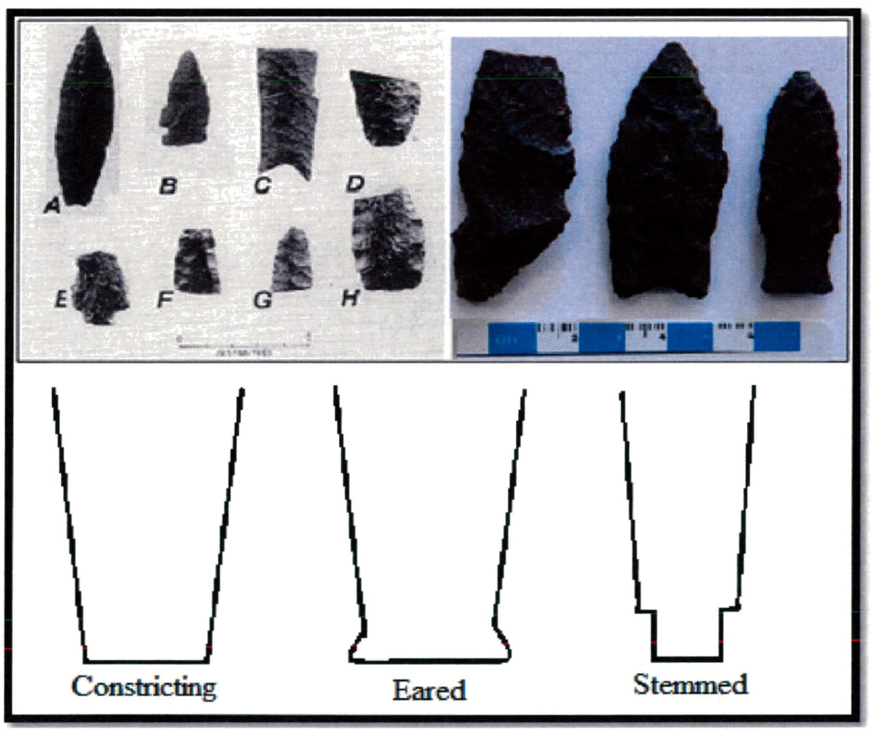

Figure 8.3: An illustration of projectile points recovered from Cummins (top) compared to the lateral edge shapes apparent within the assemblage. The lateral edge shapes were established throughout this thesis for the Mackenzie 1 assemblage. Top figure on the left modified from Julig, 1994 (Figure 5.65 & 5.66).

relationship exists between these sites, and that Mackenzie 1 should be treated within the Complex.

The eleven projectile points discovered at Brohm are a reported to resemble the Plainview type (Julig, 1994). The Brohm points are also consistent with the constricting, parallel and eared varieties, with convex, straight, low and deep basal configurations (Figure 8.4). There is also evidence of parallel oblique flaking present on some specimens. At the Biloski site four points were discovered and described as resembling Minocqua and Agate Basin types (Figure 8.5) (Hinshelwood and Weber, 1987). The points conform to the constricting and stemmed varieties, demonstrating convex, low and straight basal configurations and some evidence of parallel oblique flaking.

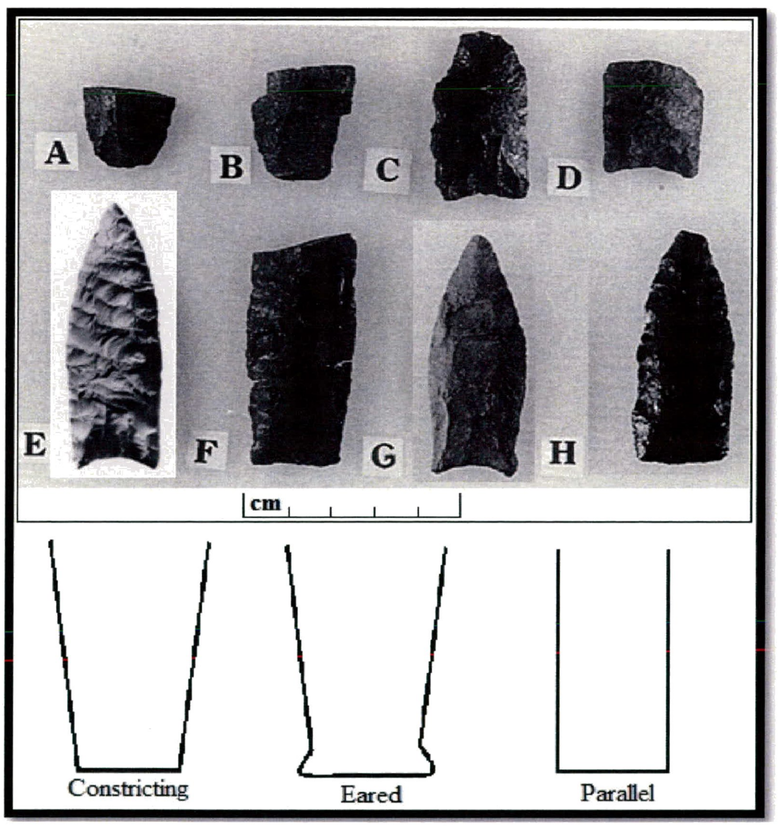

Figure 8.4: Image demonstrating the projectile points recovered from the Brohm site (top) and the illustrations representing the types identified in the Mackenzie 1 assemblage. Top image modified from Julig, 1994: Figures 6.16 and 6.17.

The Mackenzie 1 projectile point taxonomy can also be applied to interior Paleoindian sites, such as those on Dog Lake, where the projectile points demonstrate constricting, eared and parallel lateral edge shapes, with convex, straight and deep basal configurations, and evidence of some parallel oblique flaking (Figure 8.6) (Julig, 1994; McLeod, 1981). The frequency of the appearance of the specific lateral edge shapes identified in the Lakehead Complex sites compared to the Mackenzie 1 site are presented in Table 8.1. This visually demonstrates the similar morphological shapes that overlap at each site. The empty cells in the table could easily be a function of the small sample size, thereby explaining the missing types at those sites.

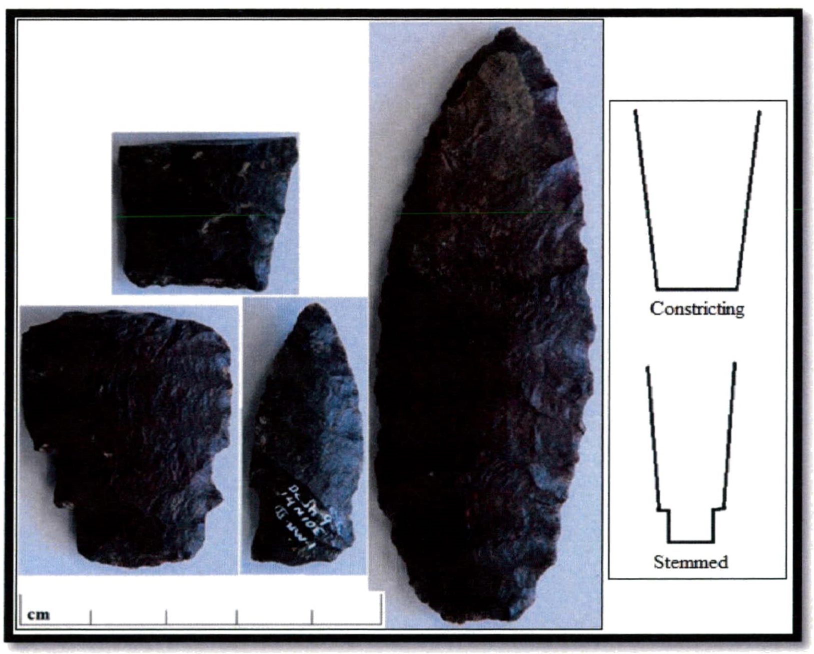

Figure 8.5: Image demonstrating the projectile points recovered from the Biloski site, with illustrations representing the types created for the Mackenzie 1 assemblage. Similar morphological shapes are found throughout the Lakehead Complex sites. Pictures on the left are photos by the author from materials stored at the Ministry of Tourism, Culture and Sport in Thunder Bay, Ontario.

The projectile points from the Brohm site appear to be the most similar to the Mackenzie 1 assemblage. The high relative frequency of the parallel oblique flaking pattern, utilizing the blending technique is the most similar to Mackenzie points. This flaking technique yields an overwhelming representation of diverse lenticular cross sections, again similar to the Mackenzie site. The domination of constricting and eared varieties is also consistent with the Mackenzie 1 collection, demonstrating a strong pattern of technological continuity between the two assemblages. The Cummins collection also bears the strongest similarity to the Mackenzie 1 collection, but appears more varied, with stemmed forms are more common and exhibiting a slightly more crude form of flaking. Corner notched points are also present within the assemblage, suggesting an Archaic reoccupation (Hinshelwood, 1990; 1994). Parallel oblique flaking is present at Cummins, but at a lower frequency and not nearly at the same success rate

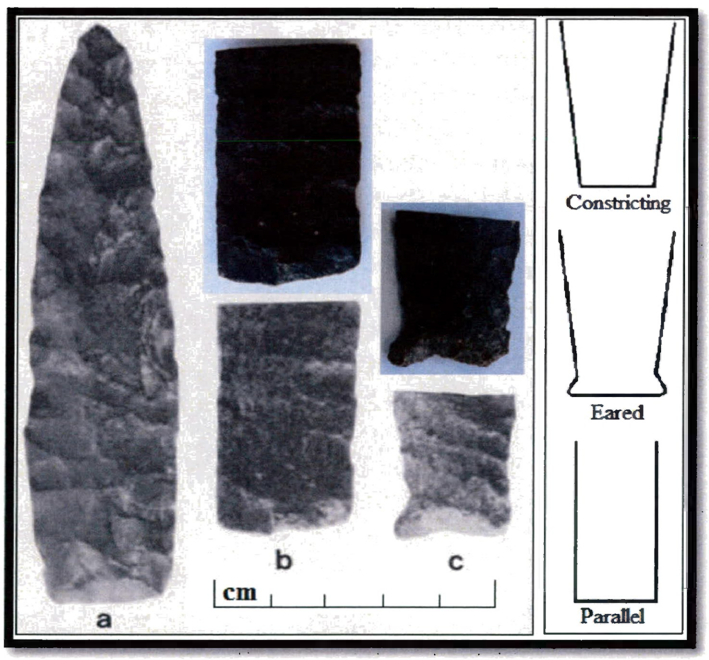

Figure 8.6: Image demonstrating a sample of projectile points from Dog Lake, specifically the Rocky Point site (DeJj-6). Illustrations representing the types created for the Mackenzie 1 assemblage are shown to indicate the similarities in morphological shape. The Dog Lake points generally demonstrate constricting, eared and parallel shapes. Point 'A' is made of Knife Lake Siltstone, while 'B' and 'C' are taconite. Black and white image is modified from Fox, 1980; Figure 3. Color inset images are photos taken by the author of material stored at the Ministry of Tourism, Culture and Sport in Thunder Bay, Ontario.

as observed at Brohm and Mackenzie. The proximity of the Brohm and Mackenzie 1 sites suggests some form of cultural contact; the distance from Mackenzie 1 to Brohm is approximately 22 km, versus approximately 38 km from Mackenzie to Cummins. Judging from the nature of the debitage, the Brohm site does not appear to have been utilized for manufacturing tools. It is likely that procurement of raw materials and early stage manufacture was undertaken at a different location (Figure 8.7) (Hinshelwood, 1990; MacNeish, 1952). The Gunflint Formation does extend out adjacent to the Sibley Peninsula, where suitable exposures are located approximately 3 km from Brohm (Hinshelwood and Webber, 1987; Hinshelwood, 1990). The procurement of large quantities of raw material would be essential to the manufacture of tools at Mackenzie 1; likely obtained from taconite exposures near Brohm, the Current River, or an as yet undiscovered source in the vicinity of the Mackenzie River.

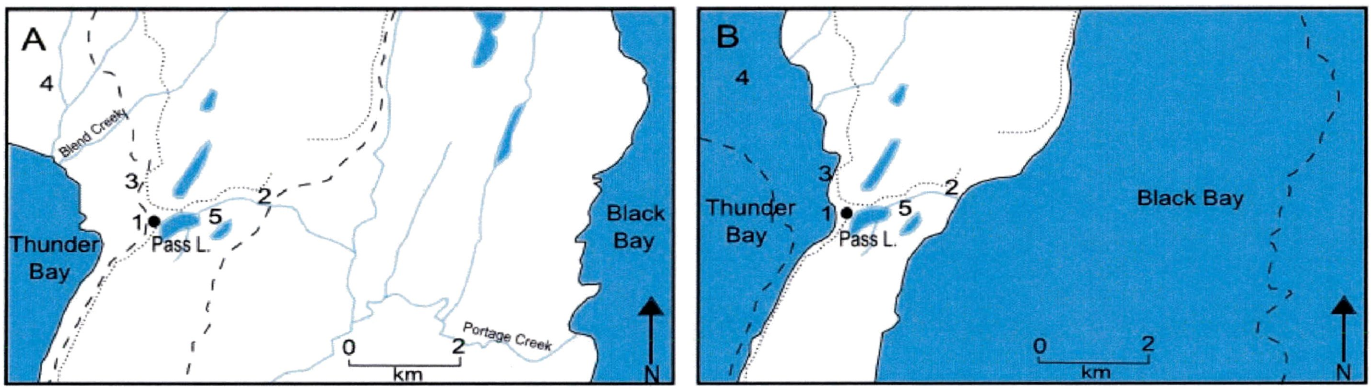

Figure 8.7: This image illustrates the location of the Brohm site (#1) on Sibley Peninsula. Image A indicates the modern day Lake Superior water levels, while image B illustrates the water levels flooded to the Brohm beach level of 253 m asl (Phillips, 1988). The dashed line represents relic (A) and submerged (B) shoreline. The dotted line represents the crest of vertical slope on both images. The numbers 2 to 5 represent other archaeological recoveries: 1= Brohm (DdJe-1), 2= Andersen site (DdJe-2), 3= Bak site (DdJe-3), 4= Price site (DdJe-4), and 5= LeGarde site (DdJe-5). No diagnostics were recovered from sites 2, 3 and 5, but they did yield taconite and siltstone bifaces. A corner-notched projectile point was recovered from the Price site (Hinshelwood, 1990). Image modified from Hinshelwood, 1990 and 1994: Figure 8.7.

A majority of the attributes exhibited on the projectile points recovered from the sites on Lake Minong strandlines also occur in projectile points recovered from sites located removed from this proglacial lake, such as South Fowl Lake I and II, Rocky Point and Narrows (see Figure 3.4 and Table 3.1 in Chapter 3) (Fox, 1975; 1980). The slight differences observed between the archaeological recoveries from the strandlines and the interior sites can all be subsumed within the variation observed at the Mackenzie 1 site (Figure 8.8). This runs counter to a perspective offered by Julig (1994), who observed that western influences' appeared to be more strongly expressed on the projectile points from interior sites, leading him to suggest that the interior sites should not be considered part of the Lakehead Complex (Julig, 1994). Julig (1994) defined these "western influences" as the presence of a diamond cross section, a medial ridge, a straight base with shorter basal thinning flake scars, and predominantly parallel oblique and collateral flaking patterns. These traits are commonly associated with western complexes, such as the Cody Complex (Scottsbluff and Eden), Frederick, Lusk and Angostura (Julig, 1994: 216). However, Mackenzie 1 site sample includes types that subsumes the supposed difference between inland versus Minong shoreline sites (see below).

After conducting the analysis of the Mackenzie assemblage and the subsequent comparison to other Lakehead Complex collections, the results suggest that the definition of the

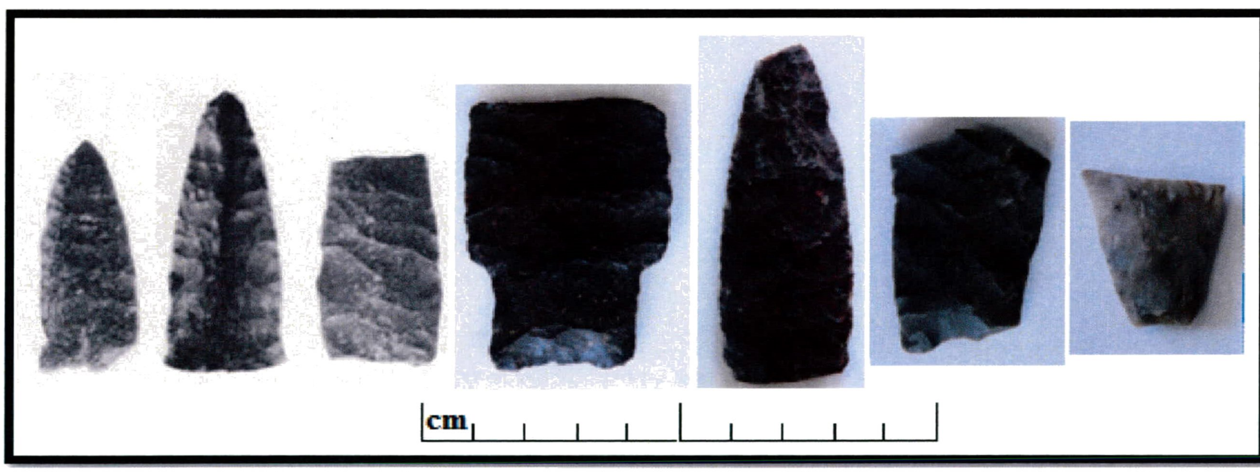

Figure 8.8: Projectile point images from interior sites demonstrating the similarities to projectile points in the Lakehead Complex and within the Mackenzie 1 assemblage. There are constricting, eared, and stemmed varieties. Also significant is the similarity in flaking pattern, some demonstrating the parallel oblique pattern so commonly found on Lakehead Complex projectile points. Points are recovered from, (left to right): Sturgeon Sand Spit site (DcJu-1), South Fowl Lake II, Narrows (DaJn-7), Narrows (DaJn-7), Hicks site (Wiktowy Lake, DfJg-1), Lac Des Mille Lacs (Pine Point site), and Lac Des Mille Lacs (Pine Point site). The image on the far left is modified from Fox, 1980: Figure 3. The four on the right are the photos taken by the author of material stored at the Ministry of Tourism, Culture and Sport in Thunder Bay, Ontario.

Lakehead Complex developed by Fox (1975) is generally consistent with the information collected. However, some minor updates of the Lakehead Complex definition is required to effectively include the Mackenzie 1 and other more recently discovered sites. The association between Paleoindian settlements and the Minong beach reflects an obvious sample bias due to the visibility of the high Minong strandlines. Subsequent research has identified Paleoindian sites in diverse contexts, but this should not be used to detract from the seasonal biotic attractiveness of shorelines, and a preference for high, dry areas to observe migrating animal herds (Hinselwood, 2004; Phillips, 1993). Interior sites yielding Paleoindian projectile points (e.g., the sites surrounding Dog Lake) that are not associated with ancient glacial lake strandlines have been discovered (Anderton et al., 2004; Boyd, 2007; Hamilton, 1996; 2000; McLeod, 1978; 1981; Phillips, 1993), but Julig (1994) does not consider them part of the Lakehead Complex. Instead, Julig (1994) insists that because of morphological traits observed at the interior sites they should be considered "western influenced" (i.e., longer, wider, thicker, higher degree of straight bases, collateral and parallel oblique flaking, and diamond cross sections with medial ridges), in contrast to Paleoindian sites on Minong strandlines that demonstrate a Great Lakes influence (i.e., shorter, narrower, thinner, with higher degrees of transverse parallel and random flaking). Western influences are suggested from Cody complex projectile points, Frederick, Lusk and Angostura types, while eastern influences include Holcombe and 'Aqua-Plano" types (Julig, 1994; 216). The projectile points recovered from interior sites demonstrate similarities to the Mackenzie 1 assemblage, yielding morphologically similar projectile points with instances of parallel oblique flaking (McLeod, 1978; 1981). The same morphological variability demonstrated in the projectile points from the interior sites are present in the Lakehead Complex sites, especially with the inclusion of the Mackenzie 1 assemblage, and should therefore be included in the Lakehead Complex series of sites and artifact assemblages.

In summary, by including the Mackenzie 1 site in the Lakehead Complex the diverse projectile point styles characterized by Fox (1975) can be better understood as major and minor morphological types due to the much larger sample size afforded by the Mackenzie 1 excavations.

8.4.3 Interlakes Composite

Ross (1995) defined the Interlakes Composite in order to integrate into a single interpretative framework the widely dispersed Paleoindian archaeological finds from the Manitoba/Ontario border in the west to the Sibley Peninsula in the east, and south to northern Wisconsin (see Chapter 3). This proved challenging in light of the relatively small projectile point sample size, and the variability observed with isolated finds or small assemblages. This makes it difficult to identify regionally patterned expression of shared traits that might be used to identify discrete phases or complexes. While interpreting the stratigraphic context and temporal duration of Mackenzie 1 is difficult, the large assemblage greatly clarifies the taxonomic problem of identifying the most commonly expressed traits (Table 8.2).

	Constricting	Eared	Fishtails	Parallel	Stemmed
Lakehead (n=210)	X	X	X	X	X
Quetico/Superior (n=5?)	X	X			X
Lake of the Woods/Rainy River (n=40?)	X	X		X	X
Reservoir Lakes (n=25?)	X		X		X

Table 8.2: Demonstrating the variety of projectile point morphological shape within the Interlakes Composite. The numbers representing each complex is an approximation.

When projectile points from Mackenzie 1 are considered in the context of Ross's (1995) observations regarding the Interlakes Composite, compelling regional similarities are evident.

The variability observed in the other complexes comprising the Interlakes Composite can also be assessed using the Mackenzie 1 analytic method.

8.4.4 Quetico/Superior Complex

The Quetico/Superior Complex is difficult to define and contains a very small sample size with virtually no publications accessible for analysis. The published information derives from work by Fox (1980), Ross (1995) and Arthurs (1987). Two of the projectile points were directly examined by the author at the Ministry of Tourism, Culture and Sport laboratory in Thunder Bay. The other samples were examined using photographs in the above publications.

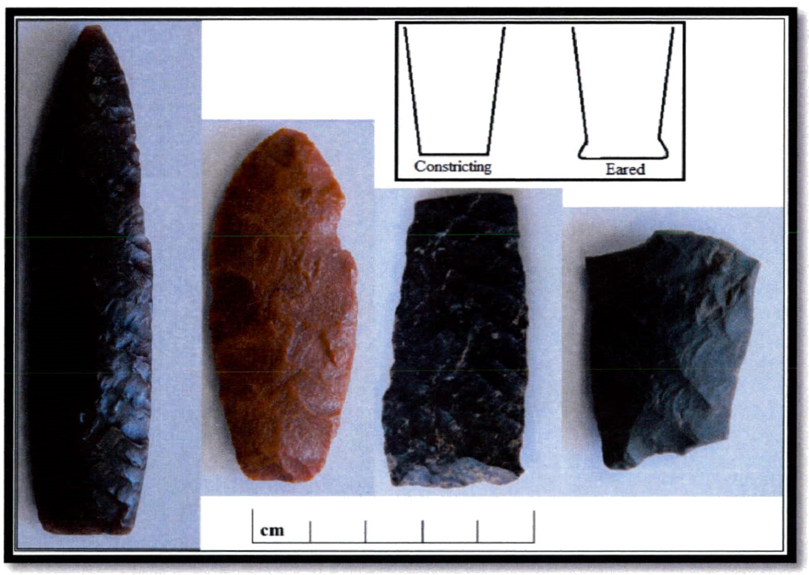

Figure 8.9: Projectile points from the Quetico/Superior Complex. The inset image demonstrates what morphological shapes are present within the assemblage using the Mackenzie 1 attribute analysis. Points include (left to right): the Pines site (DdJt-1a), DdJt-3, Lac De Mille Lacs (DfJo-3), and Lac De Mille Lacs: Pine Point. Photos taken by the author of material stored at the Ministry of Tourism, Culture and Sport in Thunder Bay, Ontario.

The complex consists of approximately five projectile points from the Pines site (DdJt-1) and Sturgeon Sand Spit site (DcJv-1). These sites occur on the Campbell level of glacial Lake Agassiz (Fox, 1980). The projectile points are lanceolate in form, demonstrating constricting and eared lateral edge shapes with straight, concave, and convex basal configurations (Figure 8.9). It is difficult to determine the flaking pattern from the photographs, but parallel oblique and collateral appear to dominate this small collection. There is one particularly long projectile point, made of chert that demonstrates parallel oblique flaking with an attempt at the blending technique. It does have a slight medial ridge on the dorsal surface prohibiting full transverse flake scars to be removed. However, this technique is similar to the examples from Mackenzie 1. It is possible the entire collection has not been published, and some specimens exist only within the Quetico Park Pavilion collection.

8.4.5 Lake of the Woods/Rainy River Complex

The Lake of the Woods/Rainy River Complex consists of approximately forty projectile points that have been published (Haywood, 1989; Magner, 2001; Reid, 1980). It is possible more

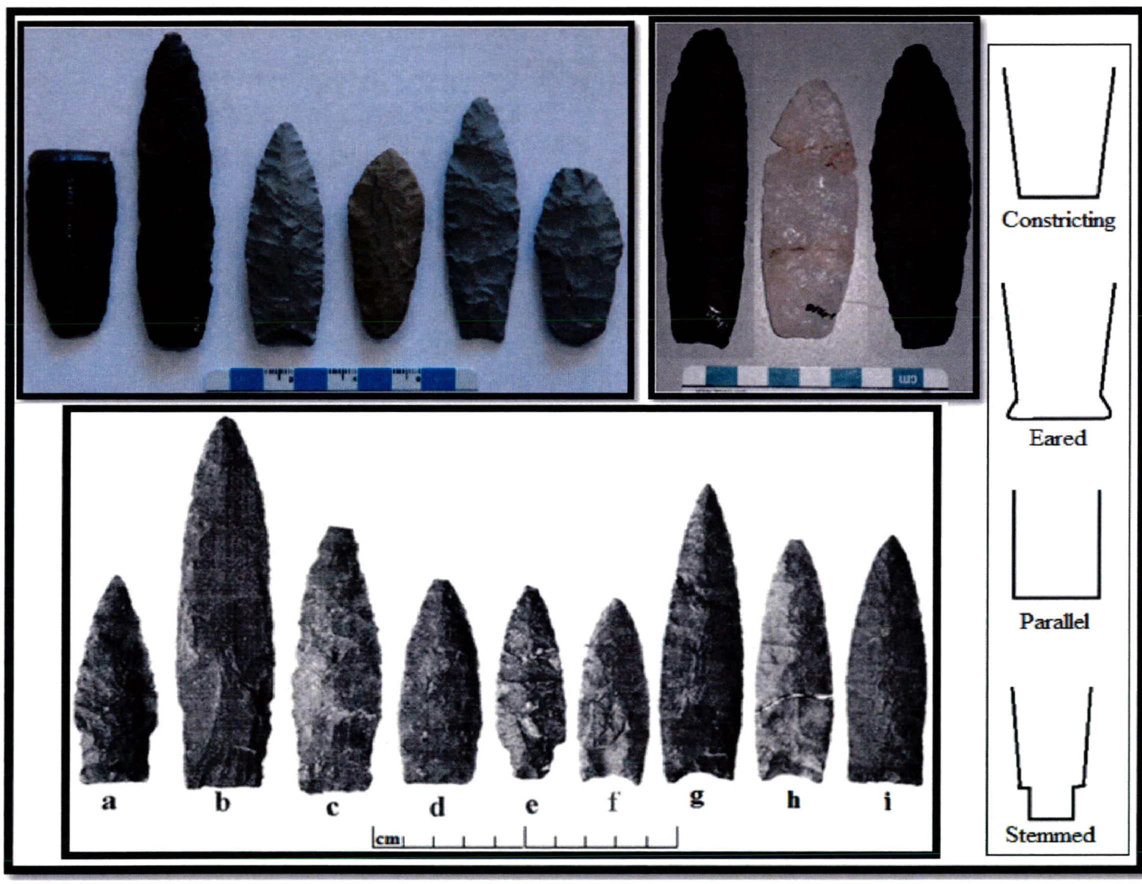

Figure 8.10: Image demonstrating the wide range of variability within the Lake of the Woods/Rainy River Complex. The top left photo consists of finds made along Rainy River. The top right photo is three points recovered from Lake of the Woods. The image on the bottom represents a portion of the Brenning Collection; a to e: stemmed specimens, f to i: 'Plainview' type points. The image along the far right is the morphological types identified within the Mackenzie 1 assemblage that appear in the Lake of the Woods/Rainy River Complex also. Top photos taken by the author; the left from material at the Ministry of Tourism, Culture and Sport in Thunder Bay, and the right with permission from Bill Ross. The bottom image is modified from Magner, 2001: Figure 5 and 6.

specimens from the area exist but are held in private collections and unavailable for analysis (see Chapter 3).

In order to conduct a comparative analysis on the specimens using the Mackenzie 1 approach, photos were utilized from Magner's (2001) publication. The lateral edge shape of the projectile points comprising the complex can be attributed to the constricting, stemmed, eared and parallel sided groups that the Mackenzie 1 assemblage displays (Figure 8.10). The stemmed specimens have straight basal concavities, while the other groups exhibit straight, concave and convex basal configurations; there is also a high representation of lateral basal protrusions or 'ears'. The variation within the flaking pattern includes collateral, irregular and parallel oblique. The distribution of Knife River Flint within the complex is restricted to the immediate southern portion of Lake of the Woods at a site on Pine Island (Magner, 2001). Moving east along the Rainy River, the dominant materials at archaeological sites increasingly becomes Knife Lake Siltstone/Lake of the Woods Chert, green rhyolite (found within the Knife Lake Siltstone/Lake of the Woods Chert outcrop) and taconite (Ross, 1995). The only exception to this pattern is a number of specimens arranged as a cache of large blade tools within the Pelland collection, located where the Little Fork River meets the Rainy River (Magner, 2001). The closer proximity to the Knife River Flint outcrops in western North Dakota could explain the representation of this material along the Manitoba/Ontario border. It is important to note that the source of this raw material is far removed from Pine Island, demonstrating either long distance exchange, or very large resource hinterlands.

There is a higher representation of stemmed specimens than in the Mackenzie 1 assemblage; however the eared, constricting and parallel sided specimens are very similar to the Mackenzie specimens. Parallel oblique flaking is less frequently evident, however it is exhibited on some specimens in the Plummer and Brenning collections (Magner, 2001). The majority of the constricting specimens exhibit the proximal constriction of the blade over half way up the total length of the projectile point, typically considered to be a western projectile point influence.

8.4.6 Reservoir Lakes Complex

The Reservoir Lakes Complex is reported across a large geographic area, and is represented by a large sample of projectile points. By employing the Mackenzie 1 approach, the variability in the Redepenning Collection can be exhibited; there is a large quantity (n=15) of stemmed specimens demonstrating straight, concave and convex basal configurations. Some of the stemmed specimens exhibit lateral basal protrusions or 'ears' (Figure 8.11). The remaining projectile points (n=10) represent the constricting and fishtail varieties with straight and concave basal configurations.

One specimen in particular is of the fishtail variety and is one of the only examples of that lateral edge shape in all of the complexes making up the Interlakes Composite. However, it has gone generally unnoticed because Harrison et al. (1995: 48) identifies the Redepenning Collection fishtail specimen as being similar to the Hell Gap type, while simultaneously acknowledging the excurvate lateral basal edges: "[s]quatter than a typical Hell Gap specimen and with a somewhat expanding fishtail-like base rather unlike the normal, tapered version, it still comes closer to this form than to any of the other Plano point types" (Harrison et al., 1995: 48). There is another projectile point of the fishtail variety found in Minneapolis, MN and has been identified as a Clovis extension from the southeast into Minnesota (Steinbring, 1974). This specimen is not considered part of the Reservoir Lakes Composite by Ross because it was recovered from south of the composite boundary (pers. comm., 2013).

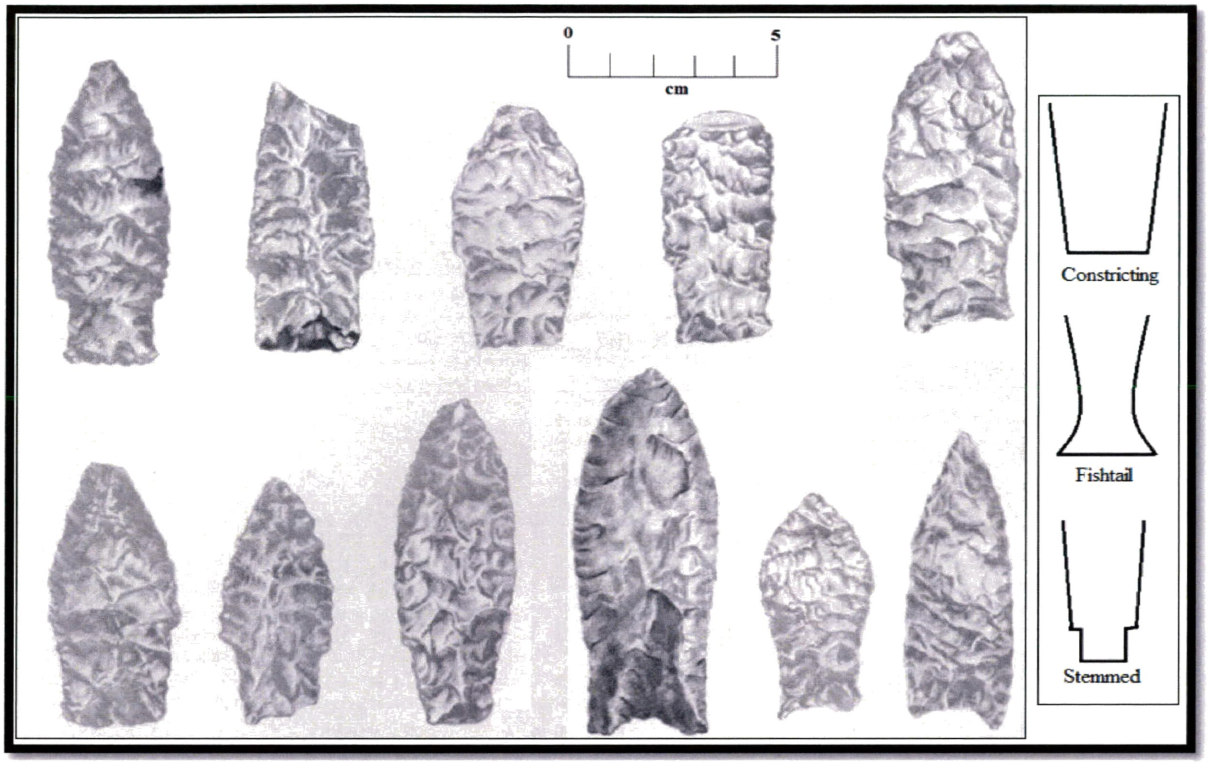

Figure 8.11: An image from Chapter 2 of a sample of projectile points from the Reservoir Lakes Complex. On the right is the morphological shapes created to demonstrate the variation within the Mackenzie 1 assemblage, representing the types observed in the Reservoir Lakes Complex. It is the only other complex within the Interlakes Composite demonstrating the Fishtail variety. Modified after Steinbring, 1974: Fig. 1 and 2.

There are similarities noted between the “Plainview-like” projectile points from the Brenning collection that consists of approximately 20 lanceolate projectile points and were located near Rainey River, Minnesota (Magner, 2001). The dominant flaking pattern on the Redepenning Collection is collateral, with minimal presence of horizontal and parallel oblique flaking. In the past, type names have been applied to describe the Reservoir Lakes Complex that include Scottsbluff, Agate Basin, Eden, Hell Gap and Plainview.

8.4.7 Other Regional Examples

Other known archaeological recoveries from northern Minnesota and Wisconsin were introduced in Chapter 3, and consist of fluted examples that include surface finds held in private collections. The fluted specimens have been recovered from Round Lake in northern Minnesota, and near Pine City, Minnesota within the Neubauer Collection. As mentioned previously, the only comparative materials came from photographs obtained through published journals or photographs belonging to colleagues. The projectile points of northern Minnesota characteristically demonstrate constricting lateral edges, with concave basal configurations. The appearance of a 'flute' on many of the specimens suggests affinity to Clovis, Folsom, Gainey

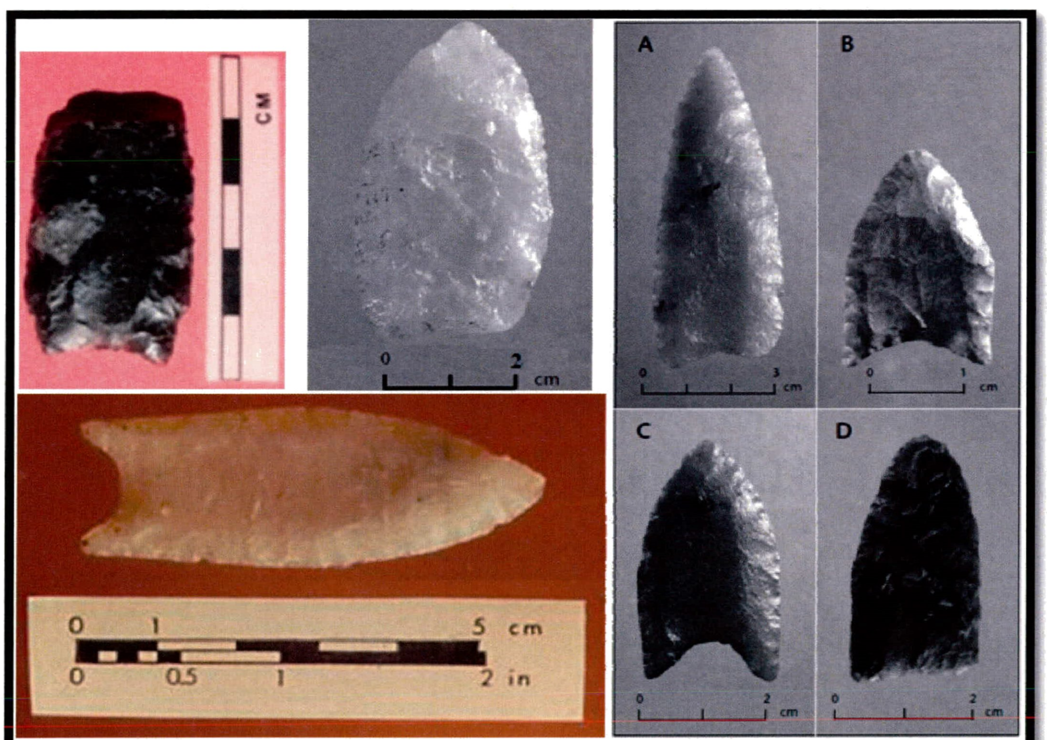

Figure 8.12: Photos demonstrating the regional examples of 'fluted' projectile points. The top left image was found in Pine City by Tony Romano (image from Bill Ross, 2012). The top middle image is from Pine City also and is part of the Neubauer Collection (Mulholland and Mulholland, 2010). The image on the right consists of four fluted points: A= Clovis, B= Folsom, C= Gainy, D= Holcombe (Mulholland and Mulholland, 2011). The bottom left image is a projectile point from Round Lake, Itasca County that is no longer available for analysis (it has either been sold or has gone missing; Bill Ross, pers. comm., 2012. Photo from Bill Ross, 2012).

and Holcombe types in the literature. This may reflect the northern-most expression of the fluted point tradition in the upper Midwest as no similar finds have been found to the north in Northwestern Ontario to date.

Within the Neubauer Collection, there appears to be evidence for the Folsom technique of basal thinning (Figure 8.12). The remaining specimens discussed here could be subject to debate whether they are truly 'fluted' projectile points as opposed to basally thinned points. The definition offered by Bradley and Frison (1996: 44) is used here to define that character of basal fluting on a projectile point: "a flake scar that travels from the base past the point of the hafting element" (i.e., basal lateral grinding). Examining the photographs available from northern Minnesota, it appears that most of the projectile points deemed 'fluted' do not conform to this definition. Therefore, it could be argued that the 'fluting' recorded on projectile points in northern Minnesota is actually basal thinning. However, further examination of the actual projectile points (not simply relying on photos) is required to fully corroborate the evidence (to determine specifics of the hafting portion, e.g., the extent of lateral grinding).

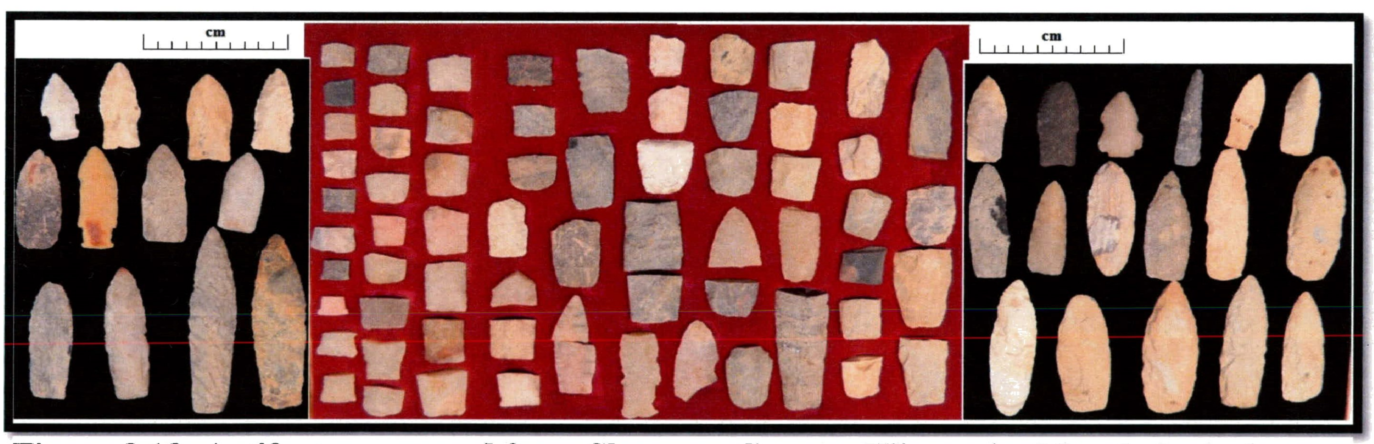

Figure 8.13: Artifacts recovered from Shawano County, Wisconsin. Morphological shapes include constricting, eared, stemmed and parallel varieties. The stemmed points characteristically display the lateral basal protrusions, or ears that are commonly found on other projectile points from Wisconsin (i.e., Minocqua). The photos were taken by the author and used with permission from Ray Reser, 2013.

A collection from north central Wisconsin that was surface collected in the late 1980's is currently undergoing research and documentation (Figure 8.13) (Ray Reser, pers. comm., 2012) (Chapter 3). The assemblage consists of approximately eighty complete projectile points, 70-80 basal fragments, plus additional formal tools (such as bifaces, adzes, drills, and scrapers) and expedient tools (Ray Reser, pers. comm., 2012). While the majority of the projectile points appear extensively reworked or fractured, among the complete points there is a subset that appear to be unused. This is similar to the Mackenzie 1 assemblage where there are projectile points in different use-life stages; that is, projectile points were being manufactured, utilized and discarded at the same site. The assemblage consists predominantly of Hixton and rhyolite raw materials, with small representations of other materials, including taconite, basalt, KLS, various cherts, and quartz. Comparisons between this collection and established types in the literature suggest Scottsbluff, Agate Basin, Hell Gap and Angostura affinities (Ray Reser, pers. comm., 2012).

Considering the Shawano County assemblage using the Mackenzie 1 attribute approach illustrates some significant morphological similarities that appear to suggest some spatial trends. The specimens were examined using photographs taken from the author or provided by Ray Reser, physical descriptions provided by Reser, and a brief physical examination by the author. The assemblage consists of projectile points demonstrating constricting, parallel sided and stemmed lateral edge shapes; many of the stemmed specimens display lateral basal protrusions, or ears. The majority of basal configurations are straight and convex, with minimal representation of concave bases. The flaking pattern is predominantly collateral, resulting in a medial ridge, however horizontal transverse and some instances of parallel oblique flaking are present (Ray Reser, pers. comm., 2012).

8.4.8 Spatial Considerations of the Co-occurrence of Attribute States

A majority of the projectile point specimens with constricting lateral edges from the Shawano County site demonstrate a long hafting portion, with the maximum width occurring over half way up the blade from the base, and a straight or convex basal configuration. This co-occurrence of attributes defines a dominant morphological shape that is observed in other complexes within the Interlakes Composite, specifically with the Lake of the Woods/Rainy River Complex and the Reservoir Lakes Complex (see above). These technological commonalities recovered from adjacent areas in North America may indicate cultural relatedness (discussed below).

The same distribution can be observed regarding the stemmed specimens that appear persistently in all of the complexes within the Interlakes Composite. The Lakehead, Lake of the Woods/Rainy River, and Reservoir Lakes Complexes all demonstrate the co-occurrence of stemmed lateral edge shapes and straight basal configurations; this projectile point shape is also reported in the Shawano County assemblage. This shape is also characteristic of the poorly defined Flambeau and Minocqua Phases of northern Wisconsin; a pattern that was also reported by Bill Fox (1975; 1980) and Bill Ross (1995), while lacking available data to confidently confirm their suspicions. Since their definition by Salzer in 1974, the Flambeau and Minocqua Phases have remained comparatively under-reported and poorly defined, but perhaps the Shawano County site will offer new interpretative insight as analysis and publication proceeds.

The persistent appearance of the stemmed lateral edge shape with a straight basal configuration and slight, lateral basal protrusions in the Western Great Lakes region is significant. The stem projectile point attribute is considered a western trait, originating in the High Plains with the Scottsbluff and Eden cultures (see Chapter 2 for full discussion of western projectile point characteristics) (Justice, 1987). The lateral ears observed on stemmed specimens may be present but are rarely observed on projectile points from the Plains (see Chapter 2 and Chapter 3). It is likely that the appearance of these lateral basal ears in the Western Great Lakes region can be attributed to a regional innovation.

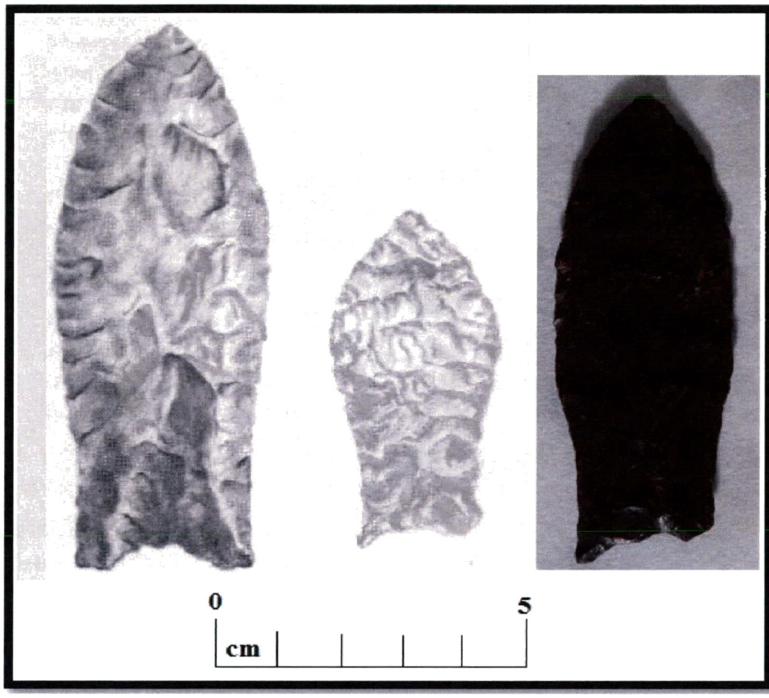

Figure 8.14: There are only two projectile points within the entire Interlakes Composite that demonstrate the Fishtail morphological shape. The far left specimen was found on the Mississippi Riverbank in Minneapolis. It is not considered as part of the Interlakes Composite because it was recovered south of the composite boundary. The middle point was found at Island Lake and is currently within the Redepenning Collection, and considered part of the Reservoir Lakes Composite; the point on the right is from the Mackenzie 1 site (WHS-P-04846). Image on the left and in the middle were modified from Steinbring, 1974: Figure 1 and 2.

The projectile point type with constricting lateral edges has been observed in all of the complexes within the Interlakes Composite. It is generally defined by a gradual constriction from the midpoint of the blade to the base, and is usually associated with a concave basal configuration. This co-occurrence of attributes has been observed in the Lakehead, Quetico/Superior, Lake of the Woods/Rainy River, and Reservoir Lakes Complexes. The eared category within the constricting type has been observed in the Lakehead and Lake of the Woods/Rainy River Complexes, with minimal representation (if any) in the remaining complexes of the Interlakes Composite. The most striking constricting variety is the subtype defined by the fishtail lateral edge shape (Figure 8.14). This configuration has only been observed in three examples; one from the Lakehead Complex (Mackenzie 1 site), and two from the Reservoir Lakes Complex (Minneapolis point (Steinbring, 1974) and in the Redepenning Collection (Harrison et al., 1995). All three specimens demonstrate the same co-occurrence of attribute states; excurvate lateral hafting portion with a concave basal configuration. This morphological shape is characteristically observed in projectile points from eastern North America (discussed more below).

The spatial distributions of the various flaking patterns are more difficult to discern. The parallel oblique flaking pattern, or a variation of it (see Chapter 6) has been observed in all of the complexes within the Interlakes Composite. However, it is not observed to varying degrees at other Lakehead Complex sites (or anywhere within the Interlakes Composite) in the same frequency as is the case at the Mackenzie 1 site. Two alternative explanations can be offered. One possibility is that this specific flaking pattern was practised to overcome the structural inconsistencies within the poor quality raw material (taconite). This style has a minimal representation within the Reservoir Lakes and Lake of the Woods/Rainy River Complexes, both characterized by heavier reliance upon Knife Lake Siltstone as opposed to taconite. Gary Wowchuk (pers. comm., 2012) offers the suggestion that since siltstone is more malleable with fewer internal flaws, the parallel transverse flaking might not have been required. As a result, reduced representation of the parallel oblique pattern would be expected.

Countering this perspective is the observation that parallel oblique flaking appears on projectile points (to varying degrees of expression) in many Lakehead Complex sites, virtually all of which are characterized by overwhelmingly high use of the challenging taconite raw material. This would suggest that the parallel oblique flaking pattern was executed to highly variable degrees throughout the Interlakes Composite region, but becomes increasingly rare south of the Lake Superior Basin. Also of note, this flaking pattern becomes increasingly prominent among the most northerly of Lakehead Complex sites, and characterizes the vast majority of projectile points (and also in other formal and informal tools) at the Mackenzie 1 site.

The same raw materials are present with varying degrees of representation in all of the Interlakes Composite complexes and in Shawano County. This indicates interaction between groups via trade and exchange, and could possibly imply group(s) obtaining materials through seasonal migration, a commonly observed pattern in southern Ontario Paleoindian sites (Deller and Ellis, 1988; Ellis and Deller, 1997).

The cross section of projectile points is a reflection of both the raw material and the flaking pattern chosen during the manufacture process (Chapter 4). This can also have implications for the expression of stylistic preferences during projectile point creation (see Chapter 4). The variation observed within the cross sections within the Mackenzie assemblage is relatively narrow, with lenticular shapes dominating the assemblage. Similar variation is observed throughout the Lakehead Complex and the Interlakes Composite, where the majority of cross sections present within assemblages are lenticular or diamond shaped. This may indicate that a similar manufacture process was ongoing throughout the region, possibly suggesting at least some form of interaction with the trade and exchange of idea.

8.4.9 Regional Influences

As part of this analysis, an extensive literature review was conducted to consider Paleoindian projectile point types observed beyond the immediate Lake Superior Basin. This led to a sense that attributes observed locally also appear non-locally. This section offers a review of those similarities in trait expression that may suggest cultural linkages.

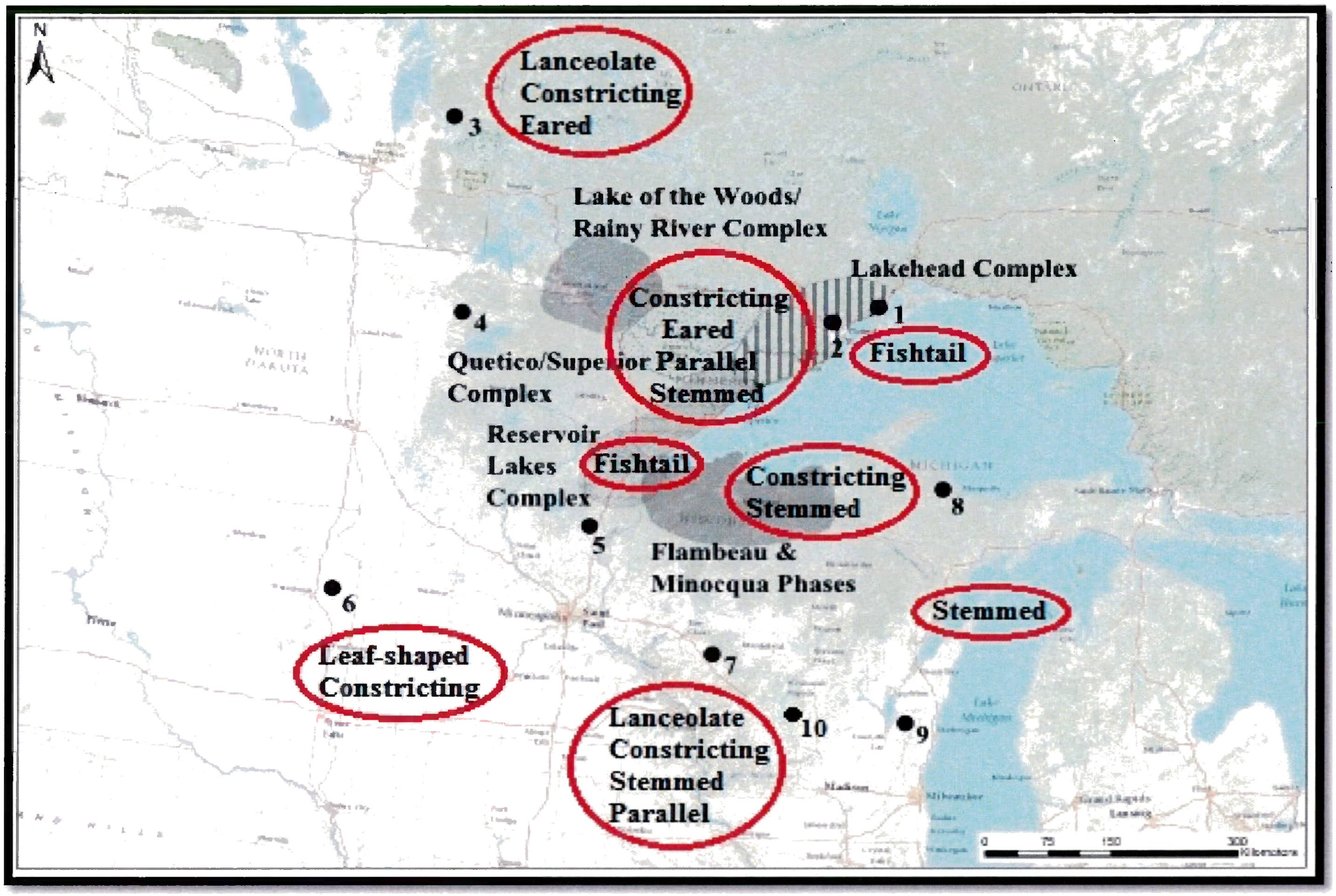

Figure 8.15: Map demonstrating the spatial distribution of some of the morphological shapes throughout the Interlakes Composite area, with eastern and western variations. 1) Brohm, 2) Cummins, 3) Sinnock site, 4) Round Lake, 5) Pine City, 6) Brown's Valley, 7) Silver Mound, 8) Gorto, 9) Renier, 10) Shawano County. Map from Chapter 3: Figure 35, modified from Ross, 1995.

East

There are a series of sites located relatively close to the Lake Superior Basin that have yielded projectile points with similar attributes to those from the Mackenzie 1 site. These sites include the Gorto (northern Michigan) (Buckmaster, and Paquette, 1988) and Renier (eastern Wisconsin) (Mason and Irwin, 1960) sites, the unpublished site from Shawano County (central Wisconsin) (Ray Reser, pers. comm., 2012) and, the Flambeau and Minocqua Phases (northern Wisconsin) (Salzer, 1974) (Figure 8.15). These sites yield projectile point assemblages that include stemmed varieties, the majority of which also exhibit lateral basal protrusions. The Shawano County and Flambeau/Minocqua assemblages have been discussed above, however the stemmed projectile point variety observed in the Interlakes Composite does extend further east to Lake Michigan.

The Gorto site is believed to be a human cremation site based upon observations of a large pit feature with associated post molds; however no evidence of bone was discovered. Buckmaster and Paquette (1988) excavated the site, and recovered 86 highly fragmentary, fire-cracked points and point fragments demonstrating either stems or side-notches. All projectile points except for five were manufactured from Hixton, and the majority exhibited lateral basal protrusions. The projectile points exhibit fine collateral and horizontal transverse flaking. Side-notched projectile points were also discovered at the site. This raised controversial questions regarding their contemporaneity with a Paleoindian burial site. This has led some to suggest that the stemmed points and the side notched points are contemporaneous in the east (Bill Ross, pers. comm., 2012).

The Renier Site was investigated by Mason and Irwin (1960) and yielded fragments of twelve projectile points, ten of which could be reconstructed. The stemmed projectile points were discovered as fire-shattered fragments in association with calcined bones of an undated human cremation. The flaking pattern on the majority of the projectile points was collateral and oblique transverse.

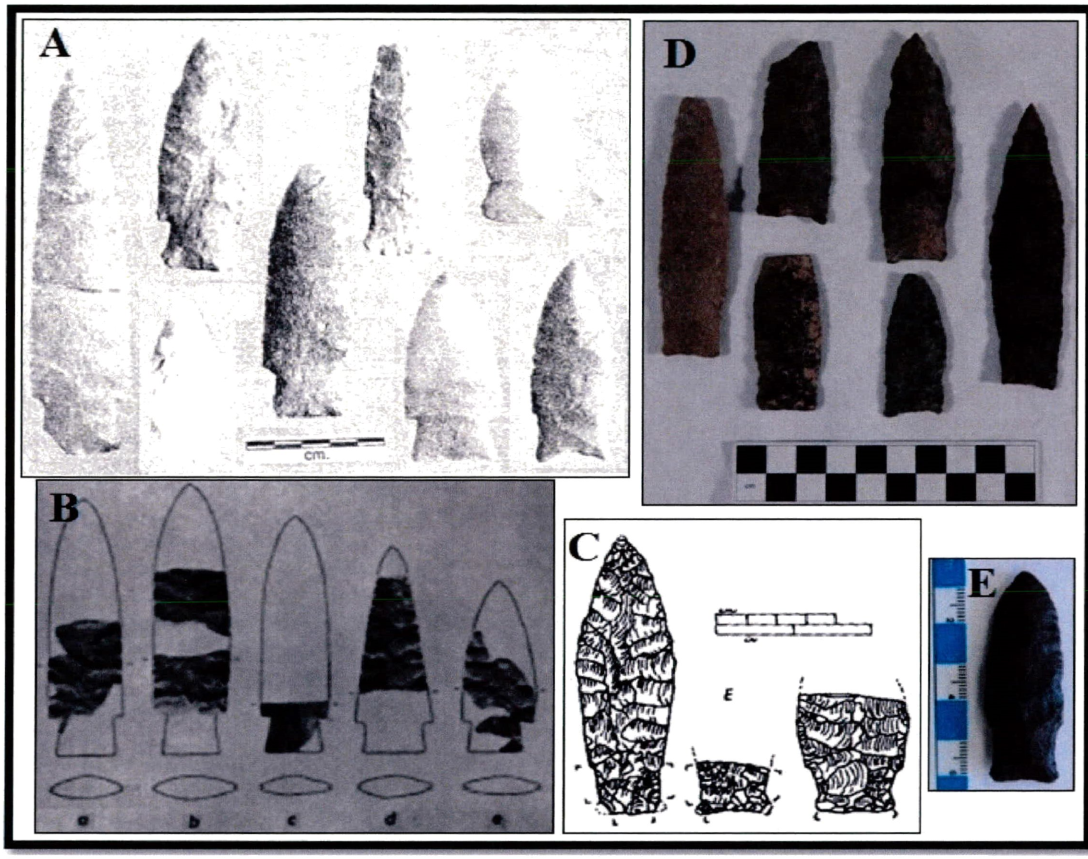

Figure 8.16: A series of five images demonstrating the stemmed varieties found within the Lakehead Complex (C, D & E) and stemmed projectile points from eastern sites for comparison (A & B). Image A represents projectile points from Gorto; B is fragments from Renier; C is the projectile points representing the Minocqua Phase of northern Wisconsin; D are the stemmed specimens from Mackenzie 1; and E is a stemmed point from the Cummins site. Image A modified from Buckmaster and Paquette, 1988: Figures 5 & 6. Image B from Mason and Irwin, 1960: Figure 3. Image C from Salzer, 1974: Figure 2. Image E is a photo taken by the author of the material stored at the Ministry of Tourism, Culture and Sport in Thunder Bay, Ontario.

The Gorto and the Renier sites both demonstrate a similar assemblage; stemmed projectile points with lateral basal protrusions discovered in what is being interpreted to be a human cremation context. They both contain purposefully burned notched and unnotched projectile point forms, indicating a relative age for the two point forms. The technological attributes outlined above are common in the Flambeau/Minocqua Phases and are also associated with some point types assigned to the Interlakes Composite (Figure 8.16). Stemmed varieties (Scottsbluff and Eden) are rarely discovered east of the Mississippi Valley, suggesting a significant interaction between the groups of people living around the Western Great Lakes after the glaciers retreated (discussed more below) (Buckmaster and Paquette, 1988; Bill Ross, pers. comm., 2012; Mason and Irwin, 1960).

West

Archaeological sites located west of Thunder Bay yield long, slender lanceolate projectile points, such as some examples from Lake of the Woods/Rainy River. This general morphology appears stylistically comparable to the Caribou Lakes Complex (Sinnock Site; Chapter 3), which demonstrates some general morphological similarities to the Interlakes Composite, and could potentially indicate cultural contact through migration of people and/or ideas to or from Manitoba (see Figure 8.16).

The Sinnock Site demonstrates other attribute states that are common throughout the Interlakes Composite. This includes constricting and parallel sided projectile points, with straight, concave and convex basal configurations. However, these projectile points are relatively thick in proportion to their length, in contrast to the comparatively thin projectile points associated with Interlakes Composite assemblages. This could reflect the choice of raw material, which included rhyolite, chert and quartzite. The flaking pattern exhibited on the projectile points was predominantly collateral, while horizontal or parallel oblique flaking is reported (Chapter 3: Figure 3.11) (Buchner, 1984).

The relative lack of lateral edge grinding on Caribou Lake Complex tools forms a sharp contrast to those of the Interlakes Composite. Lateral edge grinding is present on the majority of projectile points in the Interlakes Composite, presumably to facilitate hafting purposes, but also appears on the blade of the finished points as remnants of the manufacture process. During the manufacture process the lateral edges are prepared with a platform to execute effective flake removal. The edges are ground to aid in establishing the striking platform to guide flake removal across the blade of the point. This is commonly found in many of the bifaces in the early stages of manufacture but is also evident on the finished points, and has become one of the most ubiquitous traits associated with the Interlakes Composite (Bill Ross, pers. comm., 2012). Interestingly, also in sharp contrast to the Interlakes Composite sites, lateral and basal grinding is rare within the Caribou Lakes Complex, and does not appear to be a factor in the functional considerations of platform preparation and hafting of projectile points.

The inconsistency surrounding the dated material from the Sinnock site leads some to question the contemporaneity of Caribou Lakes Complex, the Lakehead Complex and the Interlakes Composite (see Chapter 3; Bill Ross, pers. comm., 2013; Buchner, 1984; Canadian Archaeological Radiocarbon Database, accessed June, 2012). The former date is commonly the date accepted for the site, despite the questionable context.

Ross suggests that the Sinnock site represents "a last gasp of the Late Paleoindian traditions and/or beginning of the Archaic, consisting of an assemblage of transitional artifacts." (Bill Ross, pers. comm., 2013). The similarity to the Lakehead Complex is likely only in the most peripheral way because of the dominance of leaf shaped projectile points found at the Sinnock site, that are not present in the Lakehead Complex (Bill Ross, pers. comm., 2013).

8.4.10 Southern Ontario Comparisons

The projectile points recovered from sites in southern Ontario are relatively distinct stylistically, suggesting that they reflect a different group of northward migrating people influenced by different groups associated with the eastern United States. This southern Ontario migration has been extensively outlined by Ellis, Deller, and Roosa (Deller and Ellis, 1988). The early Paleoindian assemblages of southern Ontario consisting of fluted points may have influenced the appearance of those types in northern Minnesota. The fishtailed projectile point variety found in the Interlakes Composite is reminiscent of types distributed across the southeastern United States (Cumberland, Dalton), from Florida (Suwannee, Simpson) to Ontario (Cumberland, Dalton), therefore, the appearance of the trait in the Superior Basin may not have necessarily originated in southern Ontario. The Holcombe Beach site can also be considered influential, but appears as though the influence of the Holcombe projectile point style was not as significant in the Superior Basin. The Holcombe projectile points demonstrate a high frequency of basal fluting, achieving superficial morphological correlations to the Clovis tool types because in some cases, the length of the basal thinning flakes do not surpass the lateral edge grinding for hafting (see above definition of a 'flute' by Bradley and Frison, 1996 : 44) . While projectile point size does not appear to be an effective means of distinguishing between point types, the Holcombe points tend to be much smaller and thinner than other types. A Holcombe point has been identified as far west as Minnesota (Bearskin Point site), however it is a single recovery with no stratigraphic context and no clear definition of what constitutes a 'flute' (Mulholland and Mulholland, 1998). If the Bradley and Frison (1996: 44) definition is applied to the specimen then it is technically not a 'flute', but rather represents basal thinning (see Figure 8.13). In some cases the Holcombe projectile points demonstrate basal thinning flakes that do exceed the lateral edge grinding, but some do not, raising questions about the close affinity to the Clovis culture that has been claimed in the past (see images in Fitting et al., 1966 and Wahla and DeVisscher, 1969). It is unlikely that southern Ontario projectile points had any significant influence on the functional or stylistic preferences of the people who occupied the Western Great Lakes. More research is necessary to determine the physical extent of these influences, however only photos were available for this thesis.

Migration likely occurred from both east and west, as attributes characteristic to both the High Plains and the eastern Woodlands of the USA and southern Ontario are present within the Mackenzie assemblage. For example, fishtail varieties and eared protrusions on stemmed specimens are not observed in collections west of the area between Agassiz and Minong, and the western characteristics, such as parallel oblique flaking and stemmed specimens are not observed in assemblages east of this area. Neither eastern nor western influence are dominant within the study area, but suggests indirect transmission of ideas from both east and west into this newly exposed area, bringing a mixture of stylistic influences.

8.4.11 Cultural Significance

The co-occurrence of a variety of western and eastern traits in the Western Great Lakes region could indicate a convergence of people migrating north into the exposed land available for occupation as the glacial ice retreated. Within the Interlakes Composite, Mackenzie 1 and the Lakehead Complex demonstrate a higher frequency of projectile points with similarities to sites from the west (i.e., Lake of the Woods/ Rainy River, Quetico/Superior, Reservoir Lakes) versus eastern sites (i.e., Gorto, Renier, and Shawano County). The variation within all of the complexes that combine to make up the Interlakes Composite is consistent; attributes states cannot be recognized as one type defined previously in the literature. The co-occurrence of attribute states within the assemblages that define each complex is significant because the same variation is observed within other assemblages. The narrow range observed locally within the Mackenzie 1 assemblage demonstrates that the variability observed throughout the Western Great Lakes region may represent one group or a small number of groups of people interacting and sharing the same cultural preferences expressed in the material culture.

The Mackenzie site is located in an area of land that would have been ice-free, bordered by glacial Lake Agassiz to the west, glacial Lake Minong to the southeast, and the glacier receding to the north. The people who came to occupy this peninsula of land likely migrated northward, carrying their technological and stylistic preferences with them. The characteristics that come to define the material culture in an area reflect influences from both the east and west It is significant to note that the parallel oblique flaking pattern is not observed on projectile point assemblages east of the Mississippi River (Bill Ross and Gord Peters, pers. comm., 2013). Tool assemblages discovered between glacial Lake Agassiz and Lake Minong have characteristically demonstrated a variety of influences in style and form, resulting in confusion during typological analysis.

Hinshelwood (2004) suggests that the variation in the Interlakes region is because of temporary occupation by many different groups of people. However, the variation could also be the result of both eastern and western technological traits influencing populations who migrated north into the area. It is more likely that the Mackenzie 1 site represents a habitation site utilized periodically over many years by one or more groups. The habitation site hypothesis is suggested by the large size of the site, with high density of debitage, exceptionally high recovery rates of formal/expedient tools, and a comparatively narrow range of stylistic variation evident on the points. This variation at Mackenzie 1 is observed in other archaeological sites within the

Interlakes region (albeit in much smaller samples of tools recovered from sites reflecting diverse functions), possibly representing group(s) migrating throughout the area participating in some form of trade and/or exchange. The highly mobile groups obviously interacted consistently over a long period of time and the variation can be attributed to the eastern and western influences as people migrated northward.

8.5 SUMMARY

Archaeological sites and discoveries reported from the western Great Lakes region reveals trends of commonality in terms of raw material choice and general morphology of projectile points. The variation found in the projectile points from Mackenzie 1 echoes the general variation evident in sites assigned to various complexes included in the Interlakes Composite. The important difference is that the unique size of this assemblage allows identification of trends and preferences in attribute expression that has not been possible previously when examining collections that seldom contain more than five to ten specimens each. From this data, comparisons were made to surrounding sites and collections that revealed some interesting trends. The limited variability in general shape morphology at Mackenzie 1 is consistent with finds reported from Minnesota, and Wisconsin and even found southeast at sites in Michigan. Moving west, the same wide range of variability can be seen into the Quetico/Superior and Lake of the Woods/Rainy River areas, and even into Manitoba. There is also a noticeable overlap of the general projectile point shape morphologies in all of these areas. Fishtail varieties are found in the Reservoir Lakes region; the stemmed varieties (some demonstrating basal ears) are common from the southeast, at sites such as Renier, Gorto, Shawano County and encompasses the Minocqua and Flambeau Phases of northern Wisconsin.

Other similar shapes of the general lanceolate variety are found in Quetico/Superior, Lake of the Woods/Rainy River and west to the Sinnock site in Manitoba.

This overlap in general shape morphology and the high instance of projectile point variability recovered from one site is possibly indicative of several highly mobile groups of people utilizing the area from Manitoba to northern Michigan, all across the Superior Basin. The greatest overlap in general morphological shape is evident between the private collections photographed by Magner (2001) from the Lake of the Woods/Rainy River area and the Mackenzie assemblage. Two differences observed between the Lakehead Complex and the other Interlakes Composite sites is the overwhelming use of local raw materials in each area and the flaking pattern; the appearance of the parallel oblique pattern evident on the majority of projectile points from the Lakehead Complex is indicative of a different manufacture process (to maximize the use of taconite because it is available locally) or stylistic influence.

CHAPTER 9

SUMMARY AND CONCLUSION

9.1 SUMMARY

A central objective of typological analysis is to characterize the modal expression of diagnostic tool types that are thought to reflect cultural historical meaning compared to other types in an established chronology. This tends to result in less attention being paid to subtle variation that is deemed trivial for differentiating between types with supposed cultural historical meaning. In contrast, this thesis sought to explicitly document morphological variability evident in the 380 projectile points recovered from the Mackenzie 1 site. At one level, this focus on subtle morphological variation reflects a return to classificatory descriptive analysis (Willey and Sabloff, 1993), and not the 'classic' cultural historical approach to typology. The classic approach more often involved assigning specimens to pre-existing named types defined in the published literature.

In the past this practise of relegating objects into the most appropriate typological category was necessary when dealing with Lakehead Complex sites. These recoveries often revealed considerable variability of form, each represented by no more than one or two projectile points per site. As these recoveries often did not have interpretable stratigraphic context, it was not clear whether the various types reflected contemporaneous or successive occupation. The Mackenzie 1 site excavation has yielded a uniquely large assemblage of projectile points, thereby enabling a systematic examination of the range of morphological variation exhibited in a Lakehead Complex projectile point assemblage, and identify traits and trends that best characterize this late Paleoindian culture. However, it is important to note that the Mackenzie 1 site likely represents repeated occupation events with poor stratigraphic and temporal control, so we still remain uncertain about the meaning of variability in projectile point form, although it is now possible to address meaningful variability within the sufficiently large assemblage.

After initial examination of the collection, a series of attributes were selected that are generally consistent with those used in other Paleoindian typological exercises, and were believed to be sufficient to represent the range of trait expression noted in the collection. This involved collection of both metric and non-metric trait information. The projectile point analysis revealed an unexpectedly narrow range of morphological variability despite the dimensional variability of the specimens. The most analytically important attributes were lateral edge shape (haft area) and the degree of basal concavity. Secondary attributes that were significant in further documenting variability include flaking pattern, tool cross section, and degree of lateral and basal edge grinding. Five types were identified based on the lateral edge shape; constricting, eared, fishtailed, parallel sided and stemmed (see Chapter 6: Results), with various basal configurations including deep, low, straight, and convex (see Figure 6.18).

Interestingly, 99% of the Mackenzie 1 assemblage demonstrates a parallel oblique flaking pattern (with varying degrees of success), utilizing a blending technique so that the flake scars appear to extend transversely across the ventral and dorsal surfaces (see Figure 7.17). This pattern is discussed more fully below. Also important, the balance of the assemblage also demonstrates lenticular cross sections, with a distinct twist occurring down the length of the tools. A high incidence of basal/lateral edge grinding (presumably to facilitate hafting) was also observed. However, interpretation of this trait is complicated by the fact that such grinding might reflect edge preparation for further flaking on not yet complete points, hafting preparation or even wear deriving from expedient tool use other than as a hunting weapon.

Upon completion of the attribute analysis, the identified types were then considered relative to other assemblages assigned to first the Lakehead Complex and then the Interlakes Composite. This comparison sought to determine whether the attribute states observed at Mackenzie 1 have relevance and utility in considering other similar assemblages found throughout the western Lake Superior region. The morphological variation observed in collections assigned to the Lakehead Complex is consistent with that observed in the Mackenzie 1 projectile point assemblage. When the Mackenzie 1 assemblage was compared to those associated with the Interlakes Composite morphological similarity was again observed. This suggests that the various collections available all derive from the same cultural-technological 'stock', and that the typology developed for Mackenzie 1 has broader regional application.

It was noted that none of the assemblages assigned to either the Lakehead Complex or the Interlakes Composite exhibit the same high frequency of the parallel oblique flaking pattern that was observed at Mackenzie 1. While some might attribute this to sample bias, the author points out the low but persistent appearance of parallel oblique flaking in other regional assemblages, but extremely high expression at Mackenzie 1. This is a compelling pattern that will be addressed more fully below.

While Mackenzie 1 is a very large site that was likely repeatedly used over an extended period of time, depositional circumstances, limited absolute dating, and the standard Boreal Forest taphonomic problems do not permit consideration from a stratigraphic perspective, (i.e., technological change through time). However, a surprising degree of technological uniformity is suggested by the comparatively narrow range of morphological variation (with numeric dominance of a few specific types), coupled with the very high instance of parallel oblique flaking on all morphological types. This might offer insight into the temporal duration of site occupation and the cultural diversity of its occupants.

9.2 EXTRA-REGIONAL COMPARISONS: NORTH AMERICAN IMPLICATIONS

The Mackenzie 1 site has significant implications for North American archaeology. Its projectile point assemblage resembles a number of the 'named types' featured in the established late Paleoindian point taxonomy, leading the author to question the cultural and temporal utility that is sometimes assigned to these named types. Attaching type names to this assemblage may inappropriately imply temporal, economic and geographic meaning relevant to Paleoindian occupation elsewhere in the continent. To illustrate this point, using the 'classic' typological approach, the Mackenzie 1 assemblage contains examples with traits reminiscent of Goshen, Plainview, Dalton, Cumberland, Suwannee, Simpson, Scottsbluff, Eden, and Jimmy Allen/Frederick/Angostura. The assemblage contains technological traits noted throughout much of North America, but the collection does not fit 'perfectly' into any specific named type. Rather, it contains specimens that are reminiscent of several.

9.2.1 North American Influences

The parallel oblique flaking pattern observed as a dominant trait with the Mackenzie assemblage has also been reported in the literature deriving from the west that include Jimmy Allen, Frederick, Brown's Valley and Angostura (see Chapter 3: Study Area and Chapter 7: Discussion). It is possible that the parallel oblique flaking pattern observed sporadically on recoveries from throughout Northwestern Ontario (but frequently at Mackenzie 1), may owe its derivation from the Great Plains of the United States.

However, the Mackenzie 1 parallel oblique flaking style has a different expression that seems to be unique to the site (or perhaps the Lakehead Complex). It differs from the others listed above since it appears that the knappers sought to make the flake scars appear to 'travel' transversely across the ventral and dorsal faces by utilizing a blending technique (see Chapter 5: Methods). The locally observed parallel oblique flaking pattern is superficially similar to that observed elsewhere, however it is unique in producing long, slender flake scars on such brittle material at a surprisingly high success rate. This involved removing parallel rows of long narrow flakes (usually orientated from lower right to upper left). This often resulted in flake termination about half to two thirds of the way across the face. The knapper then 'flipped' the tool end for end, in order to detach another row of narrow parallel flakes from the opposite edge that were oriented at the same angle, and which terminated 'in line' with the flake scars originating from the opposite side (see Figure 7.17). The complexity of this operation and its widespread expression throughout the assemblage is extraordinary. None of the other extra-regional expressions of parallel oblique flaking cited in the literature exhibit the unique feathering or blending to give the appearance of a transverse flake scar (see Chapter 3 for examples). It is possible that the people who came to occupy the Mackenzie 1 site were not necessarily influenced by the ideas from the southwest, but developed the same idea independently, either to serve a functional objective (related to working with taconite), or a stylistic and/or cultural one that was unrelated to the technical demands of the raw material. The question of mechanical versus symbolic function will be addressed again below.

The Hell Gap (Irwin-Williams et al., 1973) and Agate Basin (Frison and Standford, 1982) sites are frequently cited in the literature as important type sites that offer cultural-historical interpretative meaning to the late Paleoindian projectile point sequence. This reflects their importance for establishing a regional chronology based upon intact stratigraphy, coupled with reliable absolute dating. The patterns apparent in these High Plains contexts were then extrapolated to aid interpretation of similar finds from a much wider geographic area, but which often lack good stratigraphic or temporal control. It is this process of extrapolation that is at issue. Specifically, can the High Plains typology be appropriately applied over thousands of square kilometres, including the deglaciating south-western flank of the Canadian Shield.

Consideration of the Mackenzie 1 site assemblage within the established North American chronology is difficult. Archaeological sites and associated projectile point assemblages are dated based on absolute or relative dates. Absolute dates usually reflect radiocarbon dating, while relative dates often reflect comparison to the named (and dated) types established in the literature. If considered within the broader North American context, the variability exhibited on the Mackenzie 1 site projectile points could span approximately 3,000 years with a co-occurrence of attribute traits exhibiting influences from both the east and the west. The lack of absolute (radiocarbon) dating evidence is a common dilemma in the boreal forest environment.

9.3 THESIS OBSERVATIONS

Analysis of the Mackenzie 1 projectile points offers generalizations relevant to both the Lakehead Complex, and the Interlakes Composite. Observations demonstrate the apparent cultural relatedness of assemblages from widely dispersed sites located throughout the region, and reinforces the impression that a relatively narrow range of morphological variability characterizes the projectile point assemblages from the region. Also important is the persistent appearance of parallel oblique flaking on a proportion of all projectile points recovered from sites throughout the area, but none reveals the numeric dominance apparent at the Mackenzie 1 site. This raises questions about why this difficult to execute flaking style was employed.

Repeated patterns evident within tool typologies might reflect common production sequences, tool finishing and use wear. Such patterned variation also implies cultural learning that likely varies across geographic space (reflecting discrete social units) and through time (evolution of those cultural norms). These traits might also reflect important symbolic functions related to group identity, etc. Differentiating such meanings in archaeological assemblages is a difficult challenge, but the frequent expression of parallel oblique flaking raises provocative questions.

As noted in Chapter 5, neither Wowchuk nor Wendt have been able to replicate this flaking technique. At least one offered the proposition that parallel oblique flaking might represent some sort of technological accommodation required to cope with the nature of the raw material (Gary Wowchuk, pers. comm., 2012). That is, the hard and brittle nature of taconite, with its highly variable concentrations of iron and silica, coupled with numerous internal flaws and fault planes makes it very difficult to thin the biface preforms. He speculated that the systematic flaking to produce parallel oblique flake patterns originated from steeply bevelled lateral edges might have offered some sort of technological advantage that countered the production of rather asymmetrical (twisted) cross sections. If this proposition has validity, then one would expect similarly frequent expression of this flaking pattern in other Lakehead Complex assemblages that also exhibit strong preferences for taconite use. While it has been observed at other sites (most notably the Brohm site), parallel oblique flaking has never been observed at such high frequency as was the case at the Mackenzie 1 site.

As an alternative explanation, perhaps the very high representation of the parallel oblique flaking pattern within the Mackenzie 1 projectile point assemblage (and also on other formal tools) indicates some form of isochrestic style expression (Sackett, 1977). The stylistic importance of parallel oblique flaking at the Mackenzie 1 site is further demonstrated with its frequent expression on tools manufactured from Hixton Silicified Sandstone and Knife Lake Siltstone (KLS). These raw materials are consistently reported in modest concentrations throughout the region in the Lakehead Complex and Interlakes Composite assemblages even though taconite forms the majority of the raw material.

While these raw material choices are commonly reported, parallel oblique flaking occurs much less frequently suggesting that the flaking pattern is not a functional requirement for knapping challenging materials. Indeed, it also appears on the more malleable raw materials such as KLS and Hixton.

The pattern appears to reflect some kind of cultural norm that is expected of the artisan in final tool production. To reiterate, this flaking pattern was attempted with varying degrees of success on 99% of the projectile point assemblage, and is present on some other formal tools as well. This is also observed during analysis of the biface preform sample reported in this thesis. It is generally thought that parallel oblique flaking occurred during the final stages of projectile point production as a stylistic 'last touch'. The Mackenzie 1 site biface assemblage demonstrates that actually occurred earlier in the biface reduction sequence, approximately around stage 4 (Gjende Bennett, pers. comm., 2013).

There is one notable exception from the generalizations offered about the consistency of tool form, cross section and parallel oblique flaking pattern. One specimen produced from non-local Hixton Silicified Sandstone demonstrates a diamond cross section, collateral flaking and a stemmed basal configuration (see Figure 7.18). This stylistic outlier indicates behavioural tendencies that fall well outside those normally observed within the Mackenzie 1 collection. Given that this specimen was produced from a non-local raw material, one might speculate whether it represents a lost or discarded projectile point that was transported in complete form from an extra-regional source. Another alternative is that it was produced locally from non-local raw material following a culturally mediated design template that sharply differs from that more commonly expressed in the Mackenzie 1 assemblage.

The traits that define the projectile point morphological types reported here indicate influences from both the east and the west. The spatial appearance of lateral basal ears on stemmed points in the western Lake Superior Basin may be attributed to a regional innovation demonstrating cultural preferences or a shared style between the groups occupying this region, making up the majority of the Interlakes Composite sites. These stemmed specimens that exhibit basal protrusions are generally observed exclusively around the western Great Lakes (Bill Ross, pers. comm., 2012; Gary Wowchuk, pers. comm., 2012). Western influences within the Interlakes region include the stemmed specimens and the parallel oblique flaking pattern that is characteristically observed on projectile points found west of the Interlakes Composite region. However, the presence of the basal lateral protrusions (ears) on stemmed specimens is stylistically observed in the east (Justice, 1987), which demonstrates variability within the Interlakes Composite region that indicates influences from east and west simultaneously. Similarly, the fishtailed and eared specimens demonstrate morphological shapes characteristically observed within projectile point assemblages from eastern North America, but demonstrate parallel oblique flaking which is generally considered a western trait. The convergence of eastern and western influences may be attributed to the funnel-like nature of the lands found between two pro-glacial lakes, Agassiz and Minong, where people migrating northward brought a mix of technological and stylistic preferences from diverse sources.

9.4 CONCLUSION

The expression of style is defined as a highly specific and characteristic manner of doing something that is unique to a specific time and place (Sackett, 1977). At issue is whether stylistic variability reflects mechanical function intrinsic to how the tool is employed, or whether style might reflect a mode of non-verbal communication of information important to the cultural group. It is also recognized that these two dimensions of formal variability (mechanical and symbolic expressions of variation) might occur simultaneously. That is, there might be culturally conditioned design expectations required to fulfill the functional requirements of hafting and successfully using a spear tipped with a stone implement. There might also be characteristics embedded in the projectile point that have less to do with mechanical function and more to do with other intangible functions. For the sake of argument, this might include style of flaking or hafting or shaft decoration to identify the tool maker, to symbolize group affiliation, or perhaps even ‘hunting magic’ imparted to ensure success in killing prey. Of course, analytic confirmation of such alternative explanations is beyond this archaeological analysis, but frequently we observe pattern in attribute expression that defies mechanical explanation (i.e., Folsom fluting).

The basis of stylistic analysis is the recognition that there are many ways to reach the same end product. In some circumstances the culturally mediated ‘boundaries’ of what is an acceptable form might be quite liberal, resulting in considerable variation in the tools produced. In other circumstances there might be very narrow culturally-mediated proscriptions placed upon what is deemed to be an acceptable range of variation. The recoveries from the Mackenzie 1 site tend to suggest that latter perspective. This is consistent with the relatively narrow range of morphological variation, and also the very high representation of parallel oblique flaking observed on both projectile points and other formal tools, including mid to late stage biface preforms. Interpretation of the social meaning of these patterns is confounded by the generally poor contextual control that might allow differentiation between discrete occupation events, or even clear documentation of the timing and duration of occupation.

The recovery of an extraordinarily large number of projectile points from the Mackenzie 1 site was the catalyst for this thesis. It allowed an attribute-based analysis of the primary diagnostic tool associated with regional Late Paleoindian occupation. This permitted definition of the morphological variation within the assemblage, with a sufficiently large sample size to determine the most important stylistic traits and trends. In this sense, the Mackenzie 1 site might become the 'type site' used to define the technological characteristics of Lakehead Complex. The projectile point assemblage reveals some size variation (metric traits), but surprisingly narrow morphological variability. Five major types were identified on the basis of lateral hafting form, with further subtle variation apparent in the configuration of basal indentation coupled with other secondary traits. Some specific types are numerically dominant (Figure 6.18 and Table 6.1).

Notably, this narrow range of types serves to capture much of the projectile point variability noted at other Lakehead Complex sites, and to a certain degree also with collections assigned to the Interlakes Composite. This implies a significant degree of cultural continuity between late Paleoindian groups moving northwards into the region as deglaciation proceeded. That being said, the analysis also suggests some technological traits are much more strongly expressed at the Mackenzie 1 site than at any other Lakehead Complex site investigated to date. This is particularly evident with the very high expression of the parallel oblique flaking pattern.

While appearing on several specimens recovered from some Lakehead Complex sites, it is nearly universally expressed on the projectile points (of all types), on many of the other formal tools, and even on some of the biface preforms. It also appears on tools produced from diverse raw materials. This difficult to execute flaking pattern does not appear to have served a mechanical function, and it may reflect a distinctive style of flaking that served some unknown symbolic function. As this large site appears to have been repeatedly used over an unknown time period, the consistency of expression of these flaking patters offers interesting perspectives on the cultural relationships between successive site occupants.

CHAPTER 10

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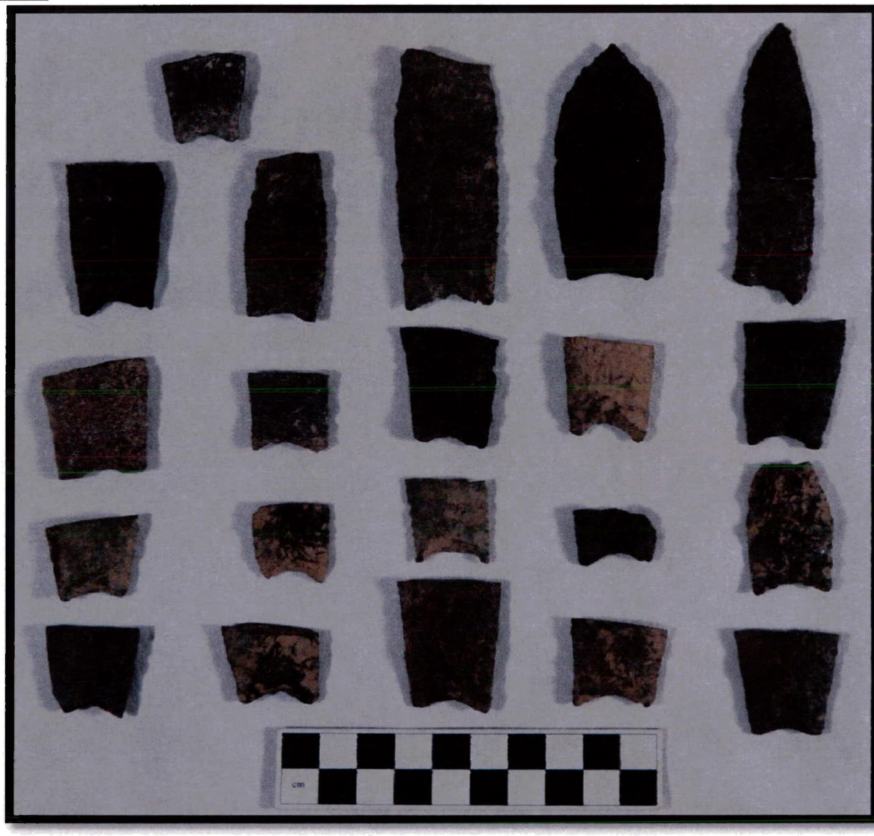
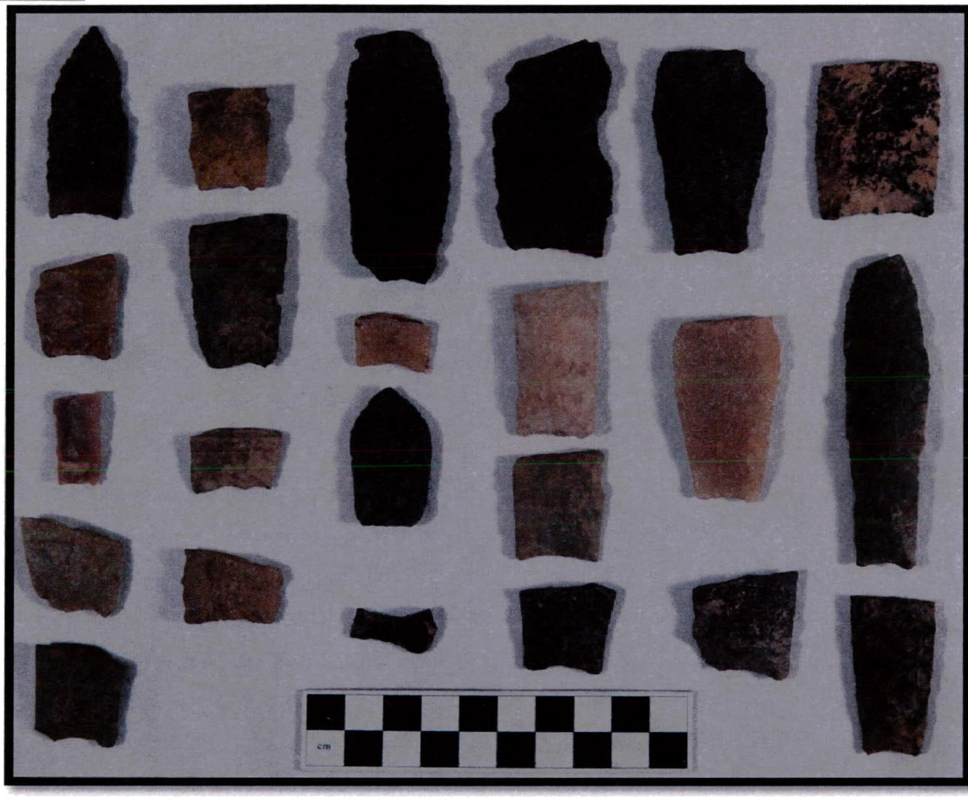
Appendix 1: Images of the complete and basal fragments of projectile points that separated into the groups created based on the primary set of attributes examined during the analysis: lateral edge shape and basal configuration.

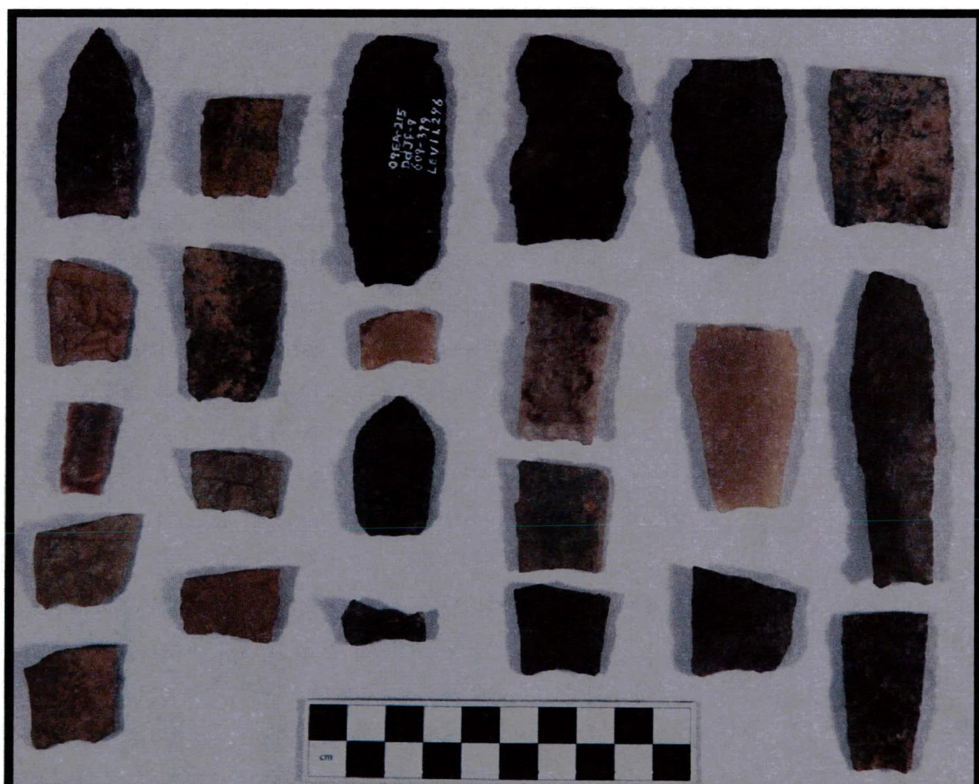
Constricting, Deep

Constricting, Deep



Constricting, Low





Constricting, Straight

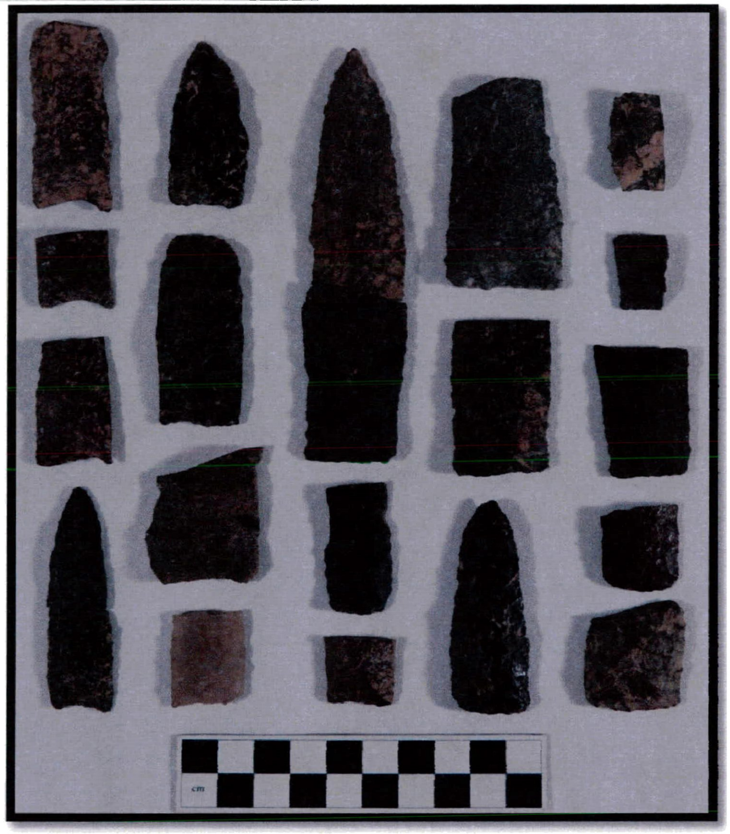
Constricting, Convex

Eared, Deep

Eared, Low Straight and Convex

Fishtails, Deep Low

Parallel Sided, Deep Low Straight Convex



Stemmed, Deep Low Straight

__Unknown/Unanalyzable__

Other

<u>Appendix 2:</u> Includes pictures of every single projectile point and fragment that was included in this analysis. The projectile points from the Mackenzie 1 total 380 specimens; 53 complete points, 116 base fragments, 80 midsections, 116 tip fragments, and 15 other specimens demonstrating projectile points at various use-life stages.

Complete Projectile Points

Dorsal (top) and ventral (bottom) views of projectile points (top L to R): WHS-P-05974 & 05058, L247, WHS-P-13603; (bottom): WHS-P-09119, WHS-P-03298 & 06832, WHS-P-03568.

Dorsal (top) and ventral (bottom) views of projectile points (top L to R): WHS-P-06001, WHS-P-08107, WHS-P-10256 & 08582. (bottom): WHS-P-13810, WHS-P-20080 & 19946, WHS-P-20565.

Dorsal (top) and ventral (bottom) views of projectile points (top L to R): WHS-P-06074, WHS-P-07873, WHS-P-10195. (bottom): WHS-P-02042, WHS-P-08983 & 13668, WHS-P-00179, WHS-P- 07265.

Dorsal (top) and ventral (bottom) views of projectile points. L to R, Top: WHS-P- 01963 & 09729 & 01948, WHS-P-08239, WHS-P-07456, WHS-P-08964. Bottom: WHS-P-06988, WHS-P-24310, WHS-P-13937 & 06053.

Dorsal (top) and ventral (bottom) views of projectile points. L to R, Top: WHS-P-06132 & 06132, WHS-P-05435 & 05436, WHS-P-24329 & 22507. Bottom: WHS-P-25996, WHS-P-05812, WHS-P-19885 & 19887, WHS-P-13986.

Dorsal (top) and ventral (bottom) views of projectile points. L to R, Top: WHS-P-08645, WHS-P-06831, WHS-P-05815. Bottom: WHS-P-09560 & 09560, WHS-P-06455, WHS-P-25749, WHS-P-05118.

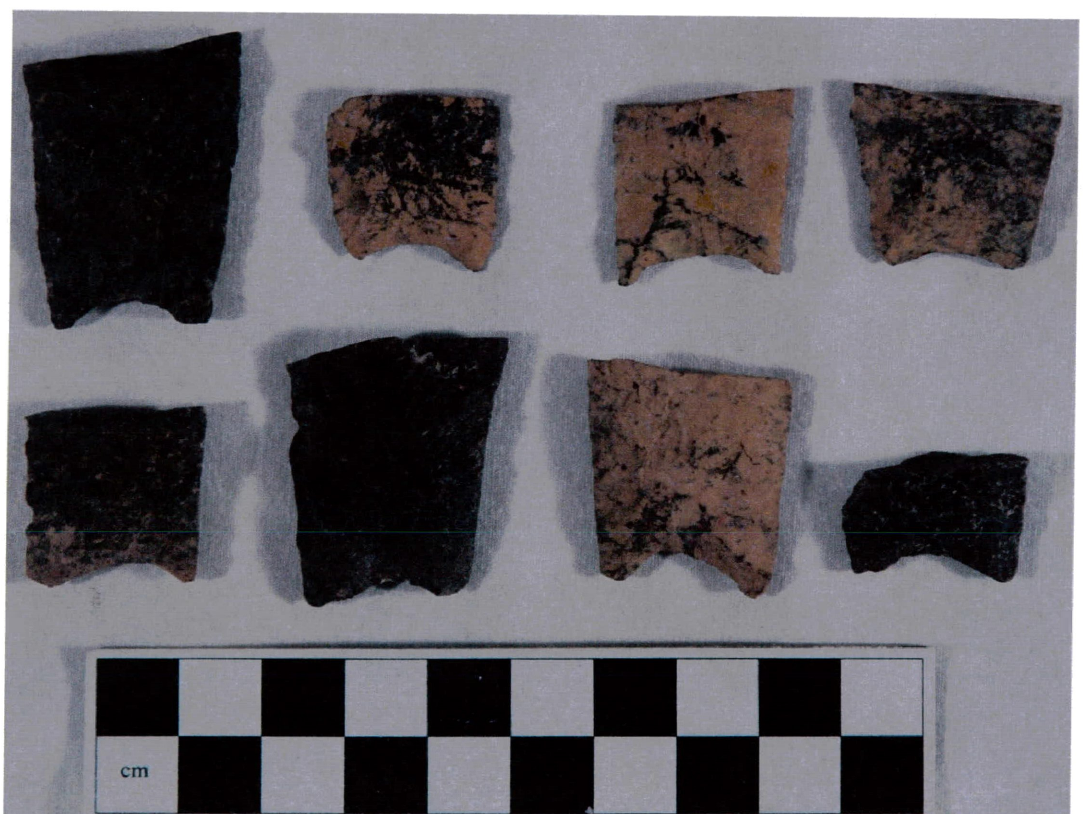
Dorsal (top) and ventral (bottom) views of projectile points. L to R, Top: WHS-P-03997 & 04274, WHS-P-05248, WHS-P-01761. Bottom: WHS-P-04308, WHS-P-25731, WHS-P-04449 & 06453.

Dorsal (top) and ventral (bottom) views of projectile points. L to R, Top: WHS-P-16400 & 10056, WHS-P-, WHS-P-14955, WHS-P-03437 & 23363. Bottom: WHS-P-04846, WHS-P-08800.

Basal Fragments

Dorsal (top) and ventral (bottom) views of projectile points. L to R, Top: WHS-P-03214, WHS-P-20535, WHS-P-06566, WHS-P-08914. Bottom: WHS-P-04404, WHS-P-19009, WHS-P-19867, WHS-P-01943.

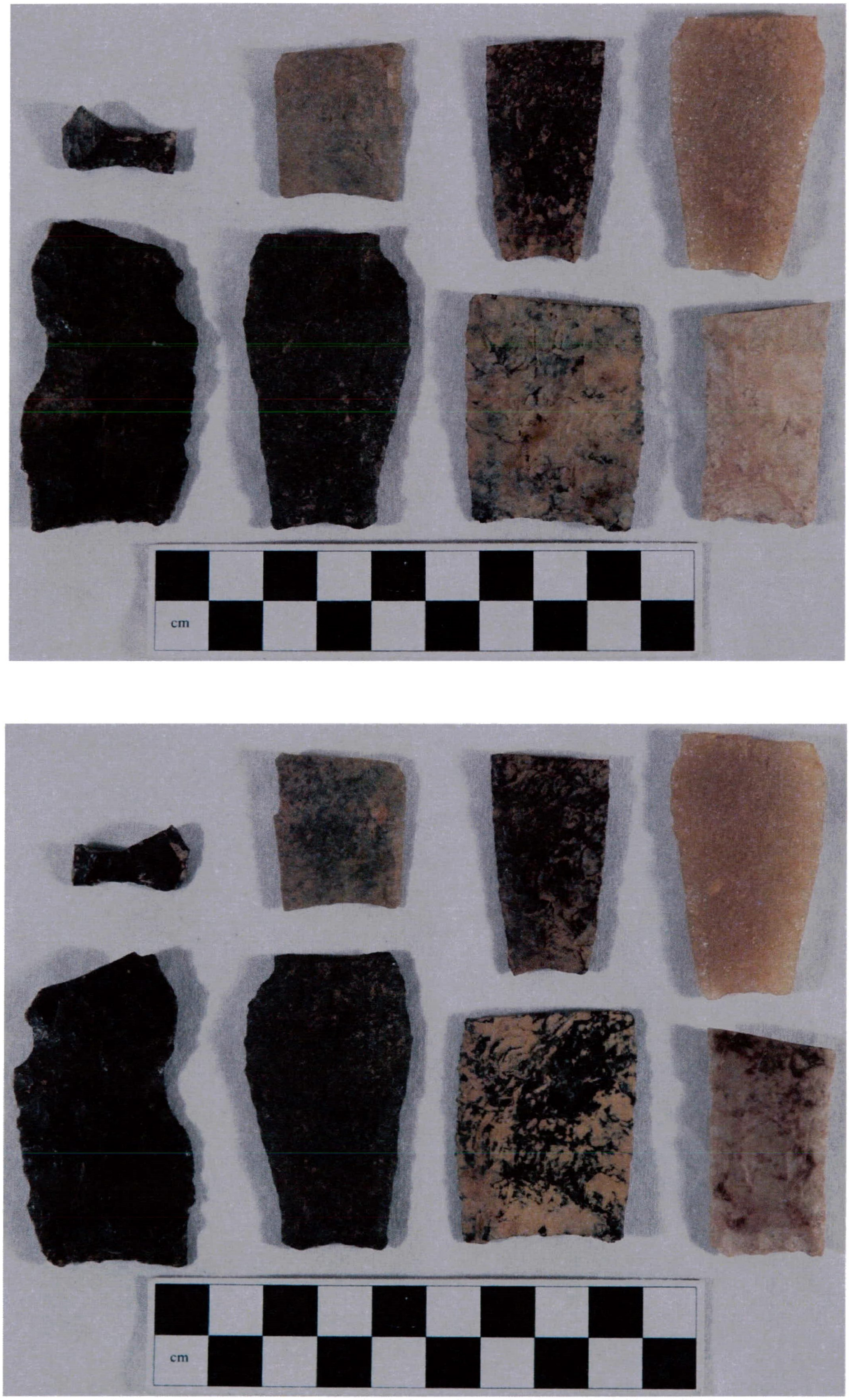
Dorsal (top) and ventral (bottom) views of projectile points. L to R, Top: WHS-P-07090, WHS-P-09396, WHS-P-04489 & 04915, WHS-P-04580. Bottom: WHS-P-04524, WHS-P-05829, WHS-P-08448, WHS-P-08609.



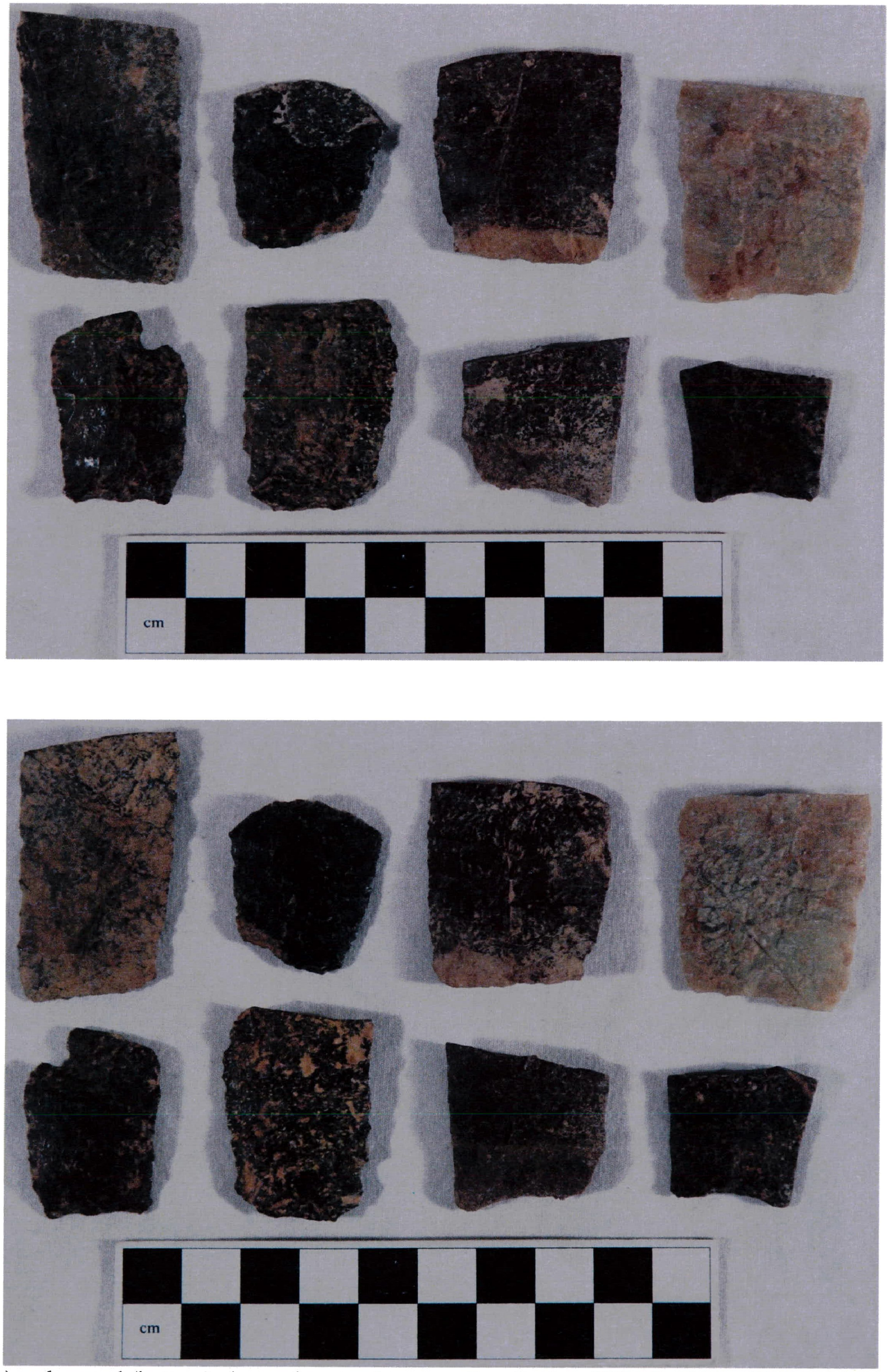
Dorsal (top) and ventral (bottom) views of projectile points. L to R, Top: WHS-P-05567, WHS-P-10373, WHS-P-24087, WHS-P-24264. Bottom: WHS-P-08958, WHS-P-22961, WHS-P-23793, WHS-P-01939.

Dorsal (top) and ventral (bottom) views of projectile points. L to R, Top: WHS-P-09376, WHS-P-12096, WHS-P-23814, WHS-P-13986. Bottom: WHS-P-01860, WHS-P-24573, WHS-P-20059, WHS-P-00891.

Dorsal (top) and ventral (bottom) views of projectile points. L to R: WHS-P-L296. Top: WHS-P-05816, WHS-P-25873, WHS-P-06989. Middle left: WHS-P-09563. Bottom: WHS-P-10041, WHS-P-CF, WHS-P-16016.

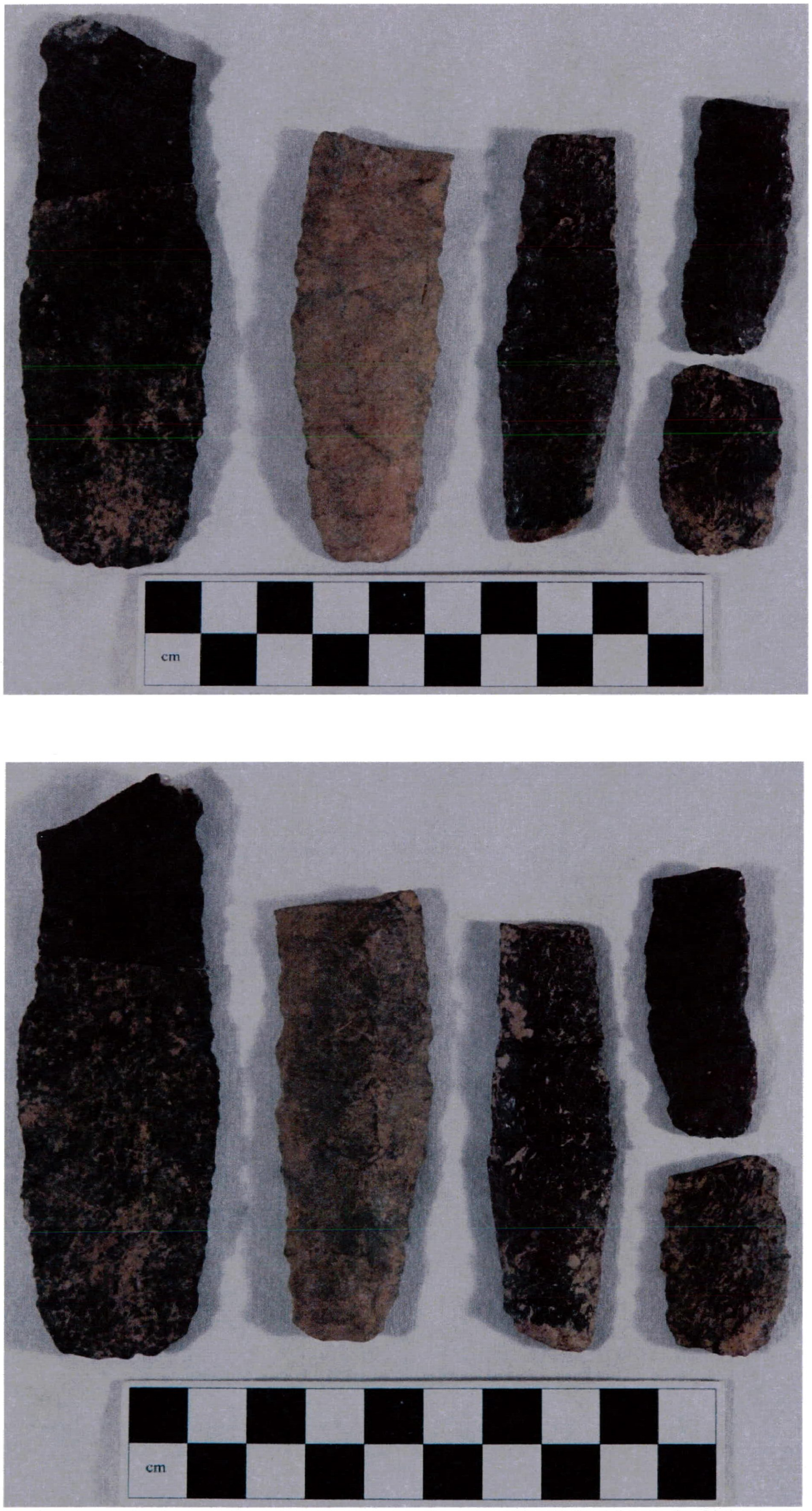


Dorsal (top) and ventral (bottom) views of projectile points. L to R, Top: WHS-P-03606, WHS-P-08464, WHS-P-04533, WHS-P-13941. Bottom: WHS-P-08642, WHS-P-09569, WHS-P-04707, WHS-P-04949.

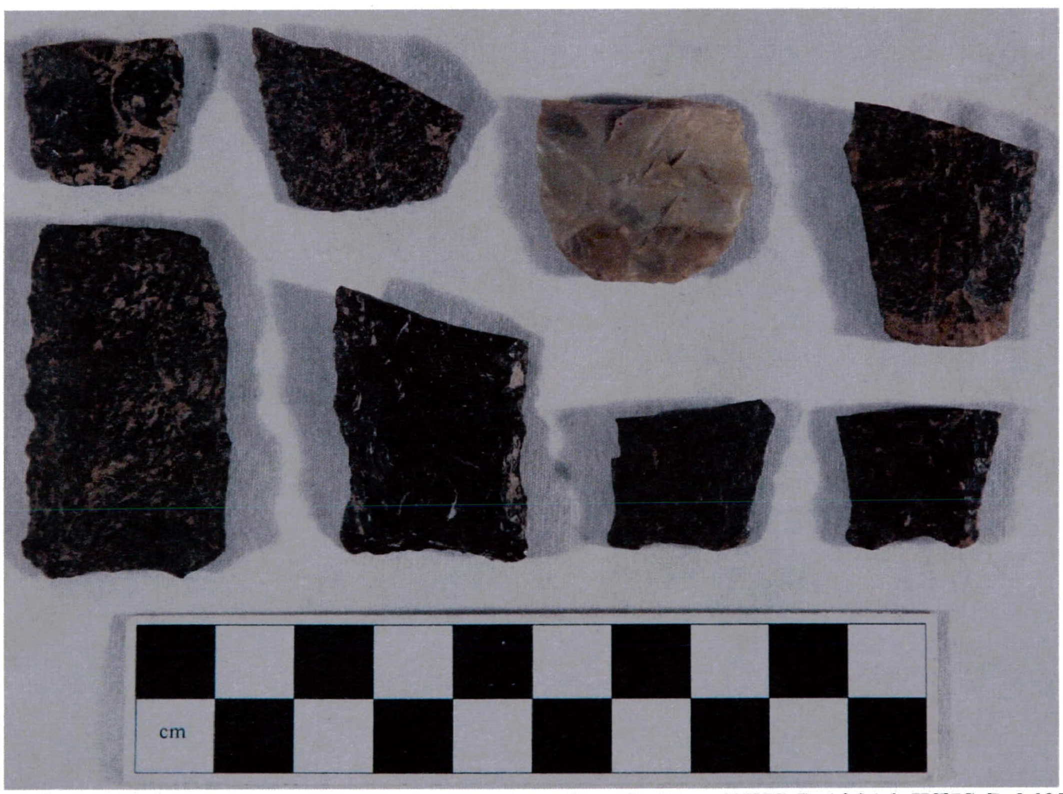


Dorsal (top) and ventral (bottom) views of projectile points. L to R, Top: WHS-P-05281, WHS-P-06498 & 06581, WHS-P-22001, WHS-P-05390. Bottom: WHS-P-08448, WHS-P-04308, WHS-P-04402, WHS-P-05734.

Dorsal (top) and ventral (bottom) views of projectile points. L to R, Top: WHS-P-04937, WHS-P-02697, WHS-P-24005, WHS-P-04329. Bottom: WHS-P-08496, WHS-P-18810, WHS-P-20470, WHS-P-23375.



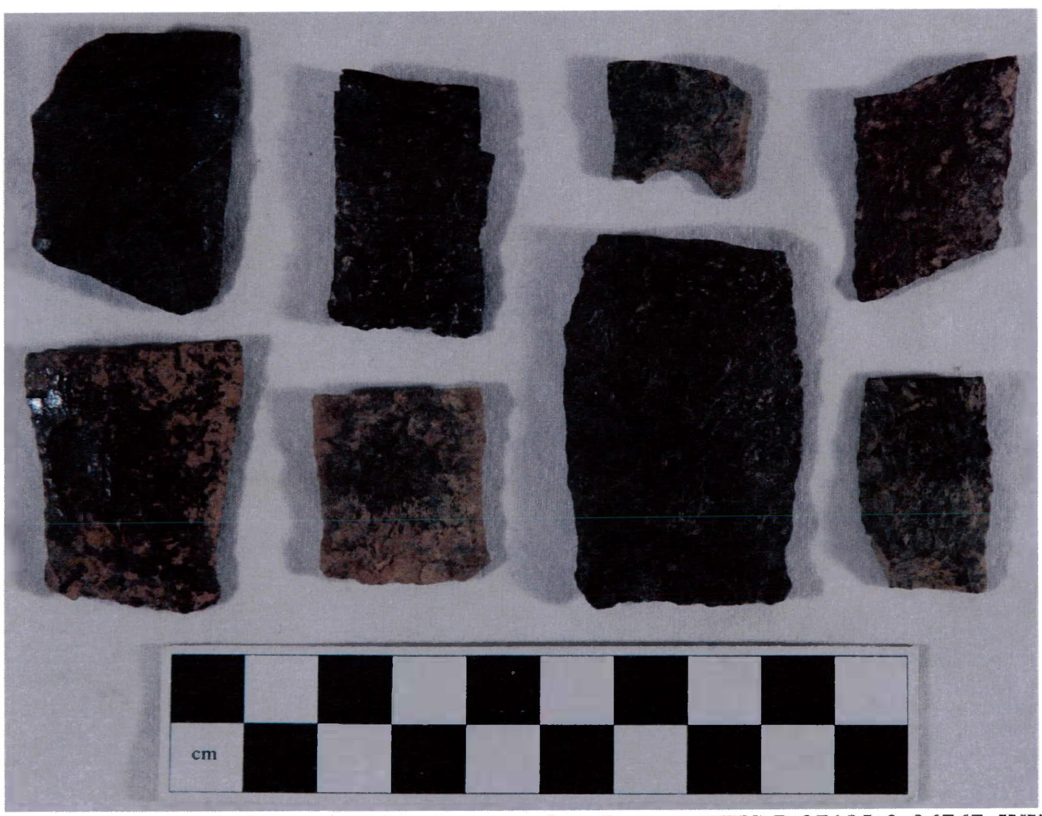
Dorsal (top) and ventral (bottom) views of projectile points. L to R: WHS-P-06499 & 21045, WHS-P-07499, WHS-P-09182 & 13872. Right Top: WHS-P-04701. Bottom: WHS-P-13923.



Dorsal (top) and ventral (bottom) views of projectile points. L to R, Top: WHS-P-13016, WHS-P-06074, WHS-P-23171, WHS-P-13013. Bottom: WHS-P-14849, WHS-P-10253, WHS-P-04415, WHS-P-08940.

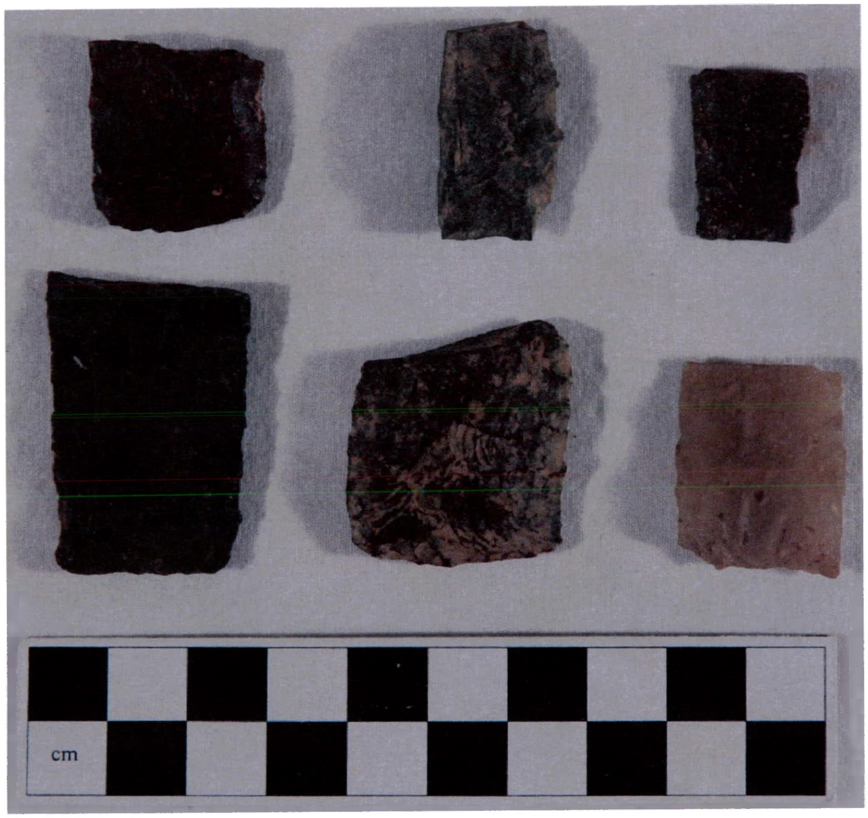
Dorsal (top) and ventral (bottom) views of projectile points. L to R, Top: WHS-P-04424, WHS-P-19875, WHS-P-08941, WHS-P-08464. Bottom: WHS-P-01884, WHS-P-23360, WHS-P-08525, WHS-P-08429.

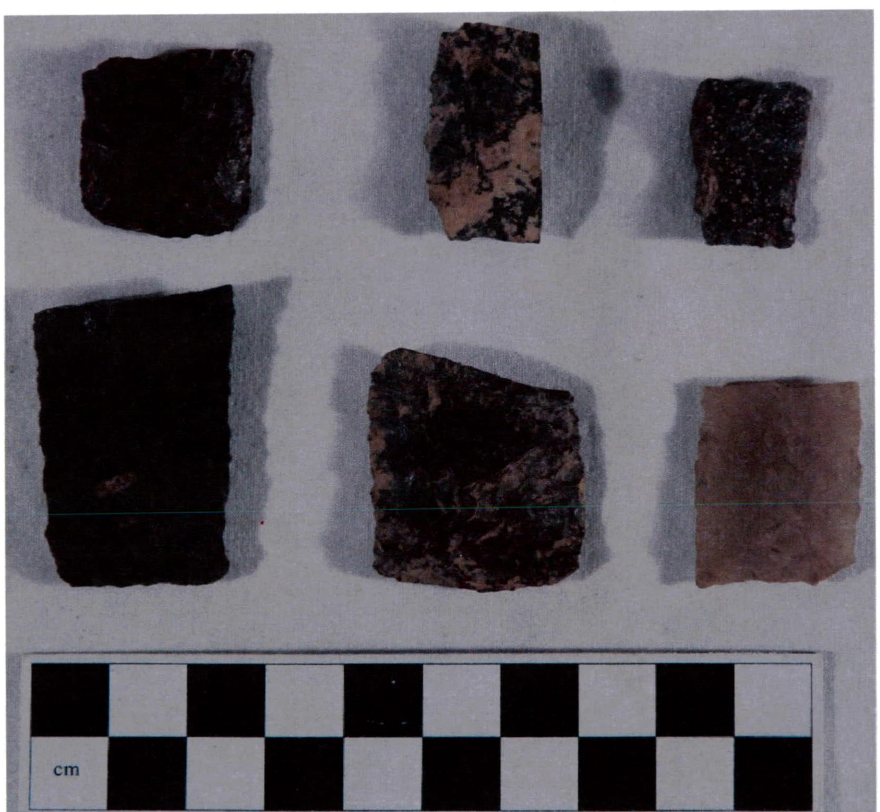
Dorsal (top) and ventral (bottom) views of projectile points. L to R, Top: WHS-P-L353, WHS-P-08757, WHS-P-21071, WHS-P-24858. Bottom: WHS-P-09238, WHS-P-06180, WHS-P-09629, WHS-P-23634.



Dorsal (top) and ventral (bottom) views of projectile points. L to R, Top: WHS-P-07185 & 06767, WHS-P-04953 (F & I) & 04366, WHS-P-04527, WHS-P-07266. Bottom: WHS-P-20512, WHS-P-05604, WHS-P-10809, WHS-P-04495.

Dorsal (top) and ventral (bottom) views of projectile points. L to R, Top: WHS-P-25731, WHS-P-09347, WHS-P-05968. Bottom: WHS-P-23558, WHS-P-05448, WHS-P-01861.



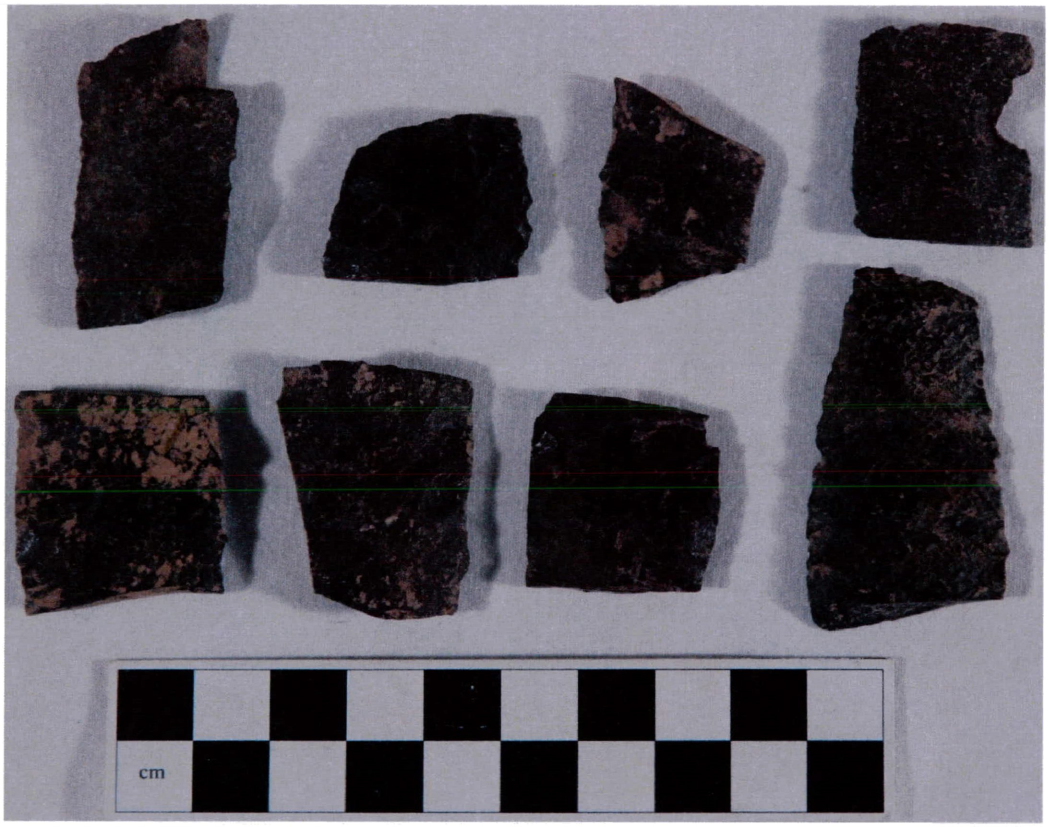


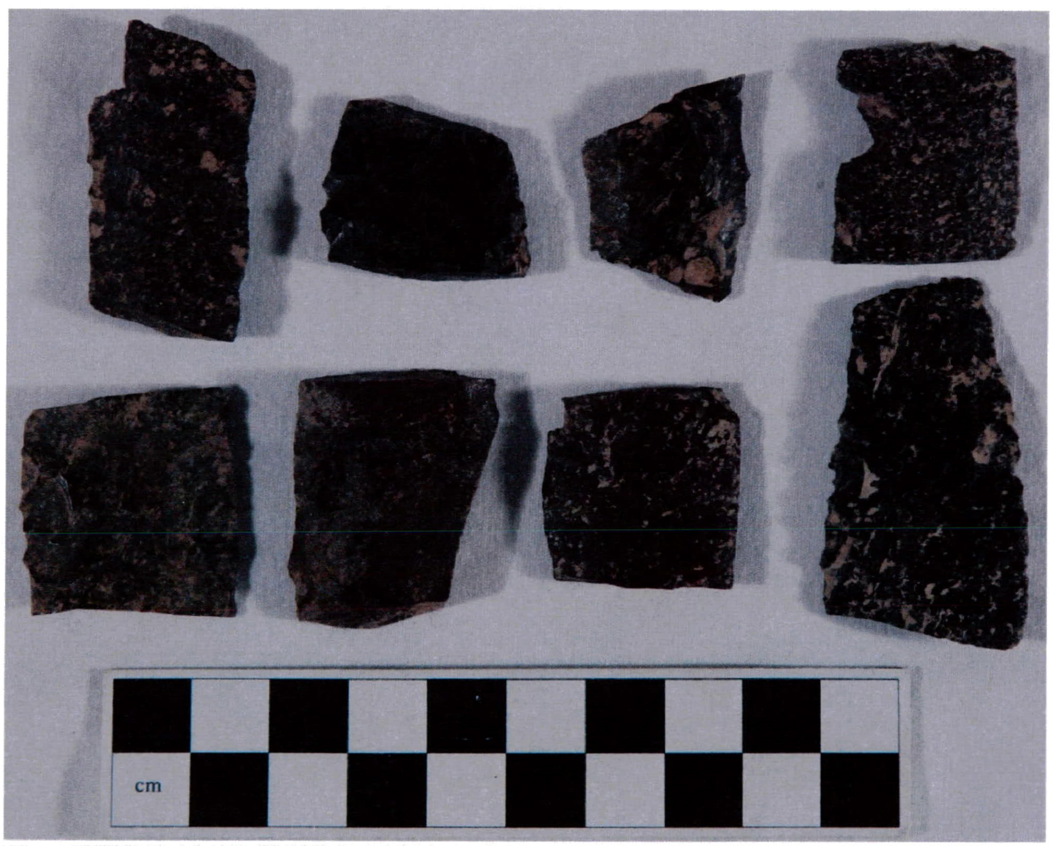
Dorsal (top) and ventral (bottom) views of projectile points. L to R, Top: WHS-P-05965, WHS-P-16072, WHS-P-04366. Bottom: WHS-P-04944, WHS-P-06457, WHS-P-12743.

Dorsal (top) and ventral (bottom) views of projectile points. L to R. Left Top: WHS-P-07246. Bottom: WHS-P-05401. Right: WHS-P-15397, WHS-P-10256.

Midsection Fragments

Left to Right. Top: WHS-P-23276, WHS-P-18738, WHS-P-23862, WHS-P-22516. Bottom: WHS-P-21015, WHS-P-17306, WHS-P-01987, WHS-P-13959.





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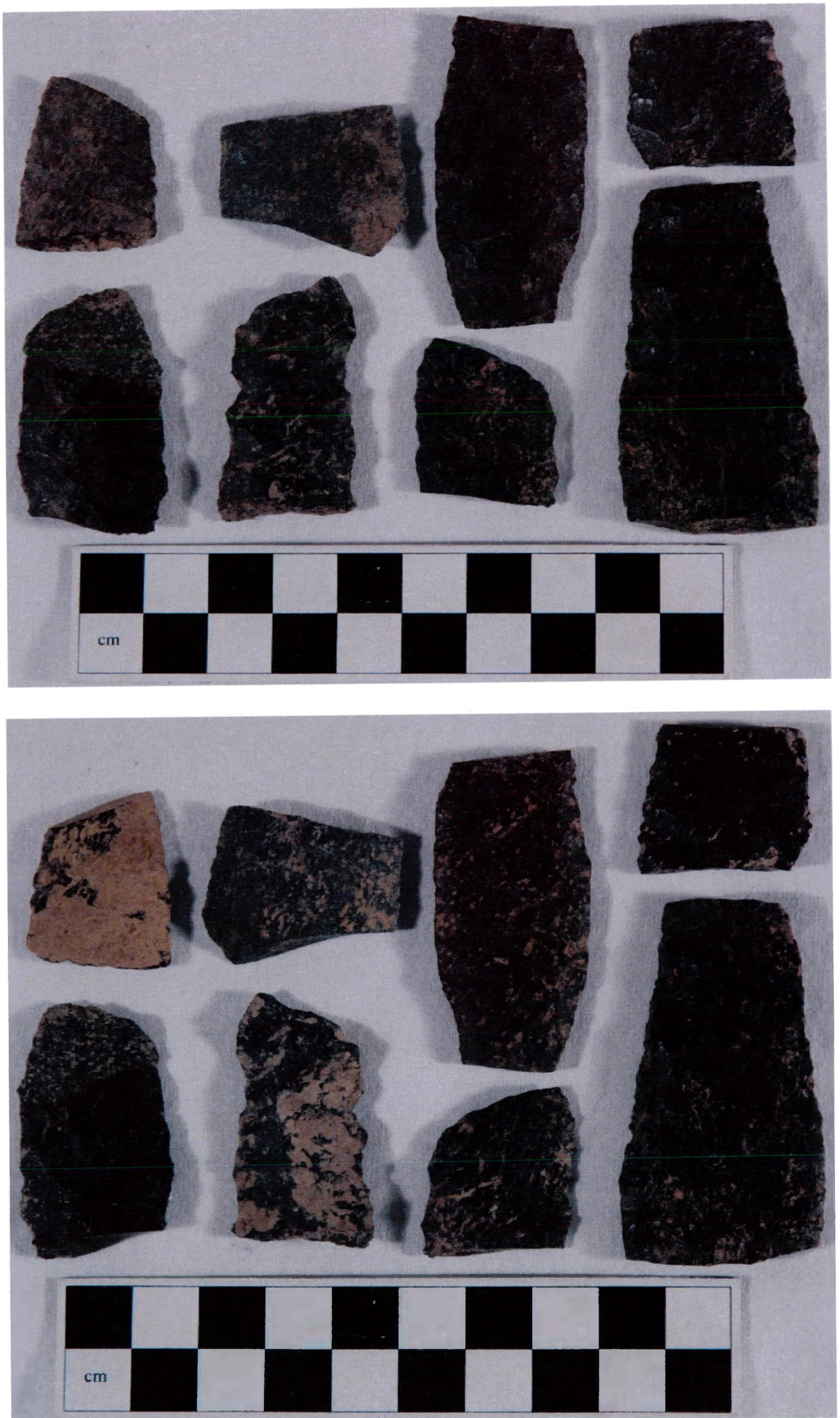
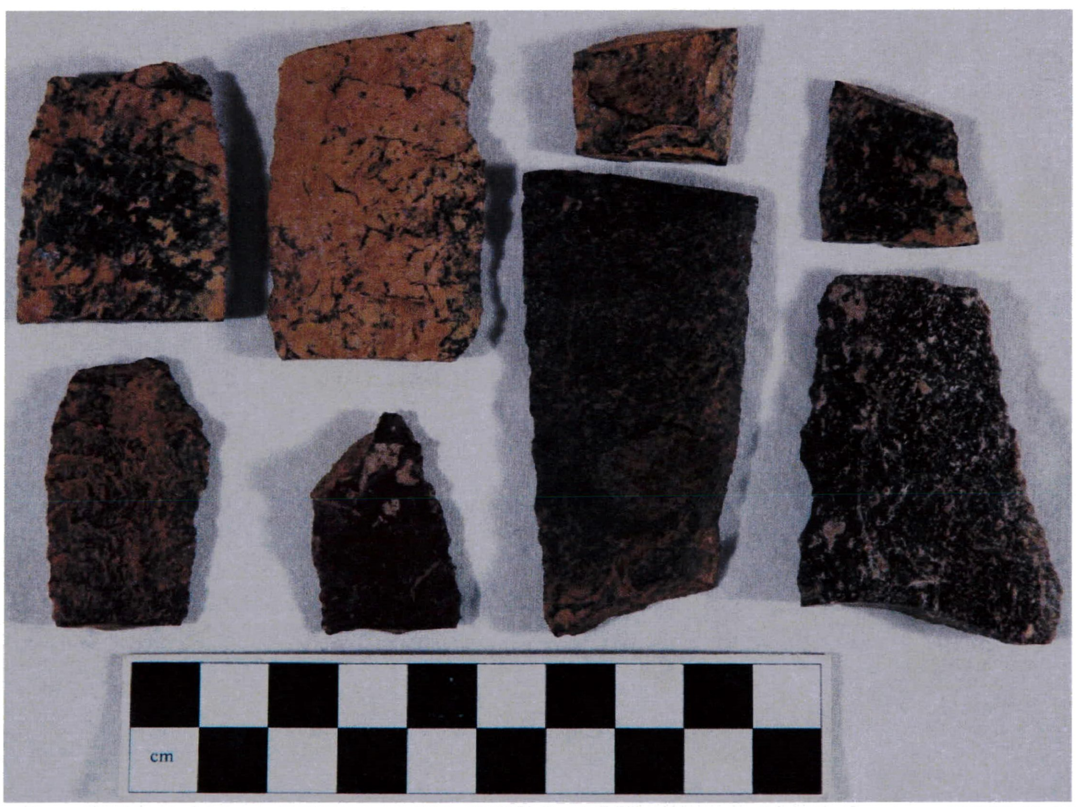


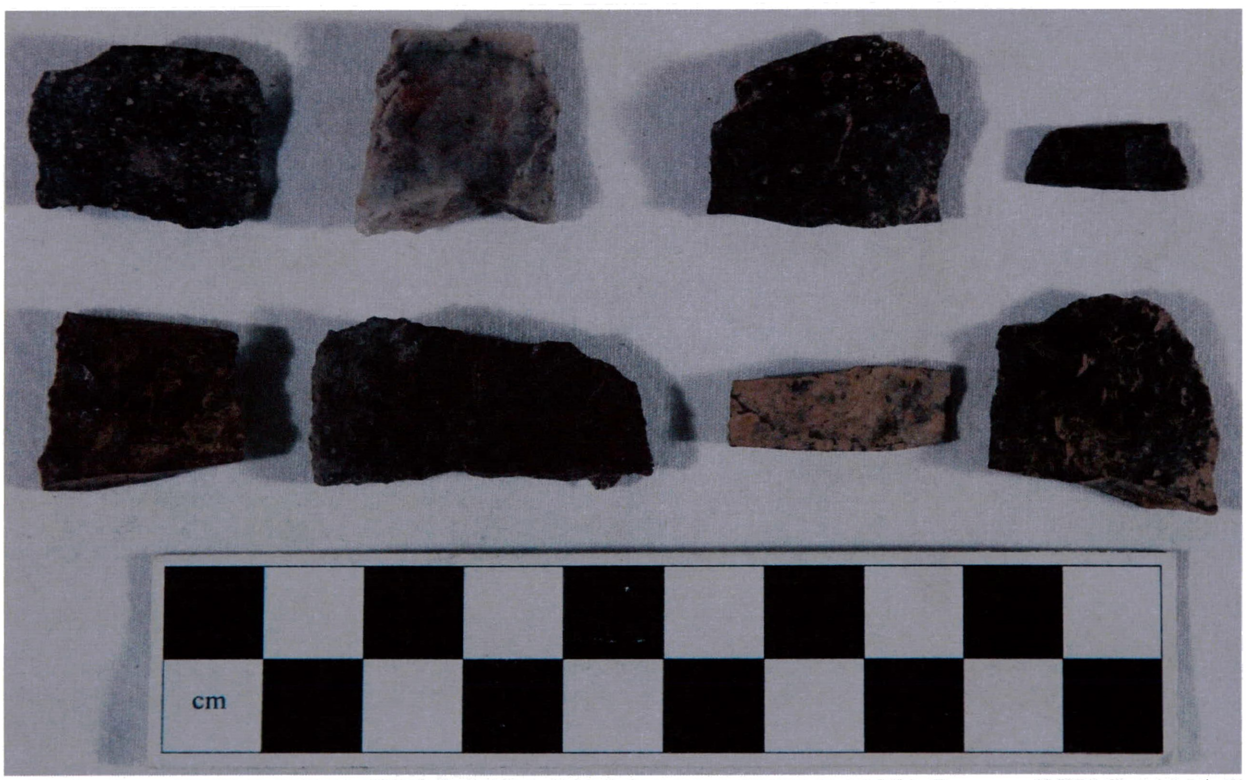
Left to Right. Top: WHS-P-05051, WHS-P-04915, WHS-P-05419, WHS-P-10256. Bottom: WHS-P-05968, WHS-P-08815, WHS-P-08458, WHS-P-19788.

Left to Right. Top: WHS-P-13773, WHS-P-10341, WHS-P-11050. Bottom: WHS-P-04309, WHS-P-05122, WHS-P-12715, WHS-P-08983.

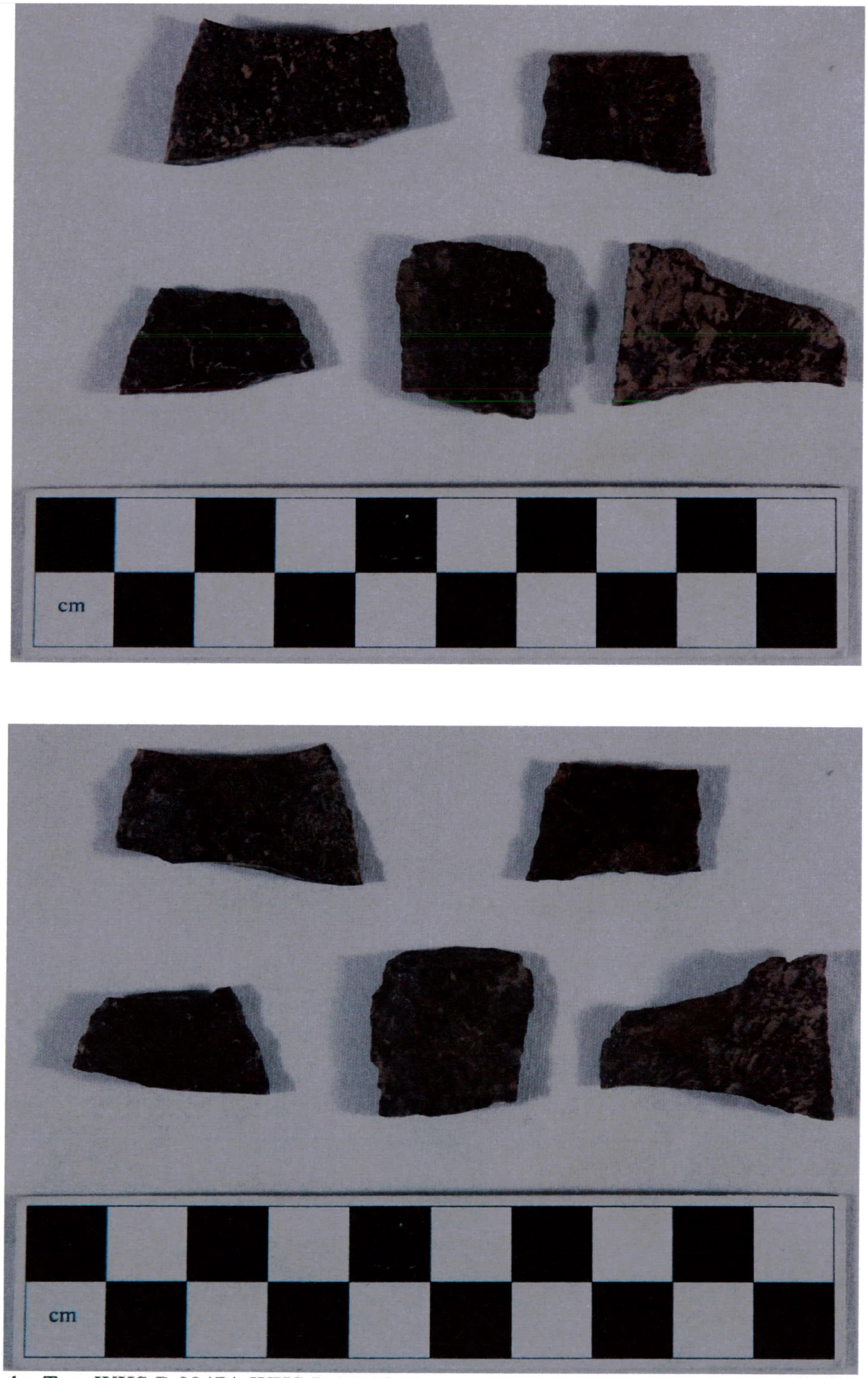


Left to Right. Top: WHS-P-20364, WHS-P-14693, WHS-P-07098, WHS-P-20071. Bottom: WHS-P-10051, WHS-P-13074, WHS-P-06667, WHS-P-24496.

Left to Right. Top: WHS-P-08684, WHS-P-05814, WHS-P-03605, WHS-P-03571, WHS-P-10006. Bottom: WHS-P-13669, WHS-P-09846, WHS-P-23118, WHS-P-23780, WHS-P-24722.



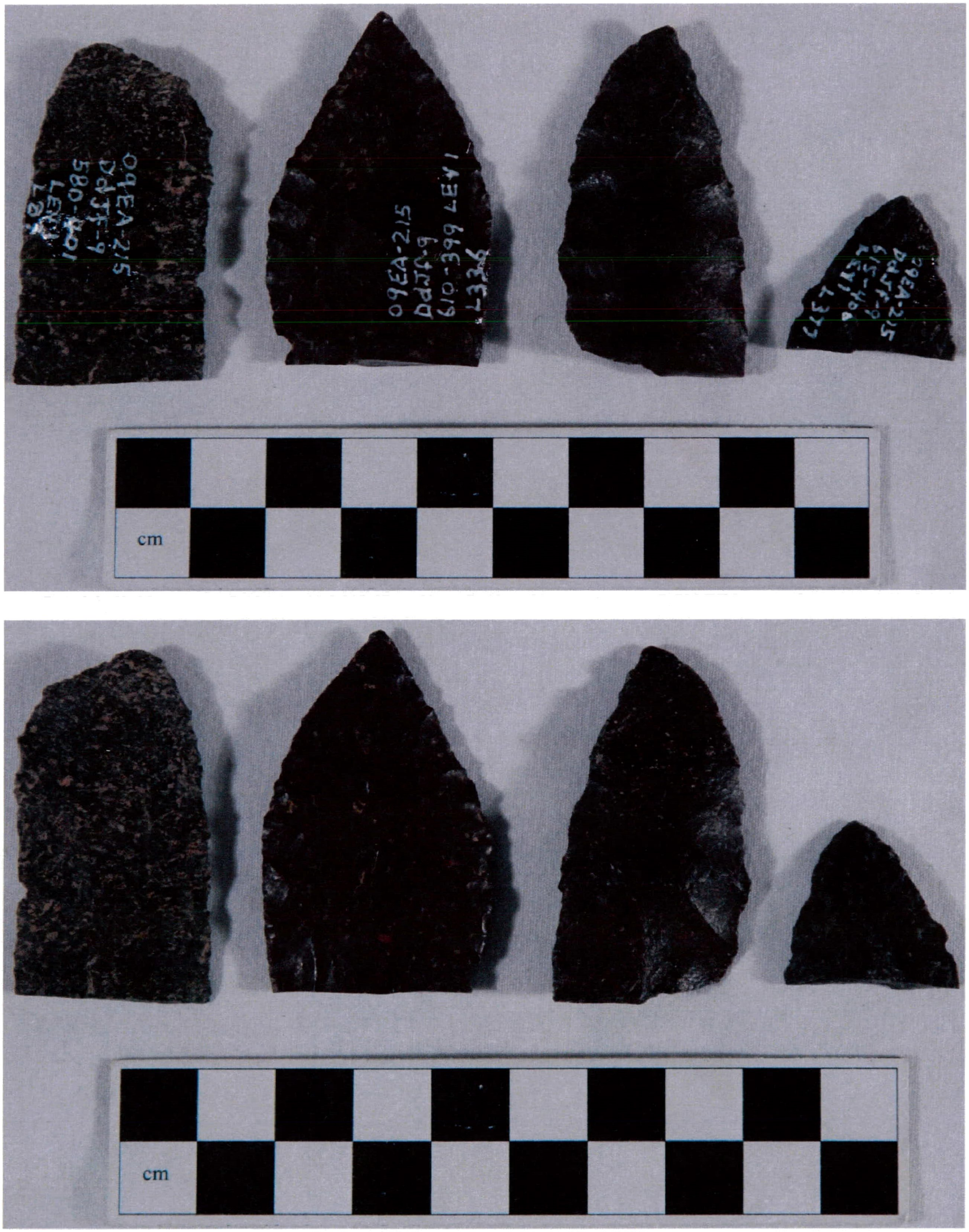
Left to Right. Top: WHS-P-07257, WHS-P-08738, WHS-P-04773, WHS-P-10256. Bottom: WHS-P-01966, WHS-P-06229, WHS-P-24263, WHS-P-06618.



Left to Right. Top: WHS-P-09474, WHS-P-11173. Bottom: WHS-P-10256, WHS-P-15241, WHS-P-15432.

WHS-P-07194

Tip Fragments



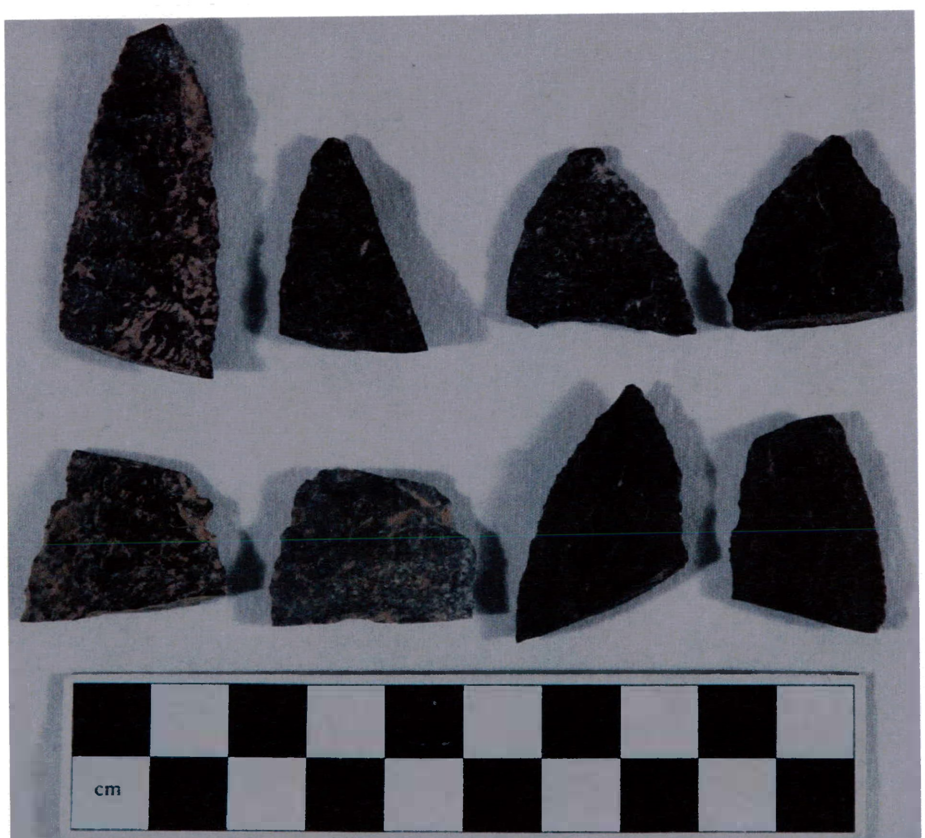
Left to Right: L87, L336, L17, L377.

Left to Right. Top: WHS-P-02049, WHS-P-19526(SW), WHS-P-19526(SE), WHS-P-18717. Bottom: WHS-P-S1, WHS-P-23591, WHS-P-15303, WHS-P-13868.

Left to Right. Top: WHS-P-09063, WHS-P-16849, WHS-P-08549, WHS-P-18853. Bottom: WHS-P-06601, WHS-P-25866, WHS-P-08789, WHS-P-04527.

Left to Right. Top: WHS-P-08478, WHS-P-12341, WHS-P-04318, WHS-P-13320. Bottom: WHS-P-05585, WHS-P-05716, WHS-P-04409, WHS-P-05350.

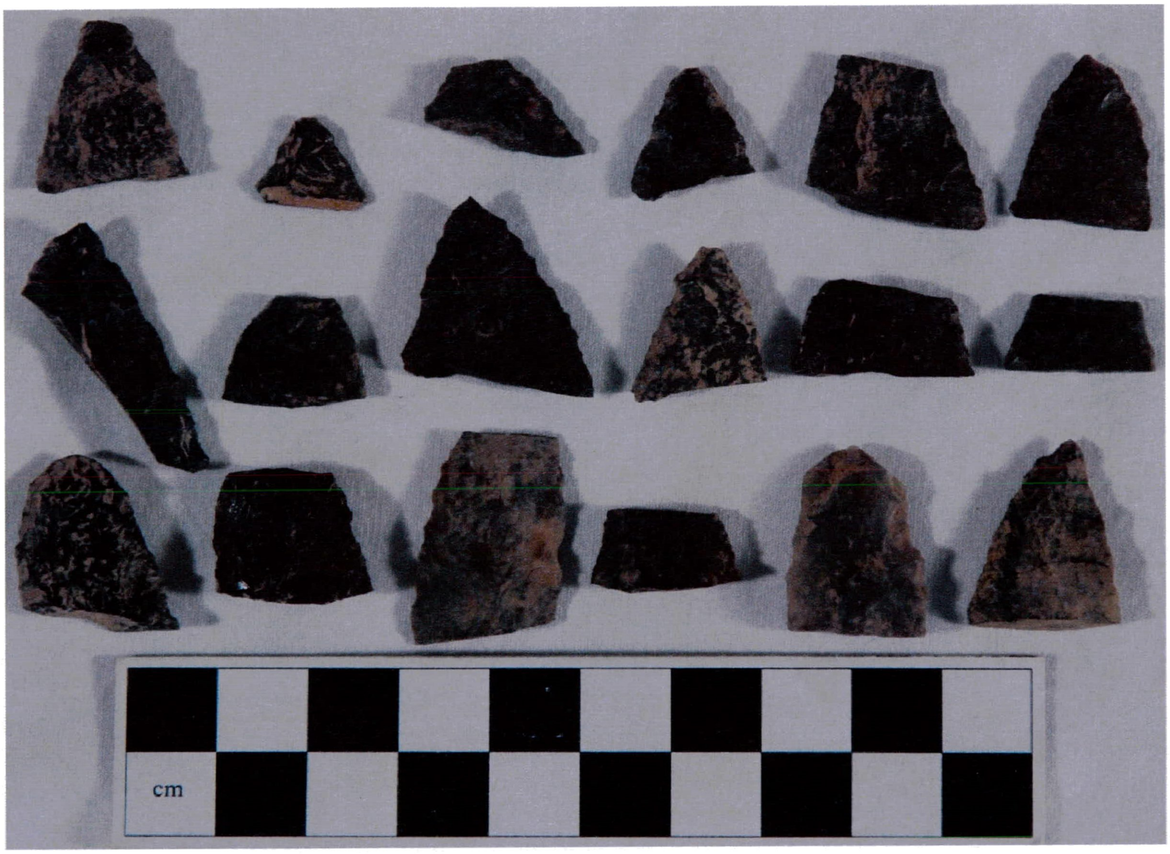
Left to Right. Top: WHS-P-23635, WHS-P-06449, WHS-P-23634, WHS-P-15408. Bottom: WHS-P-23033, WHS-P-13824, WHS-P-19724, WHS-P-S2.



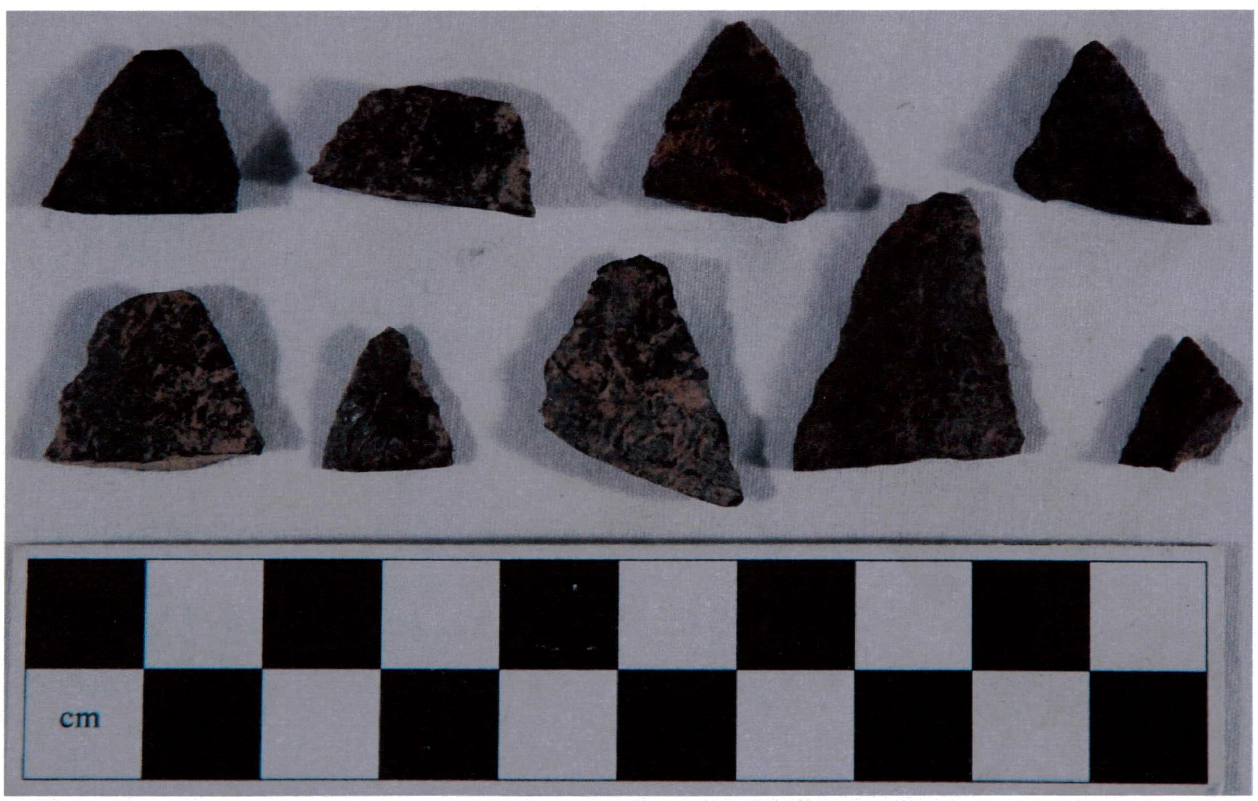
Left to Right. Top: WHS-P-20312, WHS-P-06074, WHS-P-01931(A), WHS-P-01931(B). Bottom: WHS-P-10059, WHS-P-06121, WHS-P-09781, WHS-P-06667(37723).

Left to Right. Top: WHS-P-20073, WHS-P-20072, WHS-P-15287, WHS-P-14834. Bottom: WHS-P-23316, WHS-P-15288, WHS-P-15196, WHS-P-23737.

Left to Right. Top: WHS-P-05605, WHS-P-03642, WHS-P-03647, WHS-P-03505, WHS-P-03578. Bottom: WHS-P-03699, WHS-P-23780, WHS-P-09470, WHS-P-03529, WHS-P-08149.



Left to Right. Top: WHS-P-15381, WHS-P-09594, WHS-P-09986, WHS-P-07095, WHS-P-13014, WHS-P-13017. Middle: WHS-P-04391, WHS-P-08810, WHS-P-05536, WHS-P-20052, WHS-P-13262, WHS-P-08948. Bottom: WHS-P-19825, WHS-P-00879, WHS-P-24267, WHS-P-18869, WHS-P-20394, WHS-P-20481.



Left to Right. Top: WHS-P-24043, WHS-P-07647, WHS-P-05771, WHS-P-04095. Bottom: WHS-P-15200, WHS-P-22577, WHS-P-06249, WHS-P-13601, WHS-P-15326.

Left to Right. Top: WHS-P-10256, WHS-P-23327, WHS-P-25686. Bottom: WHS-P-03527, WHS-P-23737, WHS-P-04329, WHS-P-19432.