BESANT REVISITED:

THE FINCASTLE SITE (DlOx-5) AND ARCHAEOLOGICAL CULTURES ON THE NORTHWESTERN PLAINS, 2500 B.P. – 1250 B.P.

IRENE (RENA) VARSAKIS
Bachelor of Arts, Simon Fraser University, 2002

A Thesis
Submitted to the School of Graduate Studies
of the University of Lethbridge
in Partial Fulfillment of the
Requirements for the Degree

MASTER OF SCIENCE

Department of Geography
University of Lethbridge
LETHBRIDGE, ALBERTA CANADA

signature page

DEDICATION

For my family.

My heart and thoughts are always with you, no matter how far I roam...

ABSTRACT

An assemblage of distinctive projectile points from the Fincastle site (DlOx-5), Alberta at *c.* 2500 B.P. instigated an analysis of archaeological cultures on the Northern Plains during the late Middle Prehistoric Period. Archaeological sites included in this study are from the Pelican Lake Phase, the Besant Phase, the Sandy Creek Complex, a previously Unnamed Complex, and the Plains Woodland at approximately 2500 – 1250 B.P. A projectile point analysis was conducted on assemblages from Fincastle, EbPi-63, EgPn-111, Kenney (DjPk-1), Leavitt (24LT22), Muhlbach (FbPf-1), and Smith-Swainson (FeOw-1) sites. As part of this study, nearly 40 metric and non-metric attributes were examined in approximately 500 projectile points from these seven sites. Research findings indicate that two coeval groups existed in Alberta, identified as the Kenney and Sonota subphases of the Besant Phase. Two additional subphases are hypothesized for the Besant Phase in Wyoming and Montana.

Acknowledgements

There have been many people and agencies over the course of the past couple of years who have provided much-appreciated assistance along this journey. Your contributions helped both the Fincastle site project and my research significantly. To anyone that I may have accidentally omitted below, many thanks, and please accept my apology for my oversight. Any errors or omissions in this work are solely my responsibility.

Funding support for my M.Sc. research has been provided through a Research Fellowship (Social Sciences and Humanities Research Council, Community-University Research Alliance), University of Lethbridge Assistantship, Alberta Historical Resources Foundation (Roger Soderstrom) Scholarship, and Alberta Advanced Education's Achievement Scholarship Program. Further funding support throughout the project has been given by the Heritage Resources Management Branch, Alberta Community Development.

Good archaeology always begins with good archaeologists. The Fincastle project has been rich with crew members from two field schools, field assistants, and many volunteers (including those in the lab!) over the past two years, with Shawn Bubel our keen and seemingly tireless Principal Investigator. Special mention should also be made here of the ongoing support provided by the Archaeological Society of Alberta, Lethbridge Chapter, who have assisted in site monitoring, assessment, and excavations since 2003.

Fincastle 2004 University of Lethbridge and Red Crow College Field School: Starsha Battrick, Narcisse Blood, Brent Eichhorn, Robert First Charger, Jeremy Fox, Nicole Hembroff, Cory Janzen, Jason Jorgenson, Stan Knowlton, Holly Kunst, Sam Lieff, Ken Manyfingers, Tammi Mills, Josh Nagy, Roxanne Oka, Michelle Rice, JJ Shade, Willie Shade, Alanna Shockley, Jon Veale, Mike Verdonck, Fred Wadsworth, Kristina Weisner, Jermayne Wells, Deonne White Quills. I'll always have fond memories of the inaugural field school, camping out during the week at the Taber Rotary Hall, amid snow, sleet and sun during the day, and cadet marches, lectures, and assignments in the evenings.

Fincastle 2004 volunteers: Ben Andreas, Janice Andreas, Johnathon Chalmet, Richard Crowe, Bob Dawe, Fleur Demeyer, Marshall Dzurko, Sonia Dzurko, Simonne Flynn, Murray Gardner, Cole Gillard, Meghan Kooyman, Joanne Lusty, Ray Lusty, Jim Marshall, Lorine Marshall, Jim McMurchy, Bob Mutschler, Delores Mutschler, Darcie Norberg, Shirley Rose, Evan Sandham, Gillian Sandham, Derek Sorkilmo, Bob Stanko, Desirai Sweder, Mary Thompson, Bill Tyde, Barry Wahl, Eugene Wahl, Ang Watts.

Fincastle 2004, June crew: Murray Gardner, Jason Gillespie, Dallace Jensen, Tammi Mills, Trevor Peck, Derek Sorkilmo. They were a hardy but feisty bunch who gamely continued with the Fincastle dig for nearly three weeks in June, with additional support from Alberta Community Development, kindly tolerating me as their director while Shawn concurrently took the Beth Shemesh Field School to Israel.

Fincastle 2004, August crew: Jennifer Bass, Starsha Battrick, Charleen Davidson, Brent Eichhorn, Cole Gillard, Nicole Hembroff, Cory Janzen, Sam Lieff, Rachel Lindemann, Stan Knowlton, Holly Kunst, Ester Schultz, Ang Watts.

Fincastle 2006 University of Lethbridge Field School: Narcisse Blood, Nicole Côté, Colleen Curran, Chrissy Foreman, Alyssa Hamza, Randy Hahn, Terrena Husak, Ian Larsen, Amber Leppky, Tammi Mills, Maria Peters, Courtney Rode, Craig Rudolph, Ang Watts. You were a fantastic team, and gamely dealt with the wildest wind that southern Alberta had to offer!

Fincastle 2006 volunteers: Rhonda Clements, Sarah Friesen, Britt Kane, Bev Kong, Courtney Lakevold, Guillaume Laroche, Ken Perl, Stephanie Perl, Andy Watts.

I am grateful to the many professional archaeologists in Canada and in the United States who have provided me with advice, assistance, their experiences, and often much food-for-thought over the past two years. Their observations and comments have improved my research significantly; any omissions are purely my oversight.

Archaeologists at the Heritage Resources Management Branch, Alberta Community Development, were keen supporters of the Fincastle research, recognizing early on the significance of the site. Trevor Peck offered his professional expertise, extensive academic knowledge, and insights to the project as a whole; his enthusiasm for Plains archaeology is evident for all to see, and has certainly inspired me. David Link and Jack Ives also supported the Fincastle research, providing additional research funds to enable the additional excavation of units of this threatened site, as well as for radiocarbon dating.

Archaeology staff at the Royal Alberta Museum, Archaeology Program, in Edmonton were also extremely generous with their time and resources in support of my research. Special thanks to Jack Brink, Archaeology Curator, for access to archaeological collections and records. Bob Dawe, Inventory Curator, keenly tracked down projectile point collections for me, provided additional Muhlbach projectile point data, as well as aided in a whirlwind lithic raw material analysis session. Kathy McCormick tirelessly helped track down rogue archaeological collections in Alberta. Figures of the missing Muhlbach site projectile points were generated from catalogue records, and appear courtesy of the Royal Museum of Alberta.

Special thanks must go out to Alison Landals, FMA Heritage Resources Consultants in Calgary, who generously provided guidance in the very early days of my research, including advice on selecting radiocarbon date samples, in addition to her insights on my lithic analysis at a key moment. It was exciting to include EbPi-63 as part of my study, one of the Little Bow sites that I had helped excavate five years earlier as a field assistant, and I appreciate this opportunity. Bonnie Brenner, FMA Heritage Resources Consultants, provided assistance with cataloguing and collections management, while Keith Wilkinson, FMA Heritage Resources Consultants, kindly scanned the EbPi-63 points, sharing his tricks of the trade with me for digitizing lithic collections en mass. Images of the EbPi-63 projectile points appear courtesy of FMA Heritage Resources Consultants.

Barney Reeves, Lifeways of Canada, very kindly offered loans of archaeological collections and catalogue records from the Kenney and Leavitt sites, and offered ideas about where collections might be housed that predated the 1973 heritage legislation in Alberta. His comments on my research were most welcome on a stormy summer afternoon in Waterton.

Assistance in tracking down wayward archaeological collections also came from the University of Calgary. Brian Kooyman helped seek out projectile point assemblages from early research in the province, with additional efforts from Sonia Zarillo in her own quest for pottery collections.

Leigh Syms, The Manitoba Museum, thoughtfully provided data regarding ancestral Sonota projectile point forms in Manitoba, along with a chronology.

Stateside, I have been impressed with the equally keen enthusiasm and thoughtful responses I've received in regard to my research. Their expertise and comments provided much fodder for reflection and leads for further investigation.

Paul Picha, Chief Archaeologist, Historical Preservation Division, State Historical Society of North Dakota, provided references in addition to his insights on the Fincastle site in relation to the Middle Woodland Period. Dennis Toom, Department of Anthropology, University of North Dakota, for references and his comments regarding projectile point technology in North Dakota.

Jim Haug, Director/State Archaeologist, Archaeological Research Centre, South Dakota State Historical Society, provided collections assistance and references. Mike Fosha, Assistant State Archaeologist, Archaeological Research Centre, South Dakota State Historical Society, offered his reflections on the Fincastle and helped locate archaeological collections. Renee Boen, Repository Manager, Archaeological Research Centre, South Dakota State Historical Society, searched high and low for archaeological collections.

Mark Anderson, Project Archaeologist, Office of the State Archaeologist, University of Iowa, for his interest in the Fincastle research. David Higginbottom, Iowa State Historic Preservation Office, gave his thoughts regarding the intricacies and pitfalls of radiocarbon dating when assessing cultural affiliations. Tim Weitzel, Office of the State Archaeologist, University of Iowa, provided his assessment after examining images of the Fincastle points.

Bill Green, Director, Logan Museum of Anthropology, Beloit College, Wisconsin, offered comments on radiocarbon dating and projectile point association. David Benn, Research Archaeologist, Bear Creek Archaeology, provided references for Wisconsin projectile point typology during the Archaic.

Many thanks go out to my family and friends, whose support and encouragement through out the past two years have enabled me to conduct this work. My officemates, Sam Lieff and Ang Watts, have provided welcome laughs and commiseration. Trevor Peck, Raven Caruso and Jen Tarr in particular have offered their support. Trevor truly made me see the fun of Plains archaeology, and has been vital in his support of my research. Special to Jen Tarr and Wim Chalmet for their Excel help; further invaluable assistance with Excel data and figures was offered by Shawn Bubel.

Heartfelt thanks also must be expressed here to my committee in the Department of Geography, University of Lethbridge: Shawn Bubel, Walter Aufrecht, and Bob Rogerson. Special thanks also to Brian Kooyman, University of Calgary, for his role as my external examiner. They have provided a tremendous amount of academic freedom and support for me to follow my hunches. Thanks to Bob, for his questions as a nonarchaeologist that encouraged me to step back and reflect on occasion, and his support. Wally must be commended on his archaeological theory class, a fantastic challenge that prepared me for my thesis research. His guidance has certainly improved both my writing and my scholarly work; most significantly, he challenged the way I perceived myself academically. Shawn—last, but by no means least! She has been an enthusiastic supervisor and mentor, encouraging me to pursue my ideas and providing the utmost support and encouragement. I feel very privileged that she selected me as a graduate student. Shawn, I will never forget your support: thank you.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

Background

Archaeologists love a good puzzle, and the Fincastle site (DlOx-5), Alberta is exactly that. When distinctive projectile points were recovered in 2003 from Fincastle, a previously unknown site that was actively being looted, they were quickly recognized by archaeologists from the Provincial Government, the University of Lethbridge, and the avocational Archaeological Society of Alberta as not typical for the late Middle Prehistoric Period (*c*. 2500 - 1250 B.P.) on Alberta's southern Plains. In the ensuing survey and excavation in 2003 and 2004, and the analysis that followed, the basic question 'who were these people that made and left these points?' necessitated revisiting pioneering definitions of archaeological cultures during this time, in order to place the Fincastle points in context within Alberta and the Great Plains culture area.

The Great Plains culture area (Figure 1.1) includes a significant portion of North America, bounded westward by the Rocky Mountains, northward into central Alberta, Saskatchewan and western Manitoba, eastward into western Minnesota, Iowa and Missouri, and southward into northern Texas. The Great Plains can also be physically subdivided into the drier shortgrass prairie region to the West, and more humid tallgrass prairie to the East: Alberta is in the shortgrass region. Within the Great Plains culture area, archaeologists refer to the Northwestern Plains, including Alberta, western Saskatchewan and Montana, as well as the Northeastern Plains, including eastern Saskatchewan, Manitoba, North Dakota, South Dakota, and Minnesota.

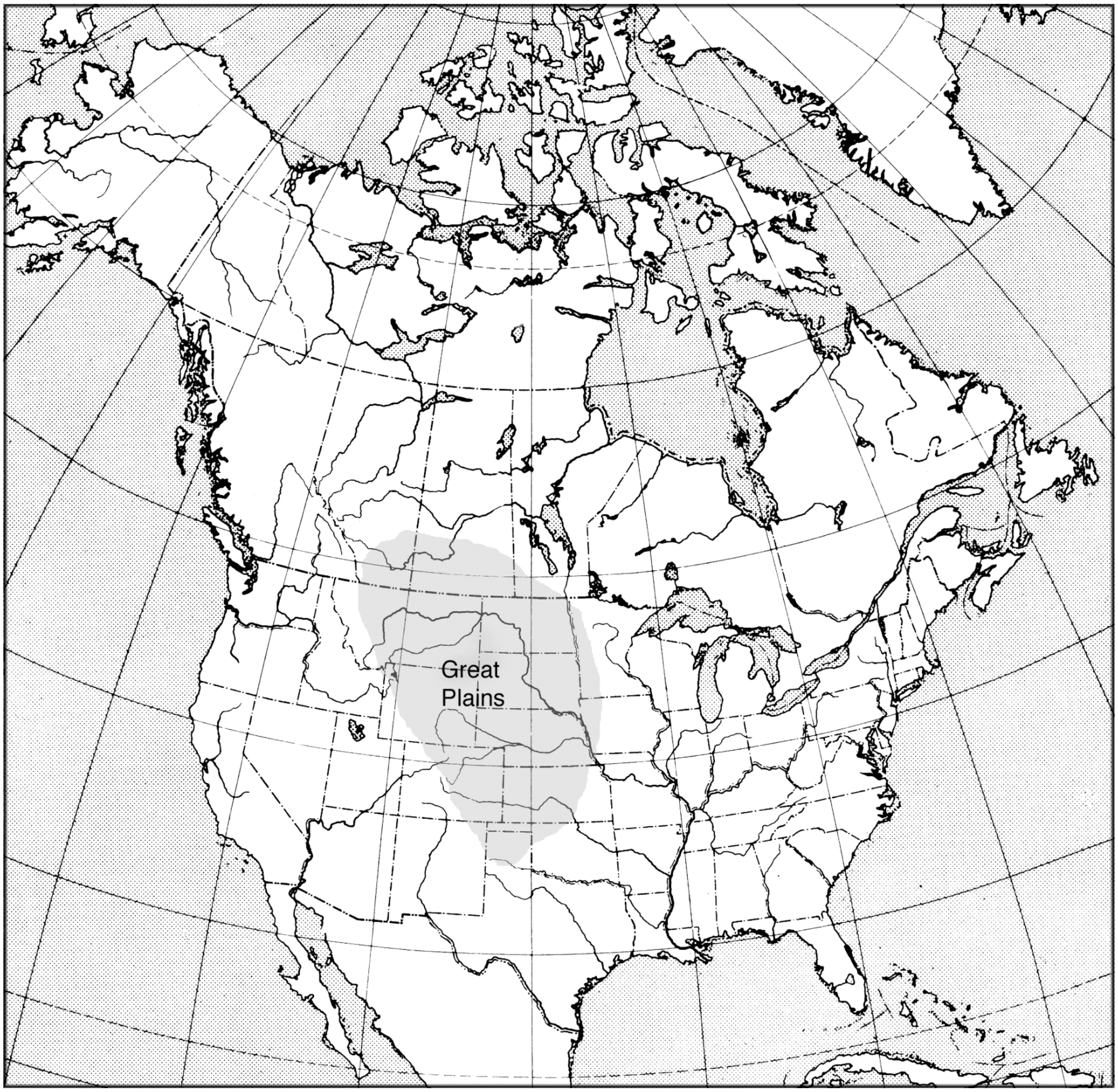

Figure 1.1. Great Plains culture area in North America.

Alberta prehistory includes evidence for the first peopling of North America until the arrival of European immigrants in the late 1700s on the Northwestern Plains (Vickers 1986). The Alberta Plains have a lengthy and rich prehistory, spanning nearly 12000 years. Paleoindians, the first indigenous people in the Americas, as broadly accepted by North American archaeologists, lived with necessarily close ties to the land and had a lifestyle keenly attuned to the now-extinct megafauna that they relied upon for their livelihood (Vickers 1986). Archaeological sites from approximately 12000 B.P. to 8000

B.P. are the most rare. The earliest sites occurred in the Eastern Slopes of the Rocky Mountains once the ice-free corridor became available, allowing a succession of plant communities to colonize the landscape, hence enticing game animals and the hunters that pursued them at this time. Archaeological sites during 8000 B.P. to 3000 B.P. showed ways of life geared towards communal bison hunting, a cultural trait that became continuous over thousands of years. Archaeological sites most commonly known in Alberta are those from the last 3000 years of prehistory, and they show the greatest diversity in site types. As was the case in earlier periods, the mobile hunter-gatherers who lived on the Plains faced a challenging environment, with extreme seasonal climatic differences. Northwestern Plains indigenous groups had highly regulated seasonal rounds in late prehistory with scheduled movements throughout the year for intercepting bison and other game, for resource gathering, and for trade; social networks and cultural traditions facilitated these deliberate rounds that met economic, subsistence, and technological needs (Bullchild 1985; McClintock 1968; Peck 2004; Vickers 1986). The present study will address only a narrow slice of this time span, focusing upon culture history on the Northwestern Plains from approximately 2500 B.P. to 1250 B.P.

During this particular period, site types represented in Alberta range from massive, well-known killsites such as Head-Smashed-In Buffalo Jump (Reeves 1990) and Old Women's Buffalo Jump (Forbis 1962), to campsites, such as Ross Glen (Quigg 1986), to processing sites, and less well-known ceremonial sites, including vision quest, and medicine wheel sites such as the Majorville cairn and medicine wheel site (Calder 1977; Vickers 1986). The sites are found within a diverse variety of landscapes, from the vast plains in the east, to the dramatic Rocky Mountain Range in the far west, and the rolling foothills in between. This archaeological evidence is often found in the form of projectile points throughout the province.

Organizing Plains Prehistory

Projectile points are ubiquitous archaeologically throughout prehistory on the Northwestern Plains. Changing through time and across space, projectile point forms are interpreted as diagnostic cultural markers. Archaeologists commonly organize prehistory in Alberta and on the Great Plains through the classification of projectile points and their attributes into a typology; in more recent Plains archaeological sites, pottery and structural remains are also included. When the unusual projectile points from the Fincastle site were recovered, they did not easily fit into the existing projectile point typology for Alberta. The typology suggested that the projectile points were a later phenomenon than indicated by radiocarbon dating; instead of the *c*. 1500 B.P. site that the point forms seemed to suggest, the radiocarbon dates were assayed at *c.* 2500 B.P.

Archaeologists organize projectile points and other archaeological evidence, including site types, into broader, temporally and spatially delimited archaeological cultures. In this thesis, an archaeological culture is defined in this study as a grouping of temporally and spatially related sites that share commonalities of material culture; an archaeological culture refers can refer to either a phase or a subphase as described in this section. Artifacts are assigned to archaeological cultures to identify groups on the Plains, and the relationships between them through time and space in order to interpret the archaeological past. Examples of archaeological cultures include Besant and Sonota. The means of defining these archaeological cultures has been debated on the Plains, but key concepts remain today.

It is appropriate here to outline terminology as used in this thesis, including 'phase,' 'subphase,' and 'complex.' A 'phase' can be best described as a distinct archaeological unit, with unique traits that occur only at a specific time and place (Willey and Phillips 1965). A 'subphase' represents the further refinement within a 'phase,' based upon temporal, stratigraphic, or artifact trait frequency occurrences that share commonalities within the broader, encompassing phase (Willey and Phillips 1965). A 'complex' occurs within a broader archaeological phase as a localized variation that maintains the overall phase characteristics, where the relationship to the preceding and antecedent archaeological cultures is not well understood (Neuman 1975; Reeves 1983a; Vickers 1986). The concept of a 'period' should also be outlined here in reference to Alberta prehistory. Generally, archaeologists divide prehistory in Alberta into three periods, based upon projectile point technology (Duke 1991:74; Vickers 1986:10-12). The Early Prehistoric Period (12000 B.P. – 7500 B.P.) is assigned due to spear hunting and adaptations to big game hunting, the Middle Prehistoric Period (7500 B.P. – 1250 B.P.) for the atlatl dart, and the Late Prehistoric Period (1250 B.P. – 250 B.P.) for the bow and arrow technology used at this time (Kooyman 2000; Vickers 1986).

Interpreting archaeological finds and sites requires building upon previous work by other researchers. The cultural affiliation of an archaeological site is assessed through a review of research findings from previous archaeological research in the study area. Using radiocarbon dates, stratigraphic context, artifacts, and features, archaeologists place their study site into the pre-existing framework of prehistory. Archaeological sites need to be placed in context with contemporaneous sites in order to assess cultural affiliation, and stratigraphic sequences must also be considered to seriate the artifacts through time. As sites are investigated, the body of archaeological data for a given region and time expands, and details of regional chronologies are refined as necessary. Our knowledge of prehistory is not static, and the archaeological record is fragmentary, creating considerable challenge when attempting to determine the cultural affiliation of a site.

In Alberta, archaeology is a fairly young discipline, and the available data have been limited until relatively recently. A general introduction to the archaeological research conducted in the province to date is needed to frame the Fincastle site, the focus of the present study. A detailed overview of the literature relating to the time period in question follows in Chapter 2.

Archaeological Investigations in Alberta

A brief historical sketch of the beginnings of archaeology in Alberta is needed in order to provide the context for the culture history to come out of this work. Junius Bird conducted the first archaeological excavation in Alberta in 1938 at Head-Smashed-In Buffalo Jump. In the following year he published archaeological finds recovered along the North Saskatchewan and Peace rivers (Bird 1939). Head-Smashed-In was further investigated in 1949 by Wettlaufer (Duke 1991:6). By the mid-1950s, the Calgary-based Glenbow Foundation under the direction of Richard Forbis, was the first Albertan organization to conduct systematic archaeological investigations in the province, along with the examination of private archaeological collections (Duke 1991:6). The Glenbow

Foundation's early work paralleled early research in Saskatchewan by Wettlaufer and Mayer-Oakes in the 1950s (Wettlaufer 1955; Wettlaufer and Mayer-Oakes 1960).

Also during this time, Thomas Kehoe recorded archaeological sites on the Blackfoot reserve, while pictographs were documented in the province by Douglas Leechman, Margaret Hess, and Roy Fowler (Duke 1991:6). William Mulloy conducted small surveys published by Wormington and Forbis (1965) as part of Wormington's work with the Denver Museum of Natural History investigating Paleoindian archaeology on the Great Plains. These research-based initiatives by pioneering archaeologists led the way for further research in the next decade, and began to outline the initial culture history for the Northwestern Plains.

By the 1960s, the University of Alberta and the University of Calgary were involved in Plains research, with new departments to facilitate growing interest in archaeology in the province. Key figures in research during this period included Richard Forbis and Brian Reeves, whose studies helped shape much of our present understanding of Alberta Plains prehistory (Forbis 1962; Reeves 1983a, 1983b).

In 1973, the Alberta Historical Resources Act legislated protection for archaeological sites from developers in the booming province, yielding data from contract archaeology. The Archaeological Survey of Alberta was created to regulate the province's archaeology and to conduct research into Alberta plains prehistory. They published the Archaeological Survey of Alberta's 'Occasional Paper Series' and 'Manuscript Series', until they ended with the recession of the late 1980s.

Since the mid-1990s, consulting archaeology firms have been enjoying another boom, contracted by developers for surveys and mitigative excavations in Alberta. These studies now provide the lion's share of new site data in the province, with research-based agencies only minimal contributors. This new information is becoming available, but analysis is minimal, although new guidelines are being prepared by the Historical Resources Management Branch, Alberta Community Development. Dissemination of consulting data is slow, leaving it to especially motivated investigators to provide further in-depth analysis. Clearly, this boom of new data and the understandable delays in presenting information to the profession has implications for our understanding of Alberta's prehistory: definitions of archaeological cultures are still very much based on early data from the 1950s and 1960s. The success of the consultant archaeology firms provides a great opportunity to revisit these early models and site types to affirm or reject their validity with newly available information. In the present study, archaeological evidence recovered in the years since Vickers' (1986) *Alberta Plains Prehistory: A Review* and Reeves' (1983a) *Culture Change in the Northern Plains: 1000 B.C. - A.D 1000* is examined, along with information from certain key sites, from approximately 2500 to 1250 B.P.

Research Problem

The recovery of distinctive projectile points at the recently recorded Fincastle site (DlOx-5) in southern Alberta provided the impetus for the present study. The elongated projectile points, made predominantly of Knife River Flint, were recognized as unusual by their form and the exotic raw material from which they were made, compared to other sites on Alberta's Northwestern Plains during the late Middle Prehistoric Period (*c.* 2500 – 1250 B.P.). These projectile points did not fit well into the pre-existing archaeological typology in Alberta. The Knife River Flint raw material mainly represented in the projectile point assemblage had been quarried from North Dakota, either representing strong trade links to the region or the presence of a group of bison hunters from that area. Problems included placing the projectile points into a typology, as well as determining the cultural affiliation of the makers of the projectile points subsequently recovered from the Fincastle site.

Additionally, the interpretive framework used by Plains archaeologists, developed primarily from culture history studies, cultural ecology, and 1960s positivist models of explanation, have created difficulties with understanding the archaeological record during the late Middle Prehistoric Period. For many years, archaeologists throughout the Northern Plains recognized the need for a systematic comparison of projectile points from the Besant Phase and the Sonota Complex. The relationship between these two archaeological manifestations has been controversial, and poses difficulties in interpretation; these difficulties include the usage of appropriate taxonomy, as well as in the models of archaeological units, and the interrelationships between them. This study addresses these issues.

Research Objectives

There are several research objectives in the present study that stem from the problems outlined above. These objectives range from specific questions about the Fincastle site, to broader questions about Plains prehistory and the theoretical framework used by Plains archaeologists in deriving their interpretations of archaeological cultures.

Research objectives specific to the Fincastle site include: 1) assessing the site's cultural affiliation through a projectile point analysis; 2) deciding whether the diversity in projectile points from the Fincastle site is technological, or represents their 'life cycle' and reuse; and 3) determining whether Fincastle represents a new archaeological culture, an early manifestation of the Besant culture, or a pre-cursor to the later Besant/Sonota archaeological cultures at *c.* 1500 B.P.

Broader research objectives with the present study include: 1) presenting a comparable data set, both quantitative and qualitative, of projectile points from Northwestern Plains sites from *c*. 2500 – 1250 B.P. for future researchers to access; 2) refining the culture chronology at *c.* 2500 B.P. on Alberta's Northwestern Plains; and 3) analyzing theoretical frameworks utilized by archaeologists when interpreting archaeological sites in Plains archaeology.

Thesis Overview

In Chapter 2, an overview of Northern Plains archaeological culture history during the late Middle Prehistoric Period is presented. The Pelican Lake, Sandy Creek, Unnamed, Besant/Sonota and Early Woodland Phases and Complexes are summarized, with an emphasis on projectile point technology. Key sites by province and state are outlined, with particular emphasis on the Northwestern Plains, and the Besant Phase. This in depth review of archaeological cultures between *c.* 2500 – 1250 B.P. provides the necessary background to place the Fincastle site in context.

In Chapter 3, archaeological investigations at the Fincastle site during 2003, 2004, and 2006 are explained. Field methodology and goals are presented, along with a discussion of archaeological finds and cultural features encountered during the field work. Radiocarbon dates obtained from the 2004 season are also reviewed.

In Chapter 4, the methodology and results of the projectile point study are presented. The Fincastle projectile points recovered over three field seasons are examined through a quantitative and qualitative study. Comparative quantitative and qualitative data is also presented from *c*. 2500 – 1250 B.P. archaeological sites on the Northwestern Plains, including EbPi-63, EgPn-111, Happy Valley (EgPn-290), Kenney (DkPj-1), Leavitt (24LT22), Muhlbach (FbPf-1), and Smith-Swainson. Trade, the significance of Knife River Flint, projectile point curation, and projectile point technology are also discussed, along with the projectile point analysis results.

Chapter 5 provides a discussion of more broad research findings regarding the context of the Fincastle site on the Northwestern Plains. Archaeological units, including phases and complexes, are reviewed, with the aim of outlining the taxonomy used in the organization of Plains prehistory. Following this, models of the Besant Phase/Sonota Complex debate are outlined. The chronological sequence, geographic distribution, site types, site environments, and stratigraphic associations of the study sites are reviewed to address this debate. Findings from the projectile point and site analysis are used in proposing a model of the Besant Phase, offering an explanation of the organization of archaeological cultures on Alberta's Northwestern Plains.

Chapter 6 provides a brief summary and conclusion of the research results, with reference to the research objectives outlined in this chapter. Future research directions are also discussed.

CHAPTER 2: CULTURE HISTORY

Culture History

Alberta Plains prehistory covers a great span of time, approximately 12000 years, which is well beyond the scope of this study to review in its entirety. As introduced in Chapter 1, prehistory in Alberta is divided into three periods, based upon projectile point technology (Vickers 1986:10-12). The Early Prehistoric Period (12000 B.P. – 7500 B.P.) is named for big game hunting that required the use of spear points, the Middle Prehistoric Period (7500 B.P. – 1250 B.P.) named for the atlatl dart, and the Late Prehistoric Period (1250 B.P. – 250 B.P.) for the bow and arrow technology (Kooyman 2000; Vickers 1986:12). The temporal focus of the present study is the Middle Prehistoric Period *c.* 2500 – 1250 B.P. This approach to organizing Plains prehistory, based on stylistic and technological changes in projectile points over time, has been classified into typologies (Duke 1991:74). Stone projectile points have been selected to frame culture chronologies on the Plains as they have a high archaeological visibility, appear continuously throughout Alberta's 12000 years of prehistory, and their attributes change through time.

For the purpose of the present research, the late Middle Prehistoric Period and the early Late Prehistoric Period transition will be reviewed more in depth to frame the context of this analysis. Archaeological phases reviewed in this study include Pelican Lake, Sandy Creek, the Unnamed Complex, Besant/Sonota, and the Early/Middle Woodland. The focus of the present study is on archaeological sites in Alberta, with the emphasis on the Besant/Sonota Phase, although other archaeological sites from the

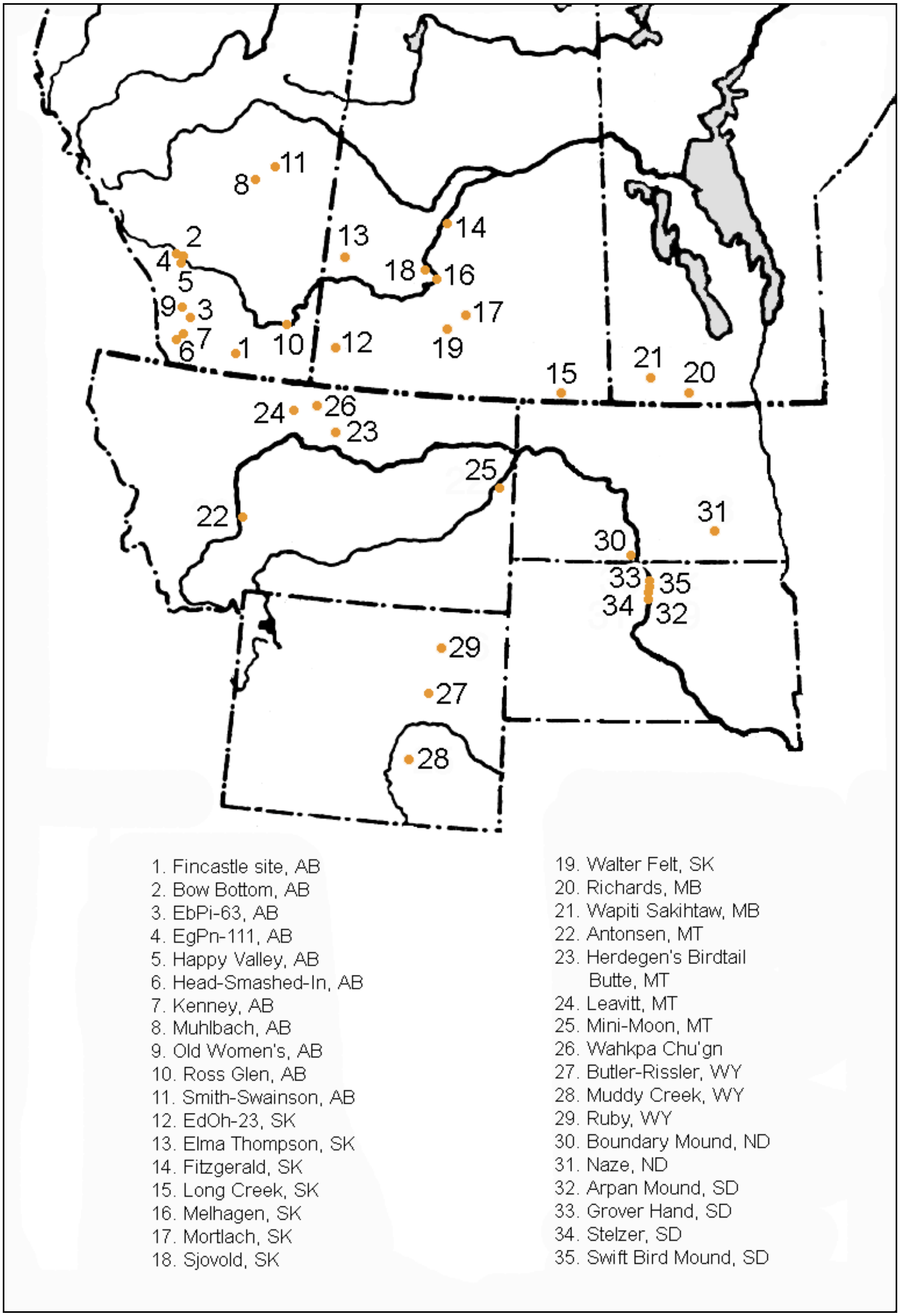

Figure 2.1. Archaeological sites on the Great Plains reviewed in the present study.

broader Northwestern Plains will also be included. Additional data will be presented from the Northeastern Plains sub-region for the later Middle Prehistoric Period, as the influence from this region is evident at the Fincastle site (Figure 2.1:1). The phases are presented in chronological order by phase or complex, then by province or state, with a summary of investigations provided by site, with the focus upon the recovered projectile point assemblages. Archaeological sites were selected for review that were named as type sites for a phase or complex during the late Middle Prehistoric Period. Additionally, site reports or analyses that had been published were also sought, along with more recent theses and consulting reports.

Pelican Lake Phase

Pelican Lake projectile points were initially defined by Wettlaufer at the Mortlach site (Figure 2.1:17) in Saskatchewan, as "corner-notched points with an oval cross-section… These points are beveled to the edges and toward the base. They are widest just above the notches and taper to a long symmetrical point. The base is somewhat narrower than the widest portion of the point…" (Wettlaufer 1955:55). Later, Reeves (1983a:57-59) in *Culture Change in the Northern Plains*, noted a similar form with regional variants across the Plains. Kooyman (2000:122) noted that "Pelican Lake projectile points have sharply barbed corner notching and a triangular form that is much like a stylized Christmas tree; the sharp points on the blade and corner edges of the notches are particularly distinctive. Basal and lateral edges vary from slightly convex to slightly concave."

Dyck (1983:105) observed that there were two varieties of Pelican Lake projectile point forms, an earlier form that "…has straight sides, a straight base and corner-notches which usually leave sharp tangs on the shoulders," and "toward the end of Pelican Lake time the base of this variety has widened to almost the full width of the shoulders and the notches are narrower, although sometimes still quite deep while remaining situated either right on the corner or else on the side but touching the corner." Brumley and Dau in their analysis of 40 Mile Coulee (1988:34-35) supported Dyck's observation, and recognized a similar pattern in southern Alberta, with a geographic distribution to the two varieties of Pelican Lake. In a paper presented at the Plains Anthropological Conference (Varsakis and Peck 2005), comparing projectile point assemblages in conjunction with radiocarbon dates in Alberta, the research data supported Dyck's (1983) observation of two varieties of Pelican Lake. Varsakis and Peck (2005) observed that Pelican Lake fell into two temporal groups, with Pelican Lake I approximately 3300 – 2800 B.P. and Pelican Lake II approximately 2800 – 2000 B.P. Pelican Lake I includes the more 'classic' form, with distinctive deep corner-notching and typical triangular shape, while Pelican Lake II becomes more variant after 2800 B.P.

Alberta

Bow Bottom site (EfPm-104)

The Bow Bottom site (EfPm-104; Figure 2.1:2) is located on the bank of the Bow River in southeastern Calgary, Alberta. Twelve tipi rings were excavated in their entirety, in advance of road construction for the Deerfoot Trail extension (Van Dyke and Head 1983:223). Excavations were conducted in 1980 and 1981, with an unusually high number of artifacts recovered from the stone circles (Van Dyck and Head (1983:223, 225). Based on the artifact assemblage, the stone circles at the Bow Bottom site were considered to be contemporaneous, and affiliated with the late Middle Prehistoric Period (Van Dyck and Head 1983:226). Van Dyck and Head (1983:227, 230) noted that:

> The range of diagnostic tools posed far and away the most difficult problem in the interpretation. The series of projectile points could arguably support either a Pelican Lake or Besant phase occupation interpretation…The Besant Phase affiliation can be argued on the basis of a number of classic Besant and Besant-like projectile points, the smaller size range of the Pelican Lake points, the generally poor execution of the points, and the heavy usage of local materials. The Pelican Lake phase affiliation can be argued equally well by appealing to the presence of the qualitatively better Pelican Lake points and the two concordant radiocarbon assays obtained for the site. The distributional data, however, clearly suggest that the Besant and Pelican Lake diagnostics occur in direct association with each other.

Van Dyck and Head (1993:230) noted that there are other sites in the Alberta foothills that have similarly mixed assemblages that may related to the Kootenay Plains Side Notched projectile point type, as well as seasonally available lithic raw materials. The authors comment that the existing tool assemblage may represent intensive reworking until trade presumably resumed in the summer and fall months (Van Dyck and Head 1993:230). However, the seasonal trade hypothesis does not explain some of the basal projectile point forms, which do not exhibit reworking. The Bow Bottom site may represent a palimpsest of cultural occupations due to minimal deposition or erosion. Van Dyck and Head (1983:230-231) obtained two radiocarbon dates for Bow Bottom: Ring 12 dates to 2530±120 B.P. (RL-1417), and Ring 4 dates to 2290±120 B.P. (RL-1528). Neither ring was in association of the typical Pelican Lake/Kootenay projectile points (Van Dyck and Head 1983:231).

Saskatchewan

Sjovold site (EiNs-4)

The Sjovold site (EiNs-4; Figure 2.1:18), located in south-central Saskatchewan on the South Saskatchewan River, represents 4000 years of prehistory in a sequence of 21 cultural occupations, with 24 radiocarbon dates (Dyck and Morlan 1995). Dyck and Morlan's (1995) exhaustive volume begins with a historic period component and concludes in the Middle Prehistoric Period, with Hanna. Additionally, the site includes occupations from Old Women's Phase, Avonlea, Besant, Pelican Lake, and undetermined archaeological cultures, due to a lack of diagnostic artifacts.

Focusing on the Pelican Lake Phase, in order to frame the present study on the Northwestern Plains, the Sjovold site yielded two Pelican Lake components (Layers XIX and XX) that predated the Besant layers at the site, and a third, later component (Layer X) that was mixed stratigraphically with a Besant occupation (Dyck and Morlan 1995:108-109).

Layer XX dates to 3900 - 3600 B.P. (1950 - 1650 B.C.), with a sample obtained from a bison scapula (S-2061; Dyck and Morlan 1995:96). This earliest Pelican Lake component for Pelican Lake at Sjovold included two small hearth features, accompanied by small quantities of faunal remains (pronghorn, canid, and unidentified mammal), debitage and formed stone tools (Dyck and Morlan 1995:513). The stone tools included one anvil and one fairly classic Pelican Lake projectile point, made from petrified wood, with deep corner notches at a right angle to the body creating a nearly stemmed appearance. The authors noted that the projectile point may have been used as an arrow point (Dyck and Morlan 1995:517-518).

Layer XIX dates to 3700 - 3400 B.P. (1750 - 1450 B.C.), obtained from large mammal bone fragments, presumed to be bison (S-1769; Dyck and Morlan 1995:96). Dyck and Morlan (1995:485) interpreted the dense Layer XIX as a Pelican Lake summer camp; archaeological remains included two hearths, several features, 'coarse' rock (fire-broken rock), stone and bone tools, faunal remains (bison, marten/fisher, canid, and rabbit/hare) and lithic tools and debitage. Four Pelican Lake projectile points were recovered from Layer XIX (Dyck and Morlan 1995:502). Two were made from Knife River Flint, one from petrified wood, and another from a silicified sediment; two were interpreted as dart points, one as an arrow point, and the fourth was unclassifiable (Dyck and Morlan 1995:502-503). These Pelican Lake points from Layer XIX are classic in form, with "…straight sides, deep corner notches and straight, narrow bases," and reminiscent of the Pelican Lake points from the Mortlach site (Dyck and Morlan 1995:502-503).

Layer X dates to 2300 - 2100 B.P. (350 - 150 B.C.), averaged over three radiocarbon samples (S-1767, S-3366, S-3367); Dyck and Morlan (1995:95) noted that this was the "most precisely dated layer in the site," obtained from both faunal remains (bison, pronghorn, wolf) and two charcoal samples. This layer yielded both Pelican Lake and Besant projectile points, along with 12 features, debitage, fire-broken rock, and faunal remains (Dyck and Morlan 1995:333). Six projectile points were recovered from Layer X: only one projectile point was complete (Dyck and Morlan 1995:351). Both side notched and corner notched projectile points are evident in the assemblage, and of the four specimens complete enough for metric analysis, three were interpreted as arrow points (Dyck and Morlan 1995:351). Dyck and Morlan (1995:351) noted that:

> A common stylistic element seems to have been a straight to slightly convex base. The notches, however, are of two types: (1) shallow side notches with the maximum width of the notch at least 25% greater than its maximum depth, and (2) moderately deep corner notches with notch width and depth approximately equal. The two types of notches did not appear together on any one specimen.

The projectile points were made from Knife River Flint (n=2), jasper (n=2), and petrified peat (n=2). Dyck and Morlan (1995:351) noted that the mixing of Pelican Lake and Besant style projectile points have been seen at other sites in the northern plains, including Mortlach. However, the authors note that they believe it is possible that Layer X may represent a palimpsest of multiple occupations, which must be taken into account when inferring cultural affiliation (Dyck and Morlan 1995:359).

Walter Felt site (EcNm-8)

In 1962 and 1965, Kehoe (1974:103), of the Saskatchewan Museum of Natural History, conducted excavations at the Walter Felt (EcNm-8; Figure 2.1:19) site in south-central Saskatchewan, near the town of Mortlach. At the stratified site, with 12 discrete components bearing artifacts, the research objective was to recover a stratified sample of projectile points (Kehoe 1974:103). Kehoe's (1974) paper focused on the two projectile points styles then known in the Middle Prehistoric Period that he termed 'the Large Corner-notched point system of the northern Plains', and he identified a number of types within this system; previously, points from this period were referred to as 'Middle Woodland'. Excavations recovered a total sample of 552 projectile points; 342 came from designated layers and were deemed to be diagnostic (Kehoe 1974:103). Kehoe (1974:104) noted that 34 'Large Corner-notched' projectile points were recovered from the earliest layers (Layers 13 to 15, dating to 500 B.C. – A.D. 400 or 2450 – 1550 B.P.), identified as Besant and Pelican Lake, along with 27 Samantha points. Kehoe (1974:109) described two variants of Pelican Lake, represented by 26 specimens (6 complete): 'Large Classic Pelican Lake Barbed, straight-based variety' and 'Small Classic Pelican Lake, barbed variety.' 'Large Classic Pelican Lake Barbed' projectile points were collected from layers 15 and 15d, manufactured out of brown chalcedony, Knife River Flint, and white quartzite. Three 'Small Classic' Pelican Lake projectile points were collected, 2 from Layer 15, and one from a disturbance between layers 10 to 13; specimens were produced from chalcedony, petrified wood and quartzite raw materials (Kehoe 1974:110). Kehoe (1974:11) observed that the two Pelican Lake variants were contemporaneous at the Walter Felt site; he also interpreted the site as a short-term campsite.

Sandy Creek Complex

Sandy Creek projectile points were first described by Wettlaufer (1955:52) at the Mortlach site, characterized as "…short, thick, rather misshapen points. They are characterized by shallow open notches and slightly indented bases." More recently, Dyck (1983:108-109) noted the similarity to the Oxbow point in form, and described Sandy Creek points occurring at Walter Felt, Sjovold (Level 12), Heron, and East Pasture, in addition to the Mortlach site. Reeves (1983a:14) observed that: "Sandy Creek points, technologically transitional between Late Oxbow and some Besant side-notched points, are characterized by squat forms, shallow side-notches and shallow offset v-shaped bases. Locally available materials, particularly Swan River Chert and quartzite, are emphasized in Late Oxbow and Sandy Creek." Reeves (1983a:14) further noted that Sandy Creek was coeval with Pelican Lake, and believed that it may represent an early Besant variant, also seen at Head-Smashed-In Buffalo Jump. In Vickers' (1986:81) synthesis of Alberta Plains prehistory, he included Bow Bottom to the list of Sandy Creek sites in support of a Pelican Lake – Besant – Sandy Creek relationship. However, with the description of the projectile points by Wettlaufer (1955) and Dyck (1983), Bow Bottom stylistically does not fit with Sandy Creek, despite the similar temporal occurrence at approximately 2500 B.P.

The Sandy Creek Complex remains poorly understood today. Projectile points of variable morphology have been identified as Sandy Creek, and a link to the Oxbow Complex of the early Middle Prehistoric Period in Saskatchewan has been posited as an origin for this type (Reeves 1983a). Very few projectile points of this type have been found. Dyck and Morlan (1995) integrate Sandy Creek into their 'Besant Series,' described later in this chapter, as the archaeological evidence after the initial naming of this type by Wettlaufer (1955) at the Mortlach site does not appear to support this as an independent archaeological culture—there have been no 'Sandy Creek' sites found to date. Below, instances where this type has been identified are described.

Saskatchewan

Mortlach (EcNl-1)

The Sandy Creek projectile point type was named at the Mortlach site (EcNl-1), introduced in the preceding section with Pelican Lake. The Mortlach site is a stratified camp site located in the Besant Valley near the town of Mortlach, Saskatchewan. The Sandy Creek projectile point type was identified from Occupation Layer 4E, underlying the Besant components at the site, and above the Pelican Lake components. This identification was made on the basis of the two projectile points recovered from this layer, as illustrated in the site report (Wettlaufer 1955:52,103). Layer 4E was radiocarbon dated at 2400$\pm$290 B.P. (Wettlaufer 1955:79).

Sjovold site (EiNs-4)

As introduced in the Pelican Lake Phase, the Sjovold site (EiNs-4) is a multicomponent, stratified archaeological site that offers an unusual opportunity to examine prehistory in a lengthy stratified sequence from Hanna to the Protohistoric Period. Layer XII dates to 2600 - 2300 B.P. (650 - 350 B.C.), based on large mammal bones. Dyck and Morlan (1995:389) interpreted this layer as Besant, although they specifically name the single projectile point find from this stratigraphic context as Sandy Creek. Layer XII included six features including hearths, faunal remains (bison), and stone tools (Dyck and Morlan 1995:389-391). Among the 24 layers at the Sjovold site, a Sandy Creek projectile point made from Knife River Flint was identified in Layer XII, while another fragmentary and undiagnostic projectile point was also recovered from this layer, made from silicified sediment (Dyck and Morlan 1995:397-398). Dyck and Morlan (1995:398) drew a comparison with the single complete specimen from Layer XII to the Mortlach site, and observed that Besant points often feature concave bases, as demonstrated in the Layer XII specimen, and tended to be made from Knife River Flint. The second point from this layer featured a straight base. Dyck and Morlan (1995:398-399) remarked:

> …Layer XII contained more than one form of projectile point and it casts doubt on the notion of our ability to diagnose a northern Plains complex

> on the basis of a single projectile point, even though it might be well formed and nearly complete. We suspect, therefore, that Layer XII at the Sjovold site belongs to what we are calling the Besant series. If so, the Layer XII date may push the age range of this group back several hundred years before the time of Christ. It may also be useful in establishing a different concept about Besant projectile point types, namely that they comprise not one type but several. With this in mind we propose that the name "Besant" be abandoned as the name of a projectile point type and taken up solely as the name of an archaeological series. One of the Besant series projectile point types, then would be 'Sandy Creek' after the side-notched basally concave type recognized by Wettlaufer in 1955. Another might be the convex-based Bratton type identified in Sjovold Layer XI. Under this scheme the Besant straight-based form(s) is yet to be named.

Dyck and Morlan's (1995) proposed Besant Series has not been taken up by Plains archaeologists in the past ten years since their work was published. Many Plains archaeologists have difficulty naming cultural variants on projectile point forms 'Outlook', 'Bratton', etc., when 'Besant' already has precedence in the literature. Dyck and Morlan (1995) take the term 'Sandy Creek' from its original context to define a unique archaeological culture predating Besant, and instead amalgamate Sandy Creek within Besant instead, on the evidence of a single projectile point. The sample is not large enough to support this relationship in the late Middle Prehistoric Period chronology.

Walter Felt site (EcNm-8)

As introduced in the Pelican Lake Phase, the Walter Felt site was excavated in the 1960s by Kehoe; it includes several stratified components containing Pelican Lake, Sandy Creek, Besant, and Samantha projectile points (Kehoe 1974:103). As part of Kehoe's (1974:103) 'Large Corner-notched point system,' he observed the occurrence of Sandy Creek projectile points at the Walter Felt site. Described as 'Sandy Creek Shouldered, eared variety,' Kehoe remarked that this projectile point style was also recovered at the neighbouring Mortlach site. Kehoe (1974:111) noted that three Sandy Creek projectile points were recovered from Layer 15b, dating to 2430±90 B.P. (S-279).

Besant Phase

The Besant Phase in Alberta dates to approximately 2000 – 1250 B.P. Besant projectile points were first named at the Mortlach site by Wettlaufter (1955), recovered from four stratified components, or layers. Kooyman (2000:124) observed that Besant/Sonota projectile points were "…generally between 3 and 8 cm in length. The internotch distance is generally between 1.4 and 2.3 cm, but the less common Samantha 'arrow' points have an internotch distance of between 1.4 and 1.6 cm." Dyck (1983:115) described:

> …lanceolate side-notched projectile points that are predominantly straight-based, but sometimes the base is slightly convex or slightly concave. Notches are generally twice as broad as they are deep and are situated so that one edge of the notch is slightly above or even touching the basal edge. Size range for dart points, which dominated most Besant collections, is a length of about 30 to 78 mm, width of about 19 to 23 mm, and hafting distance across the neck of about 14 to 16 mm. Side-notched arrowpoints identified by a neck width of about 8 to 10 mm, form only a very small part of the Besant assemblage from beginning to end.

Vickers (1986:81) observed that Sandy Creek points, which he considers an early form of Besant, frequently co-occur with Pelican Lake points. Reeves (1983a:84) noted that "Besant or Samantha Side Notched are the characteristic notched point types with Samantha replacing Besant through time."

Reeves' (1983a:55-56) extensive research into Besant projectile point typology yielded the following definition for the type:

Body: Body edges range from straight (rare) to convex (most common) with [a] number exhibiting contracting ovate edges. The point of maximum width tends to be at the shoulder and/or base. Rarely is the maximum width located distally of the shoulder. Tips tend to be sharp or slightly blunted. Cross sections are biconvex to plano-convex.

Shoulder: Sharp (most common) to rounded obtuse. Rarely do they approach 90°. Often one shoulder will be sharp and the other rounded.

Notch: As for notch location the concept of corner versus side notch is difficult to apply to Besant points. It may be “side notched” if a segment of the lateral body edge, proximal of the notch forms a basal edge; “corner removed” if the basal edge is very small; or “corner notched” if the base width is less than the body width. The blanks, however, notched perpendicular to the body edge rather than diagonally and the point should be properly termed side notched, i.e., the blow is struck from the side. Notching is usually done from both surfaces. In some Montana collections points are alternately notched. Occasionally one notch will be unidirectional and the other bidirectional. Notch shape tends to be a broad, fairly shallow U or V shape. The medial-distal and medial-proximal points of juncture are convex or rounded obtuse. Sharp obtuse points of juncture are occasionally present. The medial notch segments are concave. Occasionally they are straight. Notches are frequently ground.

Basal Edge: The distal-lateral point of juncture varies from convex or rounded obtuse to sharp obtuse. Right angles perpendicular to the longitudinal axis are never approached. Basal edge shape may be convex (most common) or straight, which may be parallel to the longitudinal axis or contracting or expanding towards the proximal end. The proximal-lateral juncture may be convex, sharp, or rounded obtuse (most common), right angular or acute. The most common overall basal edge form is a convex-rounded shape which, depending on the height of the basal edge and base shape, may appear as either a rounded “ear” or as a “spur” (Fig. 11.20). Basal edges may also appear as straight sharp basal segments flaring, or contracting (rarely), giving an appearance of a well defined angle with the base and the notch.

Basal edge formal variation is usually bilaterally symmetrical. Bilateral variation does however exist; often one basal edge will have a sharp obtuse distal-lateral juncture, a straight basal edge, and a sharp or rounded proximal-lateral juncture, a straight basal edge, and a sharp or rounded proximal lateral juncture (Figure 11.20). Basal edges are frequently ground. On many basal edges, the chipping is extremely delicate.

Base: Base thinning and grinding is very characteristic. Bases may be convex, straight (most common), or concave. The convexity or concavity rarely exceeds three millimeters. Concave bases seem to be largely a product of base thinning and grinding. Thinning techniques produce surfaces which are, when viewed in cross-section, concave on the dorsal and/or ventral surface. A distinctive but rare shape is a broad,

> asymmetric V-shaped base. Occasionally the tang is asymmetrically locataed relative to the longitudinal body axis. Bases may be wider, the same as (most common), or narrower than the shoulders.
>
> Modifications: Primary retouch usually covers both surfaces, although on some plano-convex specimens the ventral flake surface is relatively unmodified. Secondary retouch is usually confined to the lateral edges.
>
> In general two main classes or workmanship might be distinguished: the well-finished points and the rather crude, hastily manufactured form, with retouching usually confined to the flake edges (often unifacial).
>
> Quality of workmanship seems rather variable. In general workmanship is crude. However some specimens (particularly from the Richards Kill) exhibit a very high degree of controlled parallel flaking.

The Besant projectile point form occurs widely over the Plains, from the Alberta foothills, through Saskatchewan and Manitoba, southwest into Wyoming and east into Minnesota. Within the projectile point type there is a wide range of variation that has been noted by archaeologists in attempts to further refine the Besant typology (Forbis 1962; Dyck and Morlan 1995; Johnson 1970, 1977; Kehoe 1974; Reeves 1983a; Wettlaufer 1955). The Besant archaeological site outline in this section, with particular reference to the projectile point types and their stratigraphic position, is not intended to be an exhaustive inventory of all such sites in the Plains region. Instead, the intent is to outline the more significant archaeological sites for this phase, with particular emphasis on those sites in the Canadian Northwestern Plains region. In Chapters 4 and 5, projectile points from several of these sites will be analyzed more intensively for their attributes, as well as for their stratigraphic, temporal and spatial position on the Northern Plains. The aim is to demonstrate that the Besant projectile points exhibit broad variability that can be further refined using the above stated evidence; projectile point types can also reflect cultural affiliation, and play a significant role in defining archaeological cultures.

Alberta

EbPi-63 site

EbPi-63 (Figure 2.1:3) was first documented in the late 1980s by Bison Historical Services in a survey for the Little Bow Reservoir Project, and later excavated in 2001 and 2002 by Fedirchuk McCullough and Associates (Landals 2006a:135). The multi-component site is situated on a terrace of Mosquito Creek in Southern Alberta. In total, 200 m^2 were excavated at EbPi-63, in 7 excavation blocks, classified into 71 CUs, or Cultural Units (Landals 2006a:137). Landals (2006a:138-139) noted that the CUs were not correlated across the site due to the large site area and the complex stratigraphy; the majority of the CUs represented palimpsests of cultural occupations. For the purposes of this study, only the Pelican Lake/Besant CUs 6 and 10 from EbPi-63 will be examined, due to their contemporaneous dates with the Fincastle Site, although the site also includes a later Old Women's Phase occupation. Some of the projectile points from this site, although well made, do not fit into the pre-existing projectile point typology in Alberta at *c.* 2500 B.P. Landals (2006a:231) remarked that:

> …it appears that the earlier activity peak [at 2500 B.P.] occurred during a period of rapid culture change. The definite Besant points include Swan River Chert and Knife River Flint forms that may indicate new social groups from the east were expanding into southern Alberta and interacting with resident groups on a trial basis (given the very early dates). How interaction was structured, where it occurred or did not occur, and how often it occurred are all questions of historical contingency.

Based on the initial visual examination of the projectile points from EbPi-63, from both CUs, the projectile point assemblage exhibited notable diversity in both form and in raw material selection.

CU 6 is located within Excavation Block 1, a dense and poorly preserved bone bed at 100 cm below surface, that Landals (2006a:170-171) believed to minimally represent two occupations, with two hearth and one pit feature. Of the 209 lithic artifacts recovered from CU 6, 25 projectile points were recovered. Raw materials used in the projectile points included Swan River Chert (n=9), quartzite (n=3), miscellaneous cherts (n=9), obsidian (n=2), mottled chert (n=2), and one specimen each from brown chalcedony, argillite, yellow chalcedony, black chert, Avon chert, and banded black chert (Landals 2006a:172). She noted that 17 projectile points were unidentifiable due to their fragmented state, although they appeared to be atlatl darts (Landals 2006a:173). Projectile points that could be assigned to type were classified as either Pelican Lake or Besant, with one unusual, long projectile point made from brown chalcedony, that Landals (2006a:174) noted: "although the good workmanship, length and material type suggest a Besant/Sonota type, the notches and base form are quite distinct and do not fit into that type." Landals (2006a:174) concluded that the assemblage best represents a kill event, with little evidence supporting tool manufacturing at EbPi-63. There were no endscrapers, and quartzite was common in the rest of the assemblage. Landals (2006a:171) obtained one radiocarbon date from CU 6, at 2360±40 B.P. (Beta-156443).

In Block 2, CU 10 represented a palimpsest of two or three occupation floors at 120 to 130 cm below surface; Landals (2006a:186) noted that no further separation was possible. Features in CU 10 included four hearths and an ochre concentration (Landals 2006a:187). A total of 1613 lithic artifacts were collected from CU 10, with 21 projectile points recovered among the 100 tools. Eleven projectile points were too fragmented to classify to type (Landals 2006a:189), and of the remainder, there were 5 Besant, 2

Pelican Lake, 1 Besant/Pelican Lake mixture, and two unusual forms that could not be classified (Landals 2006a:191). Landals (2006a:188-189) noted that the projectile points were made from Swan River chert (n=11), brown chalcedony (n=5), silicified siltstone (n=2), Avon chert (n=1), and opaque red chert (n=2). Four endscrapers were recovered from CU 10 (Landals 2006a:192). In the overall lithic assemblage, Swan River chert dominated 45% of the raw materials utilized at EbPi-63, followed by quartzite at 31%, and then Knife River Flint with 7% of the total (Landals 2006a:188). Knife River Flint was not limited to the tools; lithic debitage from secondary and retouch flakes were present, along with a core (Landals 2006a:188). The faunal assemblage from CU 10 was the largest at EbPi-63, representing bison, canids, antelope, small ungulates, miscellaneous mammals, bivalves, muskrat, and an elk (Landals 2006a:193). One date was obtained from CU 10 of 2530+/50 B.P (Beta-156445; Landals pers. comm. 2006b).

EgPn-111 site

Site EgPn-111 (Figure 2.1:4) is located in west Calgary, along the south bank of the Elbow River. Archaeological testing was first conducted in 1974 by the University of Calgary. The site was subsequently shovel-tested in 1989, and later excavated in 1998 and 2000 by Bison Historical Services in advance of the Elbow Valley Golf and Polo Club development (Head *et al.* 2000, 2002). In total, 176 m^2 were excavated in the archaeological investigations of the fall Besant bison kill site (Head *et al.* 2002:iii). The faunal analysis of the bison remains at EgPn-111 indicated that a minimum of 44 bison were represented at the site (Head *et al.*:2002:iii). The lithic assemblage included 195 tools, including 24 point fragments and 33 scrapers, from the 1998 and 2002 excavations.

EgPn-111 was interpreted as a single kill event based on the recovered artifacts (Head *et al.* 2002:35), and this was further supported by three radiocarbon date samples, obtained from the bone bed in 1998. Dates were assayed at 1390±70 B.P. (Beta-127231), 1340±60 B.P. (Beta-127232), and 1310±60 B.P. (Beta-127233; Head *et al.* 2002:40). The overall lithic assemblage (74%), including both tools and debitage, was dominated by chert, quartzite, and siltstone raw materials; in contrast, the 34 projectile points were made from chalcedony (n=16), chert (n=13), quartzite (n=3), and siltstone (n=2; Head *et al.* 2002:130). Projectile point types identified at EgPn-111 included Besant, Pelican Lake, and Samantha. These three types were interpreted as contemporaneous by the investigators, although little discussion of this possible relationship was presented in their report. There was a tendency to overanalyze some of the projectile points that were lacking diagnostic features (i.e., body only); conversely, the lithic raw material analysis was very conservative.

Comparisons were made with the Muhlbach (FbPf-1), Happy Valley (EgPn-290), Fitzgerald (ElNp-8), and Melhagen (EgPn-1) sites, particularly in terms of the faunal analyses. Head *et al.* (2002:178, 183) observed that butchering patterns at Happy Valley were very similar to EgPn-111, although the lithic assemblages were different, with Happy Valley including more tools, while EgPn-111 featured more debitage than tools:

> The materials associated with both assemblages are quite similar although the relative percentages are different. Quartzites comprise 47.6% of the assemblage at Happy Valley while at EgPn 111 they constitute only 30.4%. Knife River Flint is a major material at Happy Valley (n=10, 15.9%) but considerably less common at EgPn 111 (n=58, 6.1%). However, much of the Knife River Flint that was recovered at EgPn 111 is either a tool or a tool fragment. Obsidian is not a major component at either site with a single piece from EgPn 111 and 3 pieces from Happy Valley (Head *et al.* 2002:183-4).

Muhlbach evidenced greater difference in cultural butchering practices with EgPn-111; the lithic assemblage was markedly different from EgPn-111 (Head *et al.* 2002:186). Head *et al.* (2002:188) observed that "at Muhlbach, points comprise over 82.4% of the tool assemblage while by comparison, points at EgPn 111 comprise 2.6% of the tool assemblage... at EgPn 111, Knife River Flint accounts for just 6.1% of the lithic assemblage but 16 of the 34 points or point fragments (47%) are this material." The Fitzgerald site in Saskatchewan had some differences with the bison butchering practices compared to EgPn-111. The lithic assemblages were markedly different, with Fitzgerald dominated by Knife River Flint (Head *et al.* 2002:190). Unlike EgPn-111, projectile points were abundant at Fitzgerald, with 134 specimens recovered. As at the Fitzgerald site, the Melhagen site featured butchering practices distinctive from EgPn-111, while the investigators noted that again there was a strong preference at Melhagen for Knife River Flint (70%) for projectile points (Head *et al*. 2002: 193).

The comparative study at EgPn-111 provided clues for further interpretation of the Besant Phase on the Northern Plains. Head *et al.* (2002:195-6) commented that:

> Besant sites are common on the northern plains and associations with Pelican Lake materials are not uncommon. The relationship between these two styles of projectile points is not always clear and has led to ongoing debates concerning the association. The data at EgPn 111 provides additional information which is likely germane to the ongoing debate. Certainly the presence of what are interpreted as Pelican Lake points in an assemblage dominated by Besant points (many [of] which are made of Knife River Flint) but also including what are thought to be small arrow points is intriguing.

EgPn-111 is a significant archaeological site, and the large sample of projectile points recovered from this locale is helpful for the present study in assessing the Besant Phase.

Happy Valley site (EgPn-290)

Located in Calgary, Alberta on the Bow River, the Happy Valley site (EgPn-290; Figure 2.1:5) was excavated in 1991 by Lifeways of Canada in advance of the Valley Ridge subdivision and golf course development (Shortt 1993:7-8, 13). Under the direction of Dale Walde, field methods included excavation by both shovel and trowel, and sediments were screened using quarter-inch mesh (Shortt 1993:13). Excavations were conducted in 50 cm by 50 cm units, and in total 39.25 m^2 were excavated after two weeks (Shortt 1993:13-15). Nearly all of the artifacts were recovered from a single stratum, including intact bison elements from a bone bed, unidentified bone fragments including burnt pieces that were found throughout the site (Shortt 1993:17). Shortt (1993:17-18) hypothesized that the burnt bones found both inside and outside of the bone bed may have been due to an intentional burn of the site following the kill event. Shortt (1993:19) noted that the site represents no more than two events. Two radiocarbon dates were obtained in 1981, from Lifeways of Canada test excavations, that were later expanded in 1991: 2440±120 B.P. (RL-1657) and 2450±120 B.P. (RL-1658) (Shortt 1993:41-42). In 1992, Shortt (1993:42) obtained another radiocarbon sample that yielded an age of 2350±80 B.P. (Beta-51285). Shortt (1993:13) remarked that "…these radiocarbon dates and the presence of Besant projectile points makes this a relatively early Besant manifestation." He described Morlan's (1988) publication that pushes earlier the first appearance of Besant in the Calgary area, than what is described in Reeves' (1983a) work. Thirteen projectile points were recovered from Happy Valley, classified as 3 Besant side notched (1 broken specimen), 2 Pincher Creek side notched, 2 Pelican Lake corner notched, along with 6 fragmented projectile points (Shortt 1993:53-

54). Two projectile points were made from Knife River Flint, one from Swan River Chert, one opaque brown chert, one white quartzite, one Paskapoo chert, and one black chert (Shortt 1993:46). There is no discussion of how three different projectile point types could be contemporaneous within a single component site, especially when the site is ultimately affiliated with Besant. Unfortunately, no photographs of the projectile points are provided; instead, line drawings are presented alongside the discussion of the projectile points. It is possible that the Happy Valley site represents a single cultural affiliation, with a projectile point type that exhibits wide variation within the assemblage, or that site's stratigraphy is compressed.

Head-Smashed-In Buffalo Jump site (DkPj-1)

The Head-Smashed-In Buffalo Jump site (DkPj-1; Figure 2.1:6) is located approximately 60 km west of Fort McLeod, Alberta. Set in the foothills of the Rocky Mountains, the archaeological site features kilometers of drivelines used to gather the bison to the steep 13 m cliffs for the bison jump, creating the dense bone beds beneath the cliffs, as well as a nearby campsite used by the hunters (Reeves 1990). The rich, stratified archaeological components at Head-Smashed-In offer thousand of years of cultural sequences on the Northwestern Plains, yielding valuable insights into cultural dynamics. Junius Bird has been credited with the first scientific excavation in the province, under the auspices of the University of New Mexico in 1949, after a preceding survey (Bird 1939; Reeves 1990:152). The University of Calgary, with the support of the Glenbow Foundation and under the direction of Dick Forbis, tested the kill site and the campsite in 1965, 1966 and 1972 (Reeves 1990:152). The Archaeological Survey of Alberta conducted excavations in advance of construction for the interpretive centre from 1983 to 1986 (Brink *et al.* 1985; Brink *et al.* 1986; Brink and Dawe 1989); excavations focused on the prairie processing areas of the site. Reeves' excavations at Head-Smashed-In recovered projectile points in a stratified context; later published excavations occurred in areas of compressed stratigraphy, and therefore are not reviewed in the present study.

Three excavation areas were delimited: south, north, and east (Reeves 1990:155). In the south excavation area, research objectives included assessing the stratigraphy, age, extent, and cultural association of the kill deposit; in the following years, further excavations in this area were undertaken to examine the Avonlea and Old Women's components (Reeves 1990:156). In the north excavation area, shallow excavations atop bedrock were conducted to investigate the site's stratigraphy at the kill site, while later excavations intended to study the earlier components at the site instead yielded disturbed deposits, from pothunters in previous years (Reeves 1990:156). The east excavation area was investigated in the kill area to assess the site's age and stratigraphic context (Reeves 1990:156).

Focusing on the Besant components at Head-Smashed-In, the south excavation area included Besant projectile points in Layer 11, stratified beneath an Avonlea component. Reeves (1990:158) assigned Layer 11 to the Pelican Lake Phase. Layer 11 was excavated in seven arbitrary levels, encompassing several feet of sediments. Despite the Pelican Lake Phase association for Layer 11, Reeves (1990:158) noted that there was evidence for the Besant Phase in the upper half-foot of sediments of Layer 11. Layers 12 to 14 were assigned to Pelican Lake. One radiocarbon date was obtained at 1.5 feet beneath the surface of Layer 11, at A.D. 25±80, or 1950±80 B.P. (GX-1253).

In the north excavation area, Besant projectile points were also recovered from a layer that included both Pelican Lake and Besant artifacts. Reeves (1990:159) observed that Besant occurred at the top of Layer 3, with Pelican Lake at the bottom of Layer 3. Two radiocarbon dates provided ages at A.D. 620±100, or 1330± 100 B.P. (RL-331), and A.D. 440±90, or 1510±90 B.P. (GX-1220). Layers 4 to 8 were assigned to the Pelican Lake Phase; Layer 2 had been assigned to the Avonlea Phase. The east excavation area was not reviewed by stratum (Reeves 1990).

Reeves (1990:165) noted that at Head-Smashed-In:

> The Besant phase is not represented by a well-defined discrete component, but it does appear as concentrations in the uppermost Pelican Lake phase kill. Stratigraphic analysis suggests that these points represent a very brief use of the kill. The assemblage is characterized by Besant Side-Notched points. The lithic suite associated is primarily Knife River Flint and other lithic varieties that are found in nearby Besant assemblages.

The Besant component at both the north and south excavation areas is separate from the overlying Avonlea and older Pelican Lake Phase occupations at Head-Smashed-In. Unfortunately, the Besant projectile points (n=4) from these layers have gone missing, and are therefore no longer available for physical analysis (Kooyman pers. comm. 2005; Reeves pers. comm. 2006). However, their stratigraphic context and the early radiocarbon dates from the Besant components have provided a valuable culture sequence for Alberta.

Kenney site (DjPk-1)

Reeves' (1983b) classic research at the Kenney site (DjPk-1; Figure 2.1:7), excavated in 1963 and 1964, provided key initial research on Besant that, along with the Mortlach site, has helped frame Plains archaeologists' understanding of this archaeological culture. The Kenney site, a stratified campsite located on Pincher Creek near Brocket, Alberta, included three occupations, two Besant components (Layers 6 and 8), and a Late Prehistoric Period component (Layer 4). Reeves' (1983b) research focused particularly on the Besant components. Reeves noted that 59 Besant projectile points were collected from Layers 6 and 8. Reeves drew comparisons from the Old Women's Buffalo Jump Site (Layer 16), and from the Mortlach site, among others. No bone upright features were observed, although there were a couple of features interpreted as caches that were later reused as discard heaps by prehistoric people. Reeves (1983b) obtained three radiocarbon dates for the two Besant components: Layer 6 dates are A.D. 1250±60 (700±60 B.P.; S-271) and A.D. 490±110 (1460±110 B.P.; GAK-1354), and the Layer 8 date is A.D. 350+/115 (1600±115 B.P.; S-272).

As one of the initial Besant Phase excavations on the Northwestern Plains, the Kenney site provides a valuable data set for this period. The Kenney site is a well-stratified campsite that includes two radiocarbon dated Besant components, necessary in order to make comparisons with Besant cultural material from other archaeological sites. The large sample from the Kenney site is also extremely valuable, as a larger sample should indicate trends within an assemblage. The first date (700±60 B.P.) for Layer 6 from the Kenney site should be rejected due to its late time period, in contrast to what is now known for the chronology of Besant, which generally terminates around 1250 B.P. More minor problems occur with the two other dates, as Layer 6 date is 140 years older than the Layer 8 date, though that could be explained by the deviation range. Reeves, in his non-metric examination of the projectile points from Kenney in comparison with the

Muhlbach points, noted that the Muhlbach points have very well ground bases, unlike those from the Kenney site.

Muhlbach site (FbPf-1)

In her preliminary report, Gruhn (1969) described excavations at the Muhlbach site (FbPf-1; Figure 2.1:8), located southwest of Stettler, Alberta. Excavations were conducted under contract with the National Museum of Canada in 1965, after the landowner brought the site to the attention of the University of Alberta. Three excavation trenches were laid out and investigated, comprising a total of 128 square metres. The Muhlbach site was situated in a low grass-covered dune field in the modern parkland; Gruhn did not know whether the site had been situated in parkland or grassland during its use. A single-component bone bed contained primarily bison remains in poor condition, believed to represent minimally 100 to 300 animals. Also of note at the Muhlbach site were pit features, 20 to 40 cm in diameter, filled with vertically oriented elements. Gruhn (1969) noted that this type of feature had been described at the Stelzer site, Sioux County in North Dakota, and the Saco and Boarding School sites in Montana. The function of the pits was undetermined, but Gruhn believed it was unlikely that they had been used to build a pound structure, due to their random distribution. Instead, Gruhn (1969) hypothesized the pits had possibly served as anvils. A sample of 36 bifacially worked projectile points were recovered, 89% made from Knife River Flint, sourced from North Dakota. Base shapes were variable among the points, including convex, concave and straight forms. Workmanship was equally variable, some projectile points seemingly made in haste. Muhlbach dates to A.D 680 ± 150 (1270±150 B.P.), somewhat later than other similar sites in Alberta and Saskatchewan excavated in the 1960s (Gruhn 1969).

Gruhn (1969) assigned the Muhlbach Site to the Besant culture, based on radiocarbon dates and comparison with the projectile points from the Mortlach and Old Women's sites. She suggested that the Muhlbach site had connections to Plains Woodland groups to the southeast, either a group from the Dakotas or a group with close trade ties to the Dakotas. Her association is based upon the extensive use of Knife River Flint in the lithic assemblage, projectile point morphology, and the presence of vertical bone upright features. Unfortunately since the excavation, the majority of the Muhlbach projectile points have gone missing from the Royal Alberta Museum (Dawe pers. comm. 2006), meaning that the points cannot be studied or quantified beyond what is available in the preliminary report. Gruhn's (1969) report was the only document ever published with the Muhlbach site findings; thus, no details of either the faunal or the lithic analyses were ever made available. Interpretations are limited without a complete site analysis, and Gruhn did not discuss possible hunting methods or social implications. Similarities to the Fincastle site include bone upright features, projectile point forms, and the site setting within sand dunes.

Old Women's Buffalo Jump site (EcPl-1)

Investigations at the Old Women's Buffalo Jump site (EcPl-1; Figure 2.1:9) were among the initial archaeological studies in the province of Alberta. Located south of Calgary, near the town of Cayley, Alberta, the archaeological site is situated beneath sandstone cliffs that were used in communal bison hunts, spanning the Pelican Lake

Phase through to the Old Women's Phase. In the late 1950s, the Glenbow Foundation, under the direction of Richard G. Forbis, conducted archaeological excavations at the Old Women's site. Units were laid out in five-foot squares, with the site area was divided into Upper Pit and Lower Pit areas 40 feet apart, and the shoveled sediments were screened through ¼ mesh (Forbis 1962:71). The cultural stratigraphy was correlated between the Upper and Lower Pits (Forbis 1962). The Besant component, Upper Pit Layer 17, was radiocarbon dated to 1650$\pm$50 B.P. (S-90), using burnt bone, and was seen as culturally contemporaneous with the findings at the Mortlach site (Forbis 1962:81-82). Layer 25, also using a burnt bone sample, yielded a date of 1840$\pm$70 B.P, (S-91; Forbis 1962:81). Two dates, 1100$\pm$180 B.P. (S-87) and 1020$\pm$80 B.P. (S-89), were obtained in Layer 13 (Forbis 1962:81).

Forbis (1962:106,109) observed that there were four varieties of Besant projectile points, further noting the presence of these four varieties at Mortlach and Long Creek. Forbis (1962:106) noted that Besant projectile points from the Upper Pit, Lower Member generally were:

> Large, in relation to points from the upper member, Besant points are chiefly characterized by shallow corner notches, which produce a broad, flaring stem, almost as wide as the body. The shoulders are straight or sloping. Body edges are almost always convex. Most specimens are bifacially dressed, secondary flake scars replacing the original flake scar. Basal thinning is not common; but basal grinding is general and may be light to heavy. The edges of the stem are similarly dulled.
>
> In length, Besant points range from 25 to 37 mm, and some incomplete specimens probably exceed 40 mm. They are from 17 to 24 mm wide, and from 4 to 7 mm thick. Width at the neck ranges from 14 to 18 mm. The proportion of length to width is generally about 1.5 to 1. Complete specimens range from 1.8 grams to 4.6 grams, and average 3.4 grams.

Forbis further observed that these four varieties of Besant were stratigraphically distinct. Variety 1 (n=2), in Layers 15 and 16, is described as: "the base, slightly concave, is nearly as wide as the body, and the basal corners are rounded. The proportion of length to width tends to be about 2 to 1" (Forbis 1962:106). Variety 2 (n=2) occurring in Layers 16 and 17, is described as "…similar to Variety 1 except that the length-width ration is the usual 1.5 to 1, and the base tends to be slightly convex." Variety 3 (n=4), from Layers 16 and 17, "…includes specimens smaller and thinner than either of the foregoing groups, and differs from Variety 2 mainly in that the base is straight or concave" (Forbis 1962:106). Variety 4 (n=4), from Layers 17 to 22, included projectile points with "…generally sharp and straight shoulders. Distinctively, the basal corner tends to be sharp, rather than rounded as among other varieties. The base is slightly convex" (Forbis 1962:106).

In the Lower Pit, Lower Member, Forbis (1962:112) noted that four Besant projectile points were also recovered. Besant points (n=3) were recovered from Layers 9, 10, and 11, believed to correlate with Upper Pit Layers 15 to 22, and identified as Variety 2. One partial point was collected from Layer 10 and identified as best belonging to Variety 4 (Forbis 1962:112).

Forbis did not identify any of the raw material types for the projectile points from the Old Women's Buffalo Jump. Small samples used to identify the four Besant varieties are also limiting; however, the stratigraphic separation between these types through time is very informative. Variety 4 shows some similarities with later Pelican Lake projectile point forms (Varsakis and Peck 2005). Varieties 2 and 3 exhibit characteristics of the classic Besant forms best recognized by Northwestern Plains archaeologists, with a broad body and shallow notches. Variety 1, the most recent variety as seen in Layers 15 and 16, exhibits narrower neck width, square basal notches, and appears to have a more slender, elongate body form.

Ross Glen site (DlOp-2)

The Ross Glen site (DlOp-2; Figure 2.1:10) is a camp site that includes 18 tipi rings, located southeast of the South Saskatchewan River near Medicine Hat, AB. Quigg (1983) excavated 246 m^2 at the Ross Glen Besant tipi ring site in southeastern Alberta in order to test ideas regarding economic and social patterns in stone circles. Eighteen rings were recorded, and two time periods were distinguished. Sixteen rings were earlier, while two rings were determined to be later (Quigg 1983). Quigg (1983) further observed that the sixteen rings believed to be contemporaneous were organized into two groupings. Four assumptions tested at Ross Glen included: first, that stone circles each represented an independent structure; second, that the base of each ring rock represented the ground surface contemporary with the prehistoric occupation; third, that the size of the tipi ring did not indicate a certain phase or time period; and fourth, that the distribution of the ring rocks was purposeful. Bone preservation at Ross Glen was minimal at best. Six Besant projectile points were recovered, as was debitage from making stone tools, and much fire-broken rock, interpreted to have been used for rendering bone grease. Quigg (1983) used statistics in order to identify social structure at the Ross Glen site, and he interpreted the difference in ring size as a reflection of either the status of its residence or family size. Quigg (1983) found that ring rock base depths represented the ground surface at the time rings were created. He also found that the placement of rings in proximity to neighbouring rings was deliberate. Quigg (1983) believed that the two groupings represented within the earlier time period were separate bands that may have gathered for communal hunting presumably in the fall.

The large sample excavated at the Ross Glen site helps cast some light on the intrasite relationship of the tipi rings. Poor bone preservation made radiocarbon dating very difficult at this site. One combined date from bone apatite and gelatin provided a date of AD 479±150, or 1471±150 B.P. (GX-5892-A, GX-5892-G). The lack of chronological control on each ring in the study is a reason for caution in regarding Quigg's interpreted results on social structure, as they are then difficult to support or refute. Evidence for Besant social structure was derived solely from statistical tests; limitations of this approach include not taking artifacts into account or radiocarbon dating problems. Ideally, each ring should have been dated in order to establish that they are contemporary, rather than going by depth below surface of the rings; a range of factors can provide differential deposition of sediments after the site was occupied. The projectile points from the site were made from local lithic material, while most of the heavily used scrapers were made from Knife River Flint. The forms of the points themselves are quite varied, and show similarity with the Fincastle site assemblage. The dominance of local material, with small amounts of exotic stone, may suggest long distance trade. Details on the context of the tools within the site would have been interesting in furthering the discussion about social status and economic ties.

Smith-Swainson site (FeOw-1)

The Smith-Swainson site (FeOw-1; Figure 2.1:11) is located south of the town of Sedgewick in central Alberta, approximately 140 km southeast of Edmonton. The site is approximately 100 km northeast of the Muhlbach site. There is little information available for the Smith-Swainson site. Projectile points (n=152) from the Smith-Swainson site are held at the Royal Alberta Museum in Edmonton, gathered as a surface collection. A survey of the site area by Maurice Doll in the early 1970s did not yield any further information (Dawe pers. comm. 2006).

Despite this limited information in terms of the site provenience, what is immediately striking about the Smith-Swainson site is its similarity to the Muhlbach site. Projectile points from these biased surface collections are dominated by Knife River Flint, indicating either strong trade ties to North Dakota, or possibly the presence of hunters from the Dakotas during the late Middle Prehistoric Period. Smith-Swainson, like Muhlbach, features both dart points and arrow points. Further efforts are recommended to relocate this site, to gain provenience information and further data.

Saskatchewan

EdOh-23 site

EdOh-23 (Figure 2.1:12) is a Besant processing site located in the Great Sand Hills of Saskatchewan (Johnson 1983). In his report, Johnson described lithic artifacts recovered from EdOh-23, including two complete and five fragmentary projectile points, bifaces, scrapers, and flakes. Lithics recovered were predominately made from Knife River Flint, although green jasper and white chalcedony were also present. Johnson

(1980) also noted that 200 g of flakes were recovered, likely produced by soft hammer percussion. Quantities of highly fragmented fire-broken rock at the site suggested intensive stone boiling, along with an abundance of burnt and unburnt small bone fragments. A spring located approximately 1500 m away from the site may have attracted game as well as prehistoric people. One radiocarbon date from unburnt bone, 1675$\pm$115 B.P. (S-2348), was obtained for the single component Besant site (Johnson 1983). Boiling and flint-knapping activities were interpreted at EdOh-23.

Johnson (1983) provided a very preliminary overview of EdOh-23 in this brief article. No details regarding excavation methodology, nor any description or profiles of sedimentary profiles from EdOh-23 were provided. The lack of data regarding excavation techniques and stratigraphy limits the interpretive value of this Besant processing site. Johnson suggested that the quantity of the fragmented faunal remains and fire-broken rock indicates that Besant people used the bone as a fuel. An alternative interpretation of the remains is that faunal remains were processed for grease extraction. The projectile points from this site are made of Knife River Flint, and the point morphology appears very similar to the points recovered at the Fincastle site. The site setting in a sand dune is another parallel with the Fincastle site.

Elma Thompson site (EiOj-1)

Finnigan and Johnson (1984) excavated 27 m^2 at the Elma Thompson site (EiOj-1; Figure 2.1:13) in Saskatchewan, both inside and outside of a stone circle. Their research objectives were to determine the site’s cultural affiliation and age, to obtain a representative sample, and to assess whether the deposits were intact. Finnigan and

Johnson (1984) determined that Besant tipi rings were larger than other rings found in any other time period on the Plains, and that Besant people tended to use fewer ring rocks. Two features were documented, one unusual pit feature filled with stone, and another feature interpreted as a possible smudge hearth. Lithic artifacts recovered from the Elma Thompson site included two projectile points. Swan River Chert and chalcedony (not Knife River Flint) raw materials dominated the lithic assemblage. Small amounts of bone were collected, including a tibia that returned a radiocarbon date of 1675 ±145 B.P. (S-2202), or A.D. 275 (Finnigan and Johnson 1984).

Overall, the report by Finnigan and Johnson (1984) was very descriptive, but did not offer much interpretation of past behaviour. The postulated smudge hearth near the east wall of the tipi is enigmatic. The photograph of the feature in the report shows intact, large cobbles, but the charcoal stained matrix did not contain enough organic material in order to obtain a radiocarbon date from the feature. The chalcedony from the lithic assemblage from the Elma Thompson site is only briefly discussed. The presence of the small quantities of non-local chalcedony in the lithic assemblage may be due to restricted availability due to trade seasons or time, or due to a distant quarry source. Lithic activities were only in the intermediary production stages; no evidence of cortical flakes or finishing flakes were observed. The forms of the projectile points themselves seem to suggest reuse; one tool was perhaps repurposed as a knife. Further comparison of the Elma Thompson site to other Besant tipi rings, such as Ross Glen, would be useful in comparing the types of lithic material in the assemblage. Additional analysis of the chalcedony from this site would also be valuable. The work at this site has helped further the evidence for understanding Besant occupation.

Fitzgerald site (ElNp-8)

Located in the Moose Woods Sand Hills, southeast of Saskatoon, Saskatchewan, the Fitzgerald site (ElNp-8; Figure 2.1:14) was excavated in 1992 and 1993 (Hjermstad 1996:1). Excavation methods included shovel-shaving to the cultural levels, which were then excavated by trowel, with deposits screened through ¼ inch mesh (Hjermstad 1996:34). Fitzgerald was identified as a Besant bison pound, with extensive bison skeletal remains accompanied with projectile points (Hjermstad 1996:1). Post-holes and bone upright features were observed; the uprights were hypothesized to be dog or tipi tie-downs, or a drying rack (Hjermstad 1996:265). Hjermstad (1996:1) determined that 90% of the formed tools and debitage were produced from Knife River Flint. In 1991, 50 projectile points were recovered, 49 of which were made from Knife River Flint (Hjermstad 1996:38). The cultural deposits were within a single stratum; four radiocarbon dates were obtained by soluble collagen extraction, in association with Besant projectile points (Hjermstad 1996:22, 25): 1490±90 B.P. (Beta-69005), 1270±140 B.P. (S-3546), 1340±60 B.P. (Beta-69004) and 1160±170 B.P. (S-3547). Hjermstad (1996:26, 28) believed the earlier Beta dates more accurately reflected the site; the calibrated dates placed the site at 1283±20 B.P. In total, 73 m^2 were excavated over two seasons, and a sample of 143 projectile points (68 complete) was recovered (Hjermstad 1996:46-47). Hjermstad (1996:77) noted that 97% of the projectile points were made from Knife River Flint. Hjermstad (1996:265) rejected dividing the projectile points into two types (Outlook and Bratton, after Dyck and Morlan 1995), but he determined that they were part of the 'Besant Series'. In sum, Hjermstad (1996:265) believed that the Fitzgerald site may represent a fall kill event of up to 800 bison.

Long Creek site (DgMr-1)

Excavated in 1957, the Long Creek site (DgMr-1; Figure 2.1:15) was the second professional excavation to occur in Saskatchewan (Wettlaufer and Mayer-Oakes 1960). Located near Estevan, Saskatchewan, the site is on a terrace of the Long Creek River, ultimately draining into the Souris River. The Long Creek site, like the Mortlach site, helped provide an initial framework for Northern Plains culture history: some of the archaeological cultures identified at Long Creek still stand, such as Pelican Lake and Besant, while others, like Long Creek, have been dropped from the literature.

Nine levels were excavated at the Long Creek site and the oldest level, dated to 3043 B.C. ± 125 (4993±125 B.P.), was assigned to the Long Creek culture, an early Middle Prehistoric archaeological culture that was followed by the Oxbow culture. Also in the Middle Prehistoric Period were levels containing Hanna, Pelican Lake, and Besant artifacts. Archaeological phases represented in the Late Prehistoric Period included Avonlea and the 'Fall River' culture, which now would be referred to Mortlach in the Old Women's Phase. Two dates were provided for the Pelican Lake component at Long Creek: Upper Level 4 dates to 293 ± 100 B.C. (2243±100 B.P.) and Lower Level 4 to 1758 ± 69 B.C. (3708±69 B.P.; Wettlaufer and Mayer-Oakes 1960).

The description for the Besant level by Wettlaufer and Mayer-Oakes (1960) is brief. Relevant to the present study, three projectile points and one possible preform were recovered in Level 3 and identified by the investigators as Besant. One of the points featured a convex base and appeared almost corner-notched. Another point had a concave base, and the third point had a straight or very slightly concave base. The last two projectile points appear elongated, but no scale was provided in the accompanying artifact photograph. The authors drew comparison with Level 4B from the Mortlach site in central Saskatchewan; they assigned a date of 377 ± 325 B.C. (2327±235 B.P.) for Level 4B at Mortlach, and apply the date for Level 3 at Long Creek (Wettlaufer and Mayer-Oakes 1960). One issue with the Besant investigations is that the radiocarbon date referred to by the authors is not actually from the Long Creek site; they believed the date was comparable as they view the points from Long Creek as identical to the points from the Mortlach site. The two archaeological sites are in fact separated by hundreds of kilometres, and although the date may give a very general approximation of the level's age based on projectile point style, it is not appropriate to apply Mortlach's Besant radiocarbon date to the Long Creek site. A clue into the age of Long Creek for Besant is gathered from the dates for the preceding Pelican Lake level; one date (3708±69 B.P.) seems rather early when compared to the other date (2243±100 B.P.) and to one of the dates from the Hanna component in Level 5. It would be more accurate to suggest that the Besant component dates after 2243±100 B.P. at Long Creek.

Long Creek remains significant as one of the earliest professional archaeological investigations in Saskatchewan. Part of the difficulty in the presentation of the data from the Long Creek site was that the excavator, Mayer-Oakes, did not write the report. The two non-convex base projectile points from Long Creek share similarities with points from the Fincastle site; unfortunately, material type was not reported for these tools. Although the sample size is small, the Besant side-notched points from the Long Creek site are suitable for comparison with other Besant/Sonota sites on the Northwestern Plains.

Melhagen site (EgNn-1)

The Melhagen site (EgNn-1; Figure 2.1:16) is located in the Aiktow Sand Hills, near Elbow, Saskatchewan, in the south-central region of the province (Ramsey 1991:i). Archaeological excavations were first conducted at this site in the 1960s, and again in 1986 and 1987; the site was identified as an early Late Prehistoric Period Besant bison pound (Ramsey 1991:i). The stratigraphy at the Melhagen site was interpreted as representing a single bone bed (Ramsey 1991:15).

Analysis of the faunal remains from both of the investigations indicated that that there were a minimum of 170 bison identified in the faunal analysis, and site sampling was believed to represent less than 25% of the site total (Ramsey 1991:2). Tooth eruption and wear studies, although problematic, suggested that the site was used from the fall until the spring; caution is required in the seasonality assessment, which would be better determined through cementum increment analysis on thin sections prepared from bison molars (Ramsey 1991:229).

During the Phenix excavations at Melhagen in the 1960s, previously unpublished, Ramsey (1991:62, 64) reported that 24 - 31 m^2 were excavated; methods included shoveling and troweling, and sediments were screened through a fine mesh in order to recover microdebitage. Units were 1 m by 1 m, excavated in 50 cm by 50 cm quadrants by shovel and trowel in 10 cm levels, and sediments screened through ¼ mesh (Ramsey 1991:67). In 1986, 46.5 m^2 were excavated, with 19 diagnostic projectile points recovered, all representing Besant with the exception of a single Pelican Lake projectile point (Ramsey 1991:77). In 1987, a surface survey was conducted at Melhagen.

Six radiocarbon dates were obtained, three from the Phenix excavations, and three from Ramsey's excavations. The Phenix dates are 1960±90 B.P. (S-491), 1910±70 B.P. (S-1640), and 1710±45 B.P. (S-1641), and the Ramsey (1991:287) dates are 1905±110 B.P. (S-2855), 1575±115 B.P. (S-2856), and 810±205 B.P. (S-2857). Based on the spread of radiocarbon dates in her study, Ramsey (1991:149) believed the site could represent multiple uses, although she mentions the possibility of contaminated samples.

Ramsey's (1991) lithic analysis included a replicable metric and non-metric analysis of projectile points from the Melhagen site. Ramsey's findings (1991:223-4) indicated that the Melhagen points fell into three categories, reflecting their function, representing 1) Samantha arrows or highly reworked projectile points, 2) atlatl dart tips, and 3) knife/spear tips. She noted a trend that projectile points from the eastern Plains kill sites tended to be larger than those from Alberta kill sites (Ramsey 1991:110). The present study is modeled after her lithic analysis of the projectile points from the Melhagen site.

Mortlach site (EcNl-1)

Located east of the town of Mortlach, Saskatchewan, the Mortlach site (EcNl-1; Figure 2.1:17) is situated within the Besant Valley, on a terrace of Sandy Creek. Wettlaufer's (1955) publication on the 1954 excavation of the Mortlach site was the first systematic archaeological excavation in the Canadian prairie provinces. An archaeological chronology had not been established until then for the prehistoric cultures in the Canadian portion of the Northwestern Plains. At the Mortlach site, 13 levels of occupation were documented, from the 'Thunder Creek Culture' (now the McKean

Complex) to the 'Mortlach Culture' (now the Old Women's Phase), with four layers of the newly discovered 'Besant Culture'. Mortlach is the type site for Besant, and Wettlaufer characterized the culture as featuring short, broad projectile points with shallow notching and concave bases, and two types of scrapers, flat-ended and plano-convex. No pottery was recovered, but bone tools were present. Wettlaufer (1955) did not consistently describe lithic raw materials in his report, but he does mention chalcedony and quartzite for Besant.

Projectile points identified as Besant occurred in Occupations 4A, 4B, 4C, and 4D, with Occupation Layer 4A the most recent and 4D the oldest, separated stratigraphically (Wettlaufter 1955). Occupation Layer 4E, identified as Sandy Creek and underlying the Besant components, was radiocarbon dated at 2400±290 B.P. (Wettlaufer 1955:79). Occupation 4A included postholes that were interpreted as part of a structure, possibly for habitation or ceremonial purposes (Wettlaufer 1955:41); Plains Woodlands groups known to the southeast used structures such as this, but Plains group were known to use tipi rings, leaving this feature as very enigmatic. Besant projectile points from 4A (n=3) were described as "…short and broad with shallow side notches and a slightly concave base" (Wettlaufer 1955:44). One additional point from this level was identified as Pelican Lake. In Occupation 4B, Besant points were identified as similar, but larger, and that the bases of the points in 4B (n=3) had been ground, unlike in 4A (Wettlaufer 1955:46). These points appear most similar to those from the Fincastle site, as well as having deeper notches than in 4A. Layer 4B dated to 377 ± 325 B.C. (2327±235 B.P.). One projectile point was recovered from Occupation 4C, reminiscent of earlier Pelican Lake points with its corner notches (Wettlaufer 1955:48). In Occupation 4D, projectile points (n=4) were recovered that are best characterized from the most intact point as "…having shallow side notches and an indented base forming 'lugs' or 'ears'." This layer was identified as Besant by Wettlaufer (1955), but the point styles appear distinct, and fit better with Sandy Creek. The stratigraphic sequence of Besant projectile points from Mortlach parallel that from the Old Women's Buffalo Jump. The one date obtained for Besant from Occupation 4B is 1580±325 B.P. (Wettlaufer 1955:80). As noted in Wettlaufer's report, the Mortlach site is well-stratified and valuable for interpreting cultural sequences on the Northern Plains.

As it can be expected with pioneering research, the report is very descriptive and does not offer explanation or modeling of past cultural activities. Many of the names of the archaeological cultures Wettlaufer identified at the Mortlach site have changed as more data became known over time; some of the definitions of the cultures have changed entirely since 1955. A range in point morphology is evident, as has been the case for several other Besant sites.

Sjovold site (EiNs-4)

As first introduced under Pelican Lake, the multi-component Sjovold site (EiNs-4; Figure 2.1:18) provided four discreet Besant layers. Turning to the 'Besant Series' components of the Sjovold site, as coined by Dyck and Morlan (1995), they identified four occupational layers for Besant.

Layer X, the most recent 'Besant Series' component, had three radiocarbon dates that averaged to 2300 - 2100 B.P. (350 - 150 B.C.). Layer X included six points; two points were corner-notched, while the others were side-notched. Dyck and Morlan (1995) believed that the assemblage represented a mix of dart and arrow points.

A single date was obtained from Layer XI at 2500 - 2200 BP (550 - 250 B.C.), and this layer included three projectile points, with two identifiable to type. Dyck and Morlan (1995) named these points the 'Bratton' type, characterized by a convex base, and corner or side notching.

Layer XII dates to 2600 - 2300 B.P. (650 - 350 B.C.), and included one complete and one fragmentary point (Dyck and Morlan 1995). The complete point, made from Knife River Flint, was described as 'Sandy Creek', a side-notched projectile point with a concave base.

The final Besant Series component was Layer XIV, dating to 2800 - 2500 B.P. (850-550 B.C.; Dyck and Morlan 1995). The ten projectile points from this level were made from Knife River Flint, chert, fused shale and silicified sediment. Dyck and Morlan (1995) identified the points from this layer as 'Outlook' points, characterized by straight bases, and the authors believed the points from Layer XIV closely resembled points from Mortlach (EcNl-1), Muhlbach (FbPf-1), Kenney (DkPj-1), Wahkpa Chu'gn (24HL101), Walter Felt (EcNm-8) and Melhagen (EgNn-1). The authors believed that some of the points in Layer XIV were arrow points (Dyck and Morlan 1995). Dyck and Morlan (1995) noted that the 'Outlook' projectile point is the dominant point form throughout the 'Besant Series'.

The radiocarbon dates from the Sjovold site seem rather early for Besant sites on the Northwestern Plains, which makes comparisons with other sites more difficult, particularly in Alberta, where Besant is generally accepted as starting at 2000 B.P. Dyck and Morlan (1995) attempted to refine the Besant projectile point typology further into three types, spanning approximately 2100 to 2800 B.P. One significant problem with this new scheme was the very small sample size used by the authors to define a type. A second problem is that they did not systematically apply this type to other archaeological data sets, restricting their enquiries only to artifacts from the Sjovold site. One or two projectile points is not a sufficient number of artifacts with which to define a projectile point type, as projectile points exhibit variability, and some of the points within Dyck and Morlan's types appear very different from one another. For example, the side notches on the two 'Bratton' points are entirely different. Although Knife River Flint was used to make some of the 'Bratton' and the 'Outlook' projectile points, exhibiting a connection to the North Dakota quarries, it was not as commonly used at other sites, such as Muhlbach. The observations by Dyck and Morlan (1995) that the 'Outlook' points are seen at a variety of sites located through out the Northern Plains appeared to have been oversimplified using a straight (or very slightly concave) basal edge as the primary characteristic of the type. However, when comparing the 'Outlook' type to the projectile points from the Fincastle site, the Fincastle points appear different in morphology, as described in Chapter 4. The point notches tended to be broader from the Fincastle site and the generally triangular preform shape of these points exhibited a slight battleship curve above the base, making the points look almost corner-notched, unlike Dyck and Morlan's 'Outlook' type. The Sjovold site's 'Besant Series' projectile points appear distinct from those recovered from the Fincastle site in southern Alberta.

Walter Felt site (EcNm-8)

At the Walter Felt site (EcNm-8; Figure 2.1:19), 8 projectile points (3 complete) were identified from layer 13, as Besant by Kehoe (1974:108). Kehoe (1974:108) ran a radiocarbon date from layer 13, obtained at 1610±70 B.P. (S-200). 'Large Samantha' projectile points were collected from layer 10, believed to represent a transitional form of Besant (Kehoe 1974:108). Raw materials included petrified wood (4 projectile points), while single specimens were made each from chalcedony, chert, jasper, argillite, and quartzite (Kehoe 1974:108). Kehoe's (1974:108) Besant varieties included 'Large Samantha, narrow eared variety,' 'Coteau Round-shouldered, convex base variety,' and 'McLean Round-shouldered, concave base variety' (Kehoe 1974:108).

Kehoe (1974:111) named several Samantha variants, although a commonality among all of these was that they resembled Besant projectile points, with the exception of their smaller size. The 'Small Samantha Variety 1' (12 specimens, 1 complete) was represented in layers 3, 7, 10 and 12, with projectile points produced from brown chalcedony, petrified wood, white chalcedony and quartzite. "These points are well made, small, and delicate. They compare unfavourably with Avonlea points in this respect, since the small Samantha points are thicker and more leaf shaped" (Kehoe 1974:112). The 'Large Samantha Variety 1' projectile point variant was described by Kehoe (1974:112) as "…in all respects identical to and the large counter parts, of the previously described points except for their size, although in the extremely long specimens the blades tend to give the overall appearance of a triangular rather than a leaf shape. The base on rare occasions may be more convex." Three specimens were assigned to the 'Large Samantha Variety 1' (one complete), from Layer 10, made from brown chalcedony and petrified wood (Kehoe 1974:112-113). The ‘Small Samantha Variety 2’ projectile point form was represented by 6 projectile points (4 complete), with five specimens in Layer 10, and one in Layer 12. Projectile points were made from agatized wood and quartzite. A radiocarbon date for this type returned at 1535$\pm$80 B.P. (S-201). Kehoe believed that the ‘Small Samantha Variety 2’ projectile point forms were the Besant answer to the Avonlea point form. The ‘Large Samantha Variety 2’ variant was seen in Layers 10 and 13; 6 specimens (5 complete) corresponded to this type, made from brown chalcedony and quartzite. “These points are identical to the previously described points except for their size” (Kehoe 1974:113); he also observed that the neck widths on this variant were 15-16 mm wide.

Manitoba

Richards site (DhLw-1)

Located near Killarney, in south-central Manitoba, the Richards Site (DhLw-1; Figure 2.1:20) was a surface collection of 188 artifacts from a cultivated field on the Waskada Till Plain (Paulson 1980). Paulson (1980) focused his attention on the lithic artifacts from the Richards site, namely the projectile points. Tool types recovered include projectile points, scrapers, awls, blades, spokeshaves, pecking stones, an atlatl weight, and a grooved maul. In terms of raw material, Knife River Flint, representing over 80% of the total collection, dominated the lithic assemblage from the Richards site. The next most frequently occurring raw material was Swan River Chert. The remainders of the raw materials included chert, quartzite, basalt, jasper, porcellanite, obsidian, granite, and ‘unidentified material’. Paulson (1980) observed that the site is multi-component, featuring diagnostic projectile points from Oxbow, Pelican Lake, Besant/Sonota, and Avonlea. Paulson (1980) described Syms' criteria for Sonota and applied his definition against the Richards site collection, determining that the elongated projectile points and the extensive use of Knife River Flint is characteristic of the Sonota Complex.

As noted by Paulson (1980), the projectile points at the Richards site best represent the Sonota archaeological culture. Unfortunately, as a surface site, there is no archaeological context in which to place the artifacts for further interpretation. It can be assumed that Oxbow is the oldest occupation at the site, likely followed by Pelican Lake, then by Besant/Sonota, and finally Avonlea, as has been seen at other sites in the Northern Plains based on stratigraphic context and accompanying radiocarbon dates. As a surface collection, no radiocarbon dates are possible in order to date the Besant/Sonota component. The projectile points from this site bear a striking resemblance to points from the Muhlbach site, as noted by Paulson (1980), and also to the Fincastle site. Paulson interpreted the site as a bison kill site, with the natural topography, including pot-holes, used to trap the bison; again, the use of the landscape by Besant/Sonota hunters was witnessed at the Fincastle site, where animals were intercepted in a parabolic dune.

Wapiti Sakihtaw site (*DiLw-12)*

Scribe's (1996) article is an overview of archaeological investigations in south central Manitoba at Big Tiger Hill in 1993. The three sites, *Pinew Watchi* (DiLw-2), *Wapiti Sakihtaw* (DiLw-12), and *Wawaskesiw Miteskun* (DiLw-13) were located within approximately 30 m^2 of each other, and they may be considered different activity areas within a large site, rather than discrete sites. Excavations at DiLw-12 (Figure 2.1:21), located in south-central Manitoba at Big Tiger Hill, were completed in 1993, with 18 m^2 excavated in total. Recovered artifacts included 67 lithic tools and 538 flakes predominately made from Knife River Flint, along with 167 pottery sherds and 3729 faunal remains. One projectile point, identified as Sonota by Scribe (1996), was recovered from Level 2, and radiocarbon sampling from this level returned a date of 1140±70 B.P. (Beta 59415). At DiLw-13, three test units were excavated with positive results. Artifacts recovered included lithic debitage, pottery, faunal remains, pottery, and fire-broken rock. Lithic material types included Knife River Flint and Swan River Chert. No radiocarbon dates were obtained for DiLw-13, and Scribe assigned a Late Period occupation to the site based on the pottery. No projectile points were found at DiLw-13. Scribe noted that DiLw-2 and DiLw-12 pottery appeared similar to the Sonota vessels described by Neuman (1975) from North and South Dakota.

Scribe provided a summary of the 1993 field season investigations at DiLw-2, DiLw-12, and DiLw-13. Although DiLw-2 is listed, no new work nor any description of the previous field work conducted at that locality was discussed. No images were included of the diagnostic artifacts found at these three sites. Photographs of the projectile points and the pottery would have helped support the Sonota affiliation of these sites. Using multiple lines of evidence for determining cultural affiliation, such as pottery and lithics as seen at DiLw-12, is a strong argument for inferring Sonota activities at Big Tiger Hill, Manitoba.

Montana

Antonsen site (24GA660)

Situated in the Gallatin Valley near Bozeman, Montana, the Antonsen site (24GA660; Figure 2.1:22) featured two distinct bison kill areas, with each area considered to include multiple components (Davis and Zeier 1978; Zeier 1983). One area was been assigned to the Besant Phase, dated to 1605±95 B.P. (I-7027), and a second area to the Old Women's Phase dated to 180 B.P. (I-7849); occurring ephemerally at the site are Pelican Lake and Avonlea phases, but they are not discussed (Zeier 1983). The Antonsen site was interpreted as representing 200 bison, as evidenced by recovered elements during the excavations. Bone features, interpreted as possible post molds, were also documented by Zeier (1983). Furthermore, 280 projectile points classified as Besant were also recovered during excavations; Zeier (1983) conducted a detailed analysis on the projectile point assemblage from Antonsen, using metric measurements to study size, shape, and appearance attributes. Size variables included metric observations, ranging from blade length (actual and estimated), to the inter-notch width. Zeier provided illustrations in his report to indicate where measurements were taken on the projectile points. Shape-related attributes included both metric and non-metric criteria to study blade shape, notch size and form, and base shape. Appearance-related attributes include examining raw materials.

Zeier (1983) grouped raw materials based on crystal size, into three categories: non-crystalline (obsidian), cryptocrystalline (chert, chalcedony, jasper, petrified wood), and macro-crystalline (basalt, quartzite). Zeier (1983) noted that if all the chalcedony points from the Antonsen site were considered to be Knife River Flint, only 9% of the assemblage would be represented by this kind of raw material. Zeier (1983) noted that nearly half of the Besant points were made from local materials (13% obsidian and 32% basalt). Artifact condition, including an analysis of breakage patterns and point maintenance and reuse, were also observed under appearance-related attributes. Attributes such as blade length and shape varied considerably with reuse; the width between notches remained fairly constant.

Zeier's premise for his analysis is that prehistoric behaviour affects artifact morphology. He conveyed a great deal of information in his article on the Besant projectile points from the Antonsen site, relying heavily on statistical analysis to indicate groupings of traits in his study. Although statistics can be useful, sometimes the information presented is not necessarily relevant to the larger questions that Zeier posed (i.e., Zeier's six classes for blank orientation frequencies). Zeier provided several significant concepts. In his analysis, he noted that the life cycle of an artifact must be considered when studying a projectile point assemblage. Most of the projectile points from the Antonsen site had been reworked. Projectile points were reused and reshaped by Besant hunters, ultimately creating a different body shape. He emphasized that archaeological studies of projectile point forms rarely take modification after initial production into account. The caution that modifications must be analyzed to determine the prototype initially created by the manufacturer is appropriate. The Antonsen site provided a large sample of radiocarbon-dated and stratified Besant projectile points suitable for further comparison with the Fincastle site.

Herdegen's Birdtail Butte site (24BL1152)

The Herdegen's Birdtail Butte site (24BL1152; Figure 2.1:23) is located in north-central Montana at the margin of the Bear's Paw Mountains and the open prairie (Brumley 1990:17). First observed by the Milk River Archaeological Society, and later recorded by the Bureau of Land Management in the 1980s, the site is situated at the junction of two creeks. Herdegen's Birdtail Butte is a multi-component site, with 6 m sandstone cliffs that were used as a buffalo jump. In 1988 and 1989, the site was sampled in a test excavation programme to further knowledge about northern Montana prehistory (Brumley 1990:17, 22). Field methods employed included the surface collection of artifacts, and test pits (Brumley 1990:25). Bison bone and fire-broken rock were observed during the surface survey, and projectile points were collected (Brumley 1990:23). Brumley (1990:28) identified projectile point types within the site assemblage, including Plains Side Notched, Prairie Side Notched, Avonlea, Besant Side Notched, Pelican Lake, and Oxbow. Brumley (1990:35) noted that there was some evidence to suggest that the site was also used as a campsite, in addition to the kill site. Relevant to the present study, Layers 13 to 15 of Brumley's (1990:41) test pits were associated with Besant. One radiocarbon date on bison bone from Layer 13 was 1690±80 B.P. (Beta-31793), while a second radiocarbon date in Layer 15 indicated a date of 1960±80 B.P. (Beta-31794; Brumley 1990:41). Each of these layers in the stratified bone bed beneath the sandstone cliffs indicated multiple events: Layer 13 represented a minimum of 16 bison, Layer 14 represented minimally 14 bison, and Layer 15 represented a minimum of 29 bison (Brumley 1990:41). It should be noted that Brumley (1990) was concerned with determining the seasonality of these events; however, his findings were based upon tooth eruption and wear methods, which are now known to be problematic and not as seasonally sensitive as first thought (Peck 2004); further analysis using dental cementum increment analysis at the Herdegen's Birdtail Butte site would hopefully yield stronger results.

The Besant projectile points from Layers 13 to 15 generally appear to have been heavily reworked into stubby forms, although the bases appear very straight-edged with open, broad notches very similar to the Fincastle site assemblage. Brumley (1990:54) noted the high frequency of Knife River Flint in the site's lithic assemblage, and he noted this as characteristic of the Besant Complex. Brumley (1990:83) does not present the projectile point raw material by layer; rather, it is presented in a summary table lumping all of the Besant CMUs (cultural material units) together. Four projectile points were made from quartzite, 11 from chalcedonies (including Knife River Flint), and 2 from porcellanite (Brumley 1990:83). It would be interesting to see what the Besant raw materials for the projectile points were by layer, to see if selection varied through time.

Leavitt site (24LT22)

The Leavitt site (24LT22; Figure 2.1:24) is a multi-component kill site, located on the Marias River (Davis and Stallcop 1966; Johnson 1970; Reeves 1983a). The two stratified components were described by Reeves (1983a:360), with a Besant layer at 44 cm below surface and a Late Prehistoric side notched component at 20 cm below surface. Davis and Stallcop (1966:29) reported that the Leavitt site had been excavated by the land owner in 1963. In 1967, the Leavitt site was sampled by Reeves (1983a:361) in order to obtain a sample of Besant and Samantha projectile points from the lower component, as well as obtain a sample for radiocarbon dating. Bone uprights have been noted at the Leavitt site (Johnson 1970). One radiocarbon sample was obtained by the landowner, assayed at A.D. 1005±120 (945±120 B.P.; GX-146; Reeves 1983a:361). A second radiocarbon sample was obtained by Reeves, assayed at A.D.770±950 (1180±950 B.P.; GX-1212; Reeves 1983a:361; Morlan 2006). According to the Canadian Archaeological Radiocarbon Database (Morlan 2006), Reeves rejected the 945±120 B.P. date, as too late for Besant. In the present study, this date is accepted for the Besant component, as a late and transitional manifestation of this phase. The second date is rejected due to its large standard deviation, and has likely been contaminated. Published data for the Leavitt site is extremely limited.

Mini-Moon site (24DW85)

The Mini-Moon site (24DW85; Figure 2.1:25) is located in the eastern Montana badlands, amid buttes and ephemeral drainage. Hughes (1991) interpreted the division of labour between men and women in a specialized bison hunting economy from excavations at the Mini-Moon site, Montana. Ethnographic analogies were used from Plains Indian bison hunters and the Alaskan Nunamiut, as both cultures pursued large game as their primary food source. Hughes acknowledged that there were difficulties with applying ethnographic records as analogies of the behaviour of indigenous groups at a site dating 2000 years earlier; hower, she observed that the hunter-gatherer groups observed historically had very similar lifeways to Besant phase people. Hughes (1991) distinguished two occupations at the Mini-Moon site: one occupation dated to 1520±70 B.P. (Beta-10044), while the second occupation dated to 1910±80 B.P. (WSU-2379) and

1930±80 B.P. (WSU-2380). Raw materials in the lithic assemblage included local porcellanite, Yellowstone River cobbles, on-site deposits of silicified wood, and Knife River Flint from North Dakota. Images of the projectile points were not provided in the publication. The faunal remains were heavily processed for marrow extraction. According to the ethnographic model, flintknapping, hunting and butchering were interpreted as male activities, while further food processing, plant gathering and hide working were considered female activities; Mini-Moon was interpreted by Hughes (1991) to follow the ethnographic model of gendered activities.

Hughes (1991) interpreted each hearth at the Mini-Moon site with gender-specific activities; one hearth had been surrounded by debitage from flintknapping, a male activity, while another hearth contained many bone fragments from rendering grease, a female activity. Alternate explanations for the hearths or activities seen at Mini-Moon were not described. The use of ethnographic analogy was acceptable at the Mini-Moon site, with caution, as later historic groups had many similarities in terms of economic and subsistence concerns shared with Besant Phase hunters. Hughes approach in trying to see the behaviour behind the artifacts is commendable: all too frequently, Plains sites have not been interpreted further to show individuals, and reports often remain purely descriptive. Further applications of Hughes' (1991) model at other archaeological sites will indicate whether it is a valid way to interpret gendered activities. Certainly trying to see ideology and social organization in archaeologically known hunter-gather groups is a worthwhile activity, though not all may agree with the interpretations.

Wahkpa Chu'gn site (24HL101)

The Wahkpa Chu'gn site (24HL101; Figure 2.1:26) is located among the bluffs of the Milk River Valley in Montana. Excavations were conducted from 1962 to 1965 by the Milk River Archaeological Society, under often demanding conditions (Davis and Stallcop 1966:6). Wahkpa Chu'gn is a bison jump site, utilizing the bluffs of the Milk River. Lithic raw materials from this site included chalcedony, agate, flint, chert, jasper, quartzite, silicified siltstone, and trace amounts of obsidian and petrified wood (Davis and Stallcop 1966:10-11). Five areas within the site were tested using five-foot squares and trenches (Davis and Stallcop 1966:11). The projectile points recovered from Area B at Wahkpa Chu'gn were interpreted as coming from a single occupation. They include large projectile points, described rather imprecisely as "…large, stemmed or corner-notched," found in association with poorly preserved bison bone; in this area, 220 artifacts were recovered, 88.7% projectile points (Davis and Stallcop 1966:16). Projectile point raw materials described by Davis and Stallcop (1966:16) included agate (n=78), chert (n=42), flint (n=30), quartzite (n=26), petrified wood (n=9), slate (n=5), siltstone (n=3), and chalcedony (n=2). The authors (Davis and Stallcop 1966:30-31) made comparisons with other archaeological sites in the region; they asked Reeves (1966) to examine the projectile points from Area B, and he communicated the following in regard to the Wahkpa Chu'gn projectile points, that they are:

> …contemporaneous with the level 8 Kenney occupation [A.D.350±50]. I base this on cross-dating of two types of Besant points which I have defined for the Kenney site, and these are restricted to level 8 of the Kenney site. These types I have named Besant Triangular and Pincher Points. They correspond with the following points from your site. Besant Triangular: 164 [see Plate 3, t), 152 [n], and 167 [not shown]. Pincher Points: 202[b], 62[g] and 186? [a] (this one may well be another type). The Besant Triangular differs from the Besant type in having straight

> lateral body edges and a triangular overall form. The Pincher Point has these attributes, but also has a base that is usually wider than the body, and well defined basal edge. The Besant point type I defined as being characterized by a lanceolate body form, convex body edges, obtuse shoulders, and a base equal to or less than the shoulders in width… I was struck by the wider variation in shapes of the basal edge and its proximal and distal junctures with the notch and the base, than I had at the Kenney Site. The Muhlbach collection [(Gruhn 1965)] also has this wider variation.

The Area B projectile points from Wakhpa Chu'gn appear very similar to those from the Fincastle Site as well. Radiocarbon dates for the Wahkpa Chu'gn site's Area B were: Area B, Test Pit 4, 1920±70 B.P. (Gak-2504); Area B, Test Pit 12, upper layer, 1800±90 B.P. (Gak-2505); and Area B, Test Pit 12, lower level, 1770±90 B.P. (Gak-2506).

Wyoming

Butler-Rissler site (24DW85)

Miller *et al.* (1987) described their preliminary results from excavations at the Butler-Rissler site (24DW85; Figure 2.1:27) near Casper, Wyoming as a single component Besant site with faunal remains, lithics, and ceramics. The site was used for tool production and maintenance, hide working, and food processing, including small game and mussels. Situated along a now-eroding river terrace, the projectile points and pottery assemblage recovered from the Butler-Rissler site indicated a Besant occupation. The 90 pottery sherds that were collected were believed to have originated from a single vessel, determined after partial reconstruction of the vessel. The lithic assemblage was described as produced from locally available materials, but the raw materials were not listed. The projectile points are described as large darts identical to other Besant points in the region. Two dorsally thinned scrapers were found as well. For this present study, the value of the Butler-Rissler site lies in extending the known range of Besant to the North Platte River in Central Wyoming. No radiocarbon dates were obtained.

In publishing this very preliminary report, the authors wanted to emphasize the link between the Besant projectile points and the ceramics found at the Butler-Rissler site. Additionally, this report highlighted non-bison as a food resource for Besant. It was disappointing that the lithic assemblage and the faunal assemblage were not described in any detail; the faunal analysis was omitted entirely, but there were several photographs showing the reconstructed Besant-Woodland vessel, suggesting that the authors were primarily interested in the pottery. Unfortunately in Alberta, pottery is a rarity at Besant archaeological sites. The initial cultural association identified for Besant/Sonota by the authors (Miller *et al.* 1987) appears correct, despite the limited data.

Muddy Creek site (48CR324)

The Muddy Creek bison kill site (48CR324; Figure 2.1:28) is located the southern Rocky Mountains in Wyoming, in the Shirley Basin. Muddy Creek flows near the site, and joins the Medicine Bow River to the southeast (Hughes 1981:31). Muddy Creek was interpreted as a bison pound, with an associated processing area and campsite (Hughes 1981:34). Archaeological investigations at the Muddy Creek site were first conducted by an avocational archaeologist, Charles Darnall, in the early 1960s, and later tested systematically by a graduate student from the University of Wyoming, Charles Love (Hughes 1981:34). Hughes (1981:35) noted that there was insufficient data to assess the number of occupations or site seasonality from Frison's early investigations. Frison

(1978) obtained a radiocarbon date from a charcoal sample of 1720±110 B.P. (RL-294) for the Muddy Creek site,.

The University of Wyoming conducted further excavations at the Muddy Creek site in 1980, primarily to map the associated tipi ring site, but to also examine the pound area for evidence of postholes, that were later revealed during the investigations (Hughes 1981:35). Hughes' (1981:39) thesis research focused on the analysis of projectile points from the Muddy Creek site (n=413), primarily from the private collection belonging to Wayne Darnall. Hughes was able to identify 305 projectile points as Besant, with 98 fragmentary points unclassifiable, and another nine identified as Samantha, interpreted as possible arrow points. The projectile points were produced from 117 different types of raw materials that Hughes (1981:56) identified in her study. There is a strong similarity in form between these skillfully executed points from the Muddy Creek site and those from the earlier Fincastle site. Although distant from the Northwestern Plains, Muddy Creek offers an intriguing example of the broad distribution of the Besant Phase temporally and spatially.

Ruby site (48CA302)

The Ruby site (48CA302; Figure 2.1:29), Wyoming, included three site areas: a bison pound, a ceremonial area, and a processing area (Frison 1971). Located in an arroyo, the natural topography was used to form part of the pound structure; the remainder of the pound was constructed with wooden posts, which were tightened by the addition of large bison elements in the postholes. Once the bison were in the pound, hunters using dart points dispatched the animals. Frison (1971) noted that there were 201 classifiable projectile points recovered from excavations at the Ruby site, with nearly a quarter of the points showing modification from their original form. There was a wide range of attributes observed in the Ruby site projectile points. Frison (1971) described the point morphology from the Ruby site as a large, symmetrical point with typically a convex base, with straight or concave bases occurring less frequently. Some of the dart points were corner-notched, while others appear side-notched. Raw materials were not described for the projectile points. Frison (1971) believed the dart hafts were collected and reused by the hunters, as fractured point bases were not recovered; presumably, the bases remained in the hafts that were removed. The Ruby Creek site dated to 1670±135 B.P., or A.D. 280 (GX-1157; Frison 1971). Frison did not name any cultural affiliation for the Ruby Creek site in his 1971 publication, other than noting that it was a late Middle Prehistoric site.

Focusing on the projectile point technology as evidenced in the pound portion of the Ruby site, the projectile points superficially appeared to share characteristics with two styles of projectile points known from the late Middle Prehistoric period: Besant/Sonota and Pelican Lake. One group of points is corner notched, while the other is side notched. Frison did not make any distinctions between the point styles. Although Frison described the Ruby site as single component event, no stratigraphic profile had been published for any of the excavation areas at the site. It is possible that the projectile points represented a minimum of two uses of the pound area, or that at least two different groups of people or two kinds of technology were utilized. Frison did not identify which of the three areas at the Ruby site had the radiocarbon date. The radiocarbon date fell within the approximate time frame for Besant and Sonota. Some of the corner notched points share characteristics with the Fincastle site, while the Pelican Lake point appears very different. Further information regarding stratigraphic profiles, the identification of the site area that was radiocarbon dated, and a description of the raw materials exhibited in the projectile point assemblage would have been useful to the present study. The lack of these data, along with the small sample (n=18) of projectile points shown in a drawing in Frison's article, limit the usefulness of the Ruby site data in understanding Besant and Sonota on the Northwestern Plains.

Sonota Complex

The Sonota Complex, a regional expression of Besant based in North and South Dakota, has been a contentious topic in Northern Plains archaeology for the past thirty years (Cloutier 2004; Duke 1991; Dyck 1983; Hjermstad 1996; Joyes 1984; Ramsey 1991; Reeves 1983a; Shortt 1993; Syms 1977); further discussion on the classification of the Sonota Complex, along with other late Middle Prehistoric Period phases will take place in a later chapter.

Neuman (1975) defined the Sonota Complex in his publication summarizing the results of his excavations and subsequent analysis at several archaeological sites, primarily burial mounds, in North and South Dakota. The six sites investigated by Neuman are situated on the Missouri River, and include Stelzer, Swift Bird Mound, Grover Hand, Arpan Mound, Boundary Mound, and Indian Hill. Radiocarbon dates were obtained for all of the sites but Stelzer, placing the Sonota Complex approximately between A.D. 1 and A.D. 600, or 1950 – 1350 B.P. Although much of the report is descriptive, with an emphasis on the human remains from the burials, Neuman also analyzed the grave goods found at each mound within each site, and described the artifacts in detail. It is evident that the Sonota people based their subsistence primarily on bison, and this was seen not only by the remains at the processing site, but also by the inclusion of bison remains in the burial mounds, including complete animals. One notable characteristic of the Sonota Complex was the interring of individuals in secondary burials after defleshing; Neuman noted that all ages and both males and females were generally equally represented at the burial mounds. Other traits include the occasional production and use of utilitarian pottery, reliance on bison as the primary food resource, a well-developed stone tool assemblage utilizing the local Knife River Flint but also other chalcedonies, moss agate, jasper, quartzite and obsidian, and the presence of bone uprights of unknown purpose. Neuman interpreted the frequent occurrence of bone uprights at the Stelzer site as anvils for stone tool production; it is also of note that cores of Knife River Flint were found infrequently, interpreted as indicative of utilizing as much of the raw material as possible.

The Stelzer site, a processing site, and the Boundary Mound site, both include large projectile point assemblages that would be suitable for further study. Neuman noted that the Sonota Complex shares many similarities with the Besant Phase in Alberta, Saskatchewan and Montana; Neuman observed that the projectile points were identical to Besant, but that the definition of Besant was becoming looser, with studies by Wettlaufer (1955), Forbis (1962) and Gruhn (1969), and needed further definition.

North Dakota

Boundary Mound site (32SI1)

The Boundary Mound site (32SI1 Figure 2.1:30) is located on the Missouri River, on the Standing Rock Indian Reservation in Sioux County, south central North Dakota. Four mounds are present at the site, and Neuman (1975) investigated 3 of these in the 1960s. Neuman (1975:64) described the mounds as single-stage construction.

Mound 1 included human remains in a secondary interment of 15 individuals, with males and females, as well as all ages represented (Neuman 1975:65). Up to 48 bison crania, among other bison remains, were recovered at Mound 1 (Neuman 1975:66). Artifacts collected from Mound 1 included projectile points (n=7), a knife, scrapers (n=3), drills (n=2), debitage (n=10), atlatl weights (n=2), gypsum, an antler flaker, bone beads (n=3), bone pendants (n=3), awls (n=2), worked bone (n=3) and shell fragments (Neuman 1975:66-70). Four projectile points were made from a mottled grey and black quartzite, one from quartz, one from Knife River Flint, and one from brown chalcedony (Neuman 1975:67). Intriguingly, Neuman (1975:67) noted that the projectile point assemblage from Mound 1 resembles that found at the Renner Hopewell site on the Missouri. These projectile points very much resemble those from the Fincastle site. A radiocarbon date of A.D. 410 ±160 (1540±160 B.P.; Isotopes Inc., #499) was obtained.

Mound 2 contained secondary interments of 7 individuals (Neuman 1975:70-71). Bison remains were also present. Artifacts within Mound 2 included an end scraper, a side scraper, a drill, debitage (n=5), an atlatl weight, unclassified objects (n=2), a bead, an awl, an antler object, and bear maxillae and teeth (n=6). The projectile point was made from Knife River Flint. A single radiocarbon sample was taken from wood, dating to A.D. 610±150 (1340±150 B.P.; Isotopes Inc., #498).

Mound 3 contained secondary interments of 24 individuals, both male and female of all ages (Neuman 1975:74). Minimally 3 bison were also interred at Mound 3 (Neuman 1975:75). Artifacts recovered included projectile points (n=3), a knife, a blade, a scraper, an abrader, a clay object, an antler pin, antler flakers (n=3), an antler handle, worked beaver mandibles (n=2), worked human bones (n=5), bone beads (n=12), and a pendant (Neuman 1975:75-77). The projectile points were made from chalcedony, Knife River Flint, and mottled tan and grey quartzite (Neuman (1975:75). A charcoal sample from burnt timber returned a radiocarbon date of 250 B.C. ±125 (1700±125 B.P.; Isotopes Inc., #414).

South Dakota

Arpan Mound site (39DW252)

The Arpan Mound site (39DW252; Figure 2.1:32) consisted of three low mounds, located nearly a mile downstream from the Grover Hand site, a site also investigated by Neuman in the 1960s (1975:59). Arpan Mound is approximately 100 feet above the Missouri River on a terrace, in Dewey County, South Dakota. One mound was excavated as it was eroding into the river.

Mound 1 included secondary human burials that represented 35 individuals, both male and female, and representing all ages (Neuman 1975:61). Bison remains were also included in the internment (Neuman 1975:61). Artifacts collected from Mound 1 included Arpan punctate pottery (n=? [no quantity provided]), a projectile point, a knife, a side scraper, debitage (n=6), ground stone tools (n=2), and a shell bead (Neuman 1975:62-63). The projectile point raw material was not described, although Neuman (1975:62) noted that the surface was covered with a “whitish limey deposit.” A single radiocarbon sample indicated that the Arpan Mound site dated to A.D. 100±90 (1850±90 B.P.; Smithsonian Institution, #311).

Grover Hand site (39DW240)

Situated on the Cheyenne River Indian Reservation in Dewey County, South Dakota, the Grover Hand site (39DW240; Figure 2.1:33) is located on a terrace high above the Missouri River. The Grover Hand site included 4 mounds, three of which were excavated, with site excavations taking place in both 1962 and 1963 under Neuman’s (1975) direction.

Mound 1 was the largest tumulus at the Grover Hand site, with secondary internments of human remains of 48 individuals, representing males and females of all ages (Neuman 1975:48). Within the mound, several articulated bison were also interred (Neuman 1975:49). The mound contained a low cone-shaped feature several feet wide and a couple feet high, containing mainly bison bone, although human, deer or antelope and skunk bones were present, along with small cobbles and fire-broken rock (Neuman 1975:49). A second feature, basin-shaped, included burnt earth, and vertically oriented burnt branches and twigs (Neuman 1975:50). Artifacts included in Mound 1 were pottery rims (n=1), pottery sherds (n=4), projectile points (n=2), a notched blade, knives (n=2), endscrapers (n=2), a side scraper, unclassified lithic tools (n=2), debitage (n=24), a grooved maul, unclassified groundstone items (n=2), antler sections (n=5), bone beads (n=2), a pendant, awls (n=2), bone tools (n=2), shell beads (n=2), a shell pendant, a worked shell fragment, and clay objects (n=2; Neuman 1975:50-53). One of the projectile points was made from reddish jasper, the other from brown chalcedony. One radiocarbon sample from Mound 1 returned a date of A.D. 1300±200 (650±200 B.P.; Smithsonian Institution, #167).

Mound 2 featured 25 secondary internments of human remains, representing male and females of all ages (Neuman 1975:54). Remains of several bison accompanied the human burials (Neuman 1975:54). Artifacts recovered from Mound 2 included a pottery body sherd, a projectile point, knives (n=2), side scrapers (n=2), a serrated bone flesher, an antler pin, shell beads (n=10), and a clay pipe (Neuman 1975:55-56). The projectile point was made from moss agate. One radiocarbon sample provided a date of A.D. 310±80 (1640±80 B.P.; Smithsonian Institution, #168).

Mound 3, the smallest at Grover Mound, included a minimum of three human internments, representing an adult and two young adults (Neuman 1975:56). Adjacent to the burial, another secondary internment contained four adults and an infant. In total, 16 bison were represented in Mound 3. Neuman (1975:58) noted that projectile points (n=4), knives (n=3), side scrapers (n=2), debitage (n=4), shell beads (n=2), and a conch pendant were recovered from Mound 3 at the Grover Hand site. Three projectile points were made from Knife River Flint, while the fourth was made from a grey flint (Neuman 1975:57). A wood radiocarbon sample provided a date of A.D. 230±75 (1720±75 B.P.; Smithsonian Institution, #48).

Stelzer site (39DW242)

The Stelzer site (39DW242; Figure 2.1:34) is located in the Oahe Reservoir Area in Dewey County, South Dakota, on a high terrace on the Missouri River. Neuman (1975:3) conducted excavations in 1962 after surface finds of pottery and lithic artifacts indicated a Woodland occupation. The Stelzer site is the campsite associated with the nearby burial mound site that Neuman also excavated in 1962. Two excavation areas were tested in 1962, and sediments were removed to expose the cultural remains *in situ* (Neuman 1975:3). The single cultural stratum was 0.3 feet thick, ranging in depth from 0.5 to 1.6 feet below the surface (Neuman 1975:6). Excavation Unit 1 was expanded in 1963 and 1964, along with test pits and joint investigative efforts with Oscar L. Mallory (Neuman 1975:6). Features at the Stelzer site included midden refuse concentrations, hearths, roasting pits, postmoulds, and 'ubiquitous' bone uprights—88 upright features were documented at Stelzer (Neuman 1975:6).

The Stelzer site included lithics and pottery. Sixteen pottery rim sherds were collected; the exterior surface of the potter was either plain and smooth-surfaced, or cord-marked (Neuman 1975:12). Seventy-five body sherds and reconstructed body sections were also recovered (Neuman 1975:16). A total of 98 projectile points were recovered from Stelzer; 12 projectile points were complete (Neuman 1975:17). Neuman (1975:17) observed:

> Although a few display carefully placed, parallel, bifacial pressure flake scars extending laterally across or almost across the face of the point, the vast majority of the projectile points from Stelzer are characteristically marked with random, percussion flake scars, leaving face surfaces and edges irregular and somewhat jagged. Along the edges of the specimens fine, bifacial secondary retouch is usually evident.

Neuman (1975:17) described the points by group (Groups A to J), clustering them based on their attributes, rather than their proveniences. Raw materials included Knife River Flint, chalcedony, quartzite and moss agate (Neuman 1975:17-18). Additionally, 170 endscrapers were recovered, nearly all made from Knife River Flint; they tended to be ovoid to triangular in plan view, plano-convex in cross-section, and Neuman (1975:20) noted that they were unifacially worked from the convex surface. Gravers and drills were also present in the lithic assemblage, along with notched and utilized flakes. Ground stone artifacts included four grooved mauls, 6 hammerstones, 22 mealing stones, and 9 abrading stones, made primarily from quartzite (Neuman 1975:26-27). Other artifacts included bone tools and items for personal decoration, such as bead and tinklers, and 2 sheets of copper (Neuman 1975).

Neuman (1975:29-30) interpreted that the Stelzer site represented a long term occupation by people who had an economy geared more for bison-hunting, rather than horticulture. He also noted the ideological significance of bison to the Sonota hunters, as evidenced by the internment of complete bison with human remains at the nearby Swift Bird, Grover Hand, and Arpan burial mound sites (Neuman 1975:30). Neuman (1975:37) did not have any radiocarbon dates from Stelzer, but through its association with the nearby burial mounds estimated that the site dated from 1950 – 1350 B.P. Two radiocarbon dates were later obtained for the Stelzer site by Haberman and Travis (1995). The first sample submitted for radiometric dating was wood charcoal from a pit feature, providing a date of 1800±50 B.P. (Beta-38267). The second sample, from a bone upright feature, yielded a date of 1660±60 B.P. (Beta-38266).

Swift Bird Mound site (39DW233)

The Swift Bird Mound site (39DW233; Figure 2.1:35) is located on a high river terrace of the Missouri River, on the Cheyenne River Indian Reservation in Dewey County, South Dakota. Two 'dome-shaped' mounds were separated by 340 feet (Neuman 1975:38). In 1960, Neuman tested Mound 1, returning in 1962 for a further investigation. Neuman (1975:38) interpreted three depressions, 40 feet in diameter and less than 1 foot deep, also at the Swift Bird Mound site, as later habitations that were not contemporary with the burial mounds. Neuman (1975:39) noted that the mounds were built in a single event, without any later additions.

In Mound 1, secondary internments represented 13 male and female individuals of all ages. Artifacts recovered within the mound included pottery sherds (n=4), believed to be an archaeological intrusion by Neuman, projectile points (n=2), knives (n=2), debitage (n=2), a bone bead, shell beads (n=9), an atlatl weight, and a pendant (Neuman 1975:41-42). One of the projectile points was made from quartz, the other from mottled jasper; Neuman (1975:41) noted that they best resembled the Group A projectile points from the Stelzer site. One radiocarbon date was obtained from charcoal: A.D. 125± 120 B.P. (1825±120 B.P.; Isotopes Inc., #718).

Mound 2 included 32 secondary internments, once again representing both males and females of all ages (Neuman 1975:42). Artifacts collected from Mound 2 included knives (n=5) endscrapers (n=2), a graver, debitage (n=5), and a shell bead (Neuman 1975:44-45). One radiocarbon date was obtained from a log on top of the burial pit: A.D. 350±100 (1600±100 B.P.; Isotopes Inc., #719).

'Unnamed Complex'

Dyck and Morlan (1995), in their excavation report from the Sjovold Site in Saskatchewan attributed projectile points from Layer 14 to an Unnamed Complex. They described 'a distinctive side-notched' projectile point style (Dyck and Morlan 1995:425). Previously, Dyck (1983:107) noted at "around 2500 B.P. some very poorly known side-notched forms appear in certain Northern Plains sites." He goes on to observe that these were "…very straight-based lanceolate side-notched projectile points of medium size that seem typical of a much earlier or much later time" (Dyck 1983:108). Dyck noted the appearance of the Unnamed Complex during the Pelican Lake sequence, at both Sjovold and in the latter use Head-Smashed-In, also dating to 2450 B.P. He suggested an Early Woodland connection to the southeast, including Minnesota, Illinois and Ohio (Dyck 1983:108; Syms 1977:129). Furthermore, Syms (1977:129) noted the expansion of Early Woodland groups at 2500 B.P. At the Sjovold Site, Dyck and Morlan (1995:425) describe Outlook as an early variety of what they term the Besant Series.

Saskatchewan

Sjovold site (EiNs-4)

The Sjovold site (EiNs-4), as previously described in regard to the Pelican Lake, Sandy Creek, and Besant Phases, also includes what has been previously termed the 'Unnamed Complex' by Dyck and Morlan (1995). Layer XIV was identified as belonging to the Unnamed Complex, based on projectile point styles later coined 'Outlook,' interpreted as an early representation of Besant (Dyck and Morlan 1995:425). Layer XIV dated to 2800-2500 B.P. (850-550 B.C.), based on large mammal faunal remains that had been associated with a hearth feature (Dyck and Morlan 1995:96). Hearth features, debitage, stone tools, and faunal remains were identified in this level. Ten complete and fragmentary projectile points were recovered from Layer XIV at the Sjovold site, six made from Knife River Flint, and one each from fused shale, buff-cream chert, silicified sediment, and Swan River Chert. Dyck and Morlan (1995:431) note:

> The shape of the points are surprisingly uniform, especially in the critical basal area. All are side-notched with straight or very slightly concave bases. Notches are low on the sides, 2 mm or less above the lateral-basal point of juncture. They are generally "u" shaped and about twice as abroad as deep. Neck width, the distance across the haft between notches, averages 11.8 mm with a range from 10.6 mm to 13.1 mm for seven measurable specimens. The sides are almost straight, forming very gentle convex curves toward the tip. Lateral edges are sharp, perhaps lightly polished, but not ground. Basal edges are either lightly crushed or lightly rounded and polished by abrasion which left transverse striae. Basal width in three cases was equal to maximum width of the body just above the haft. In one case, width of the base was about 1 mm narrower than the body, and in other cases a comparison was not possible The points are biconvex both in longitudinal and transverse section (Dyck and Morlan 1995:433).

The Unnamed Complex will be discussed further in Chapter 5, following the projectile point analysis.

Early and Middle Plains Woodland

The Early Plains Woodland Period (700 – 100 B.C., or 2650 – 2050 B.P.) and Middle Plains Woodland Period (100 B.C. – A.D. 600, or 2050 – 1350 B.P.) occurred in the Northeastern Plains, including North and South Dakota and the surrounding area. The Plains Woodland was characterized by "…burial mound mortuary practices, some gardening, and the routine production of ceramic vessels for cooking" (Gregg and Picha

1989:38). Johnson and Johnson (1998:201) also add corner-notched projectile points to the definition of the Plains Woodland. Gregg and Picha commented (1989:42) that the Sonota Complex is considered to have developed out of the Early Plains Woodland, as well as observing the believed growth in prehistoric population in this area. Extensive trade networks are known from the Plains Woodland period (Gregg 1994:76).

Significantly, Gregg and Picha offered some valuable insights into Middle Woodland lithic technology that are relevant to the present study.

> Diagnostic dart point/cutting tool styles of the Sonota complex are Besant Side Notched (a large form) and Samantha Side Notched (a small form). Both are found in early Sonota components of 2,000 years ago… The size differences are likely accounted for by functional variation in atlatl weaponry. Small points have been interpreted as tips for light, fast projectiles (Christenson1986:121). The small corner notched points of the Late Plains Archaic and Early Plains Woodland periods and the Middle Plains Woodland Samantha points are hypothesized to represent small tips used on small atlatl darts when high speed projectiles, rather than slower, heavy impact projectiles, were needed (Gregg and Picha 1989:43).

Furthermore, Gregg and Picha (1989:43) further observed that Sonota lithic technology relied on intensive use of Knife River Flint, in addition to other locally available raw materials in North Dakota that included Swan River Chert, Tongue River silicified sediment, and exotic material such as obsidian and porcellainite, "… as stock material from which tools were made."

In terms of subsistence during the Middle Woodland, bison were the primary food resource, supplemented by dog/coyote (Gregg 1994; Gregg and Picha 1989:44). There is no archaeological evidence to support gardening activities during the Middle Woodland in North Dakota (Gregg and Picha 1989:45). Ceremonial practices reflected the ideological significance of bison to Middle Woodland groups, as demonstrated by the internment of bison remains with human remains in the Sonota burial mounds (Gregg 1994; Neuman 1975).

Although the Early Plains Woodland falls outside the primary study area of Alberta, an example is given to provide a comparison during the late Middle Prehistoric Period. Neuman's (1975) Sonota sites, as already described, are also considered as later manifestation of the Plains Woodland on the Northeastern Plains. Data for the Early Plains Woodland in North and South Dakota is limited at best, and not well published.

North Dakota

Naze site (32SN246)

The Woodland is a poorly known period in prehistory, but the Naze site (32SN246; Figure 2.1:31) offers an opportunity to examine the Early Woodland period at 700 – 100 B.C. (2650 – 2050 B.P.; Gregg 1990; Gregg and Picha 1989:38). The Naze site is located along the James River, at the confluence with Beaver Creek, in southeastern North Dakota. In 1985, excavations of lodge feature, representing minimally one habitation structure, that included charred posts and a living floor. Material culture recovered from the Naze site included pottery sherds (n=36) that feature a range of decorative attributes (Gregg and Picha 1989:40). Faunal remains recovered from the Naze site included bison, elk, coyote/dog, and beaver; Gregg and Picha (1989:41) observed that "…dogs were the most important kind of dependable, storable food surplus that the people had." Floral remains included chokecherry, wild grape, lambs quarters and possibly marsh elder (Gregg and Picha 1989:41). Gregg and Picha (1989:40) noted that the lithics from the upper James River are "…stylistically unlike the large stemmed forms which characterize Black Sand and other eastern Early Woodland complexes." Small, medium, and large corner notched atlatl dart points that also functioned as cutting tools were made in a number of styles often referred to as Pelican Lake. Five radiocarbon dates were obtained for the Early Woodland component at the Naze site (Gregg and Picha 1989:53): 2472±45 B.P. (SMU-1759), 2448±44 B.P. (SMU-1760), 2388±44 B.P. (SMU-1761), 2440±70 B.P. (Beta-14746), and 2780±80 B.P. (Beta-14745).

Summary

The detailed review of key archaeological sites on the Northern Plains presented in this chapter has served to provide a context for the Fincastle site analysis during the late Middle Prehistoric Period, necessitating a review of preceding and antecedent archaeological cultures. Archaeological sites on the Northwestern Plains, with emphasis on their projectile point forms and accompanying radiocarbon dates, have been reviewed for the Pelican Lake Phase (3300 – 2000 B.P.), Sandy Creek Complex (*c.* 2500 B.P.), the Unnamed Complex (*c.* 2500 B.P.), Besant Phase/Sonota Complex (2000 – 1250 B.P.), the Early Plains Woodland Period (2650 – 2050 B.P.), and the Middle Plains Woodland Period (2050 – 1350 B.P.). Site data from pioneering archaeological investigations on the Plains through to current research has been presented, with the emphasis upon Besant/Sonota sites on the Northwestern Plains. An outline of the culture history and projectile point technology used in the classification and interpretation of these archaeological sites has been provided.

The Pelican Lake Phase is a cultural unit with a projectile point form that is distinct from points at the Fincastle site. Pelican Lake projectile forms, particularly in

Pelican Lake I (3300 – 2800 B.P.) are characterized by deeply corner notched projectile points, featuring triangular bodies and what is often described as a 'classic Christmas tree' outline. Pelican Lake II (2800 – 2000 B.P.) is coeval with the Fincastle site; however, after 2800 B.P. Pelican Lake projectile point forms become much more variable and tend to be more poorly executed. As has been noted by other researchers, the relationship between the Pelican Lake Phase and the Besant Phase is not well understood. Pelican Lake occurs stratigraphically beneath Besant components at multi-component stratified sites, and mixed Pelican Lake/Besant assemblages are frequently encountered, as demonstrated by sites such as EbPi-63 and EgPn-111 in the present study.

At approximately 2500 B.P., the poorly understood Sandy Creek Complex is identified on the Northwestern Plains. Originally identified at the Mortlach site in Saskatchewan, this projectile point type was identified in the 1950s. In the published literature, this type has seldom been identified, and no definitive Sandy Creek site has been published in the 50 years since the original definition. Projectile point forms tend to feature concave bases, side notches, and are reminiscent of the Oxbow projectile point type known from the early Middle Prehistoric Period. Based on the minimal evidence in support of the Sandy Creek Complex, these projectile points arguably do not represent an archaeological culture, but rather a variant of Pelican Lake II or possibly an antecedant of Besant.

Also at *c.* 2500 B.P., Dyck (1983) initially designated an 'Unnamed Complex' from his investigations at the Sjovold site, which he later incorporated along with Sandy Creek into what he termed the 'Besant Series' (Dyck and Morlan 1995). These projectile points are generally characterized by a reliance on Knife River Flint, straight bases, side notches, and generally more elongated forms than seen in the later Besant points. Dyck and Morlan (1995) later classify these projectile points from the Sjovold site as the 'Outlook' variant in their 'Besant Series.' Given the projectile point data at *c.* 2500 from sites such as Fincastle, Head-Smashed-In, Happy Valley, and EbPi-63 in Alberta, and the Sjovold site in Saskatchewan, it is worth revisiting the definition of the 'Unnamed Complex' at *c*. 2500 B.P. This is discussed further in Chapter 5.

The Besant Phase, approximately 2000 - 1250 B.P. on the Northwestern Plains has also been the subject of considerable investigation by archaeologists. The type site for the Besant Phase was defined by Wettlaufer (1955) at the Mortlach site, and additional efforts in defining this phase have been made by Reeves (1983a, 1983b) from his work at the Kenney site. Besant projectile points exhibit wide variability in form, quality of workmanship, and raw material selection; researchers have tried to further classify Besant projectile points into a variety of forms (Dyck and Morlan 1995; Kehoe 1974). The Besant Phase is recognized widely across the Northern Plains and considerable data has been gathered pertaining to Besant since these initial investigations. The definition of the Besant Phase is discussed in greater detail in Chapter 5.

Neuman (1975) defined the Sonota Complex, dating 1950 – 1350 B.P., based on his 1960s excavations in North and South Dakota; this complex has remained contentious since the publication of his research in its relationship to Besant on the Northern Plains. The Sonota Complex has a strong connection to the coeval Besant Phase, as evident through projectile points from these sites. Sonota projectile points are characterized by a dominance of Knife River Flint raw materials, high quality workmanship, generally straight basal edges, and side notches. The relationship between Besant and Sonota is unclear, and the present projectile point study is aimed at gathering and presenting data to try to better understand this relationship.

The Early Plains Woodland Period (2650 – 2050 B.P.) and the Middle Plains Woodland Period (2050 – 1350 B.P.) are introduced briefly to provide an introduction to the region that gave rise to the Sonota Complex. The Plains Woodland is better known for its classification of ceramic wares rather than projectile point forms; projectile point forms include Pelican Lake and Besant types. The Besant Phase is influenced by these Northeastern Plains periods, which also feature side-notched projectile points representing atlatl darts and emerging bow and arrow technology that became widespread during the Late Prehistoric Period on the Northwestern Plains.

The culture history on the Northern Plains during the late Middle Prehistoric Period, as summarized, provides a context for the analysis of the Fincastle site. The Fincastle site shares certain features with both the Besant Phase and the Sonota Complex, yet temporally occurs approximately 500 years earlier than the earliest dates in Alberta for Besant. Following this introduction to the archaeological sites considered in this analysis, results from the Fincastle site excavations, as well as a projectile point study will be used to analyze the relationship between the Besant Phase and the Sonota Complex, in reference to the archaeological phases and complexes presented in this chapter.

In Chapter 3, the 2003, 2004, and 2006 field investigations at the Fincastle site are introduced to provide a background for the projectile point study. In Chapter 4, a detailed projectile point study from the Fincastle site, along with comparative point data from Besant/Sonota sites on the Northwestern Plains are also presented. In Chapter 5, the theoretical framework utilized by archaeologists, as well as assumptions in theory-building, when interpreting archaeological sites and classifying them into culture histories using typologies will be examined, using the case study of the Fincastle site; definitions of Besant, Sonota, and the Unnamed Complex will be explored in depth. Radiocarbon date sequences from sites outlined in this chapter will be presented, in conjunction with the determination of the Fincastle site's cultural affiliation.

CHAPTER 3: FINCASTLE SITE

Introduction

The Fincastle site (DlOx-5) is located in low sand hills 125 km east of Lethbridge, Alberta (Figures 3.1, 3.2, 3.3). Located approximately 3 km south of the Oldman River (Figure 3.4), the site is on crown land, used for cattle grazing. Locals have known of the archaeological site for many years, including the Litchfield family that has leased the land for a century.

In 2003, the Historical Resources Management Branch, Alberta Community Development was alerted by concerned local residents to the vandalism and looting of a previously undocumented archaeological site located east of Taber, Alberta. Staff worked in conjunction with volunteers from the avocational Archaeological Society of Alberta to investigate the extent of the site's damage and to assess the site's significance. With these two main goals in mind, a team of Archaeological Society of Alberta volunteers, under the direction of Shawn Bubel, a University of Lethbridge archaeology professor and the Lethbridge Chapter's President, conducted a survey to map the recent damage at the Fincastle Site. In addition to the recording work, they also systematically collected artifacts from the surface, as well as through a shovel-testing programme. The 2003 preliminary investigation was supported by local collectors, who generously showed the researchers their projectile point collections recovered from surface exposures at the Fincastle site that had been eroded by aeolian and bioturbation processes.

Figure 3.1. Fincastle site location.

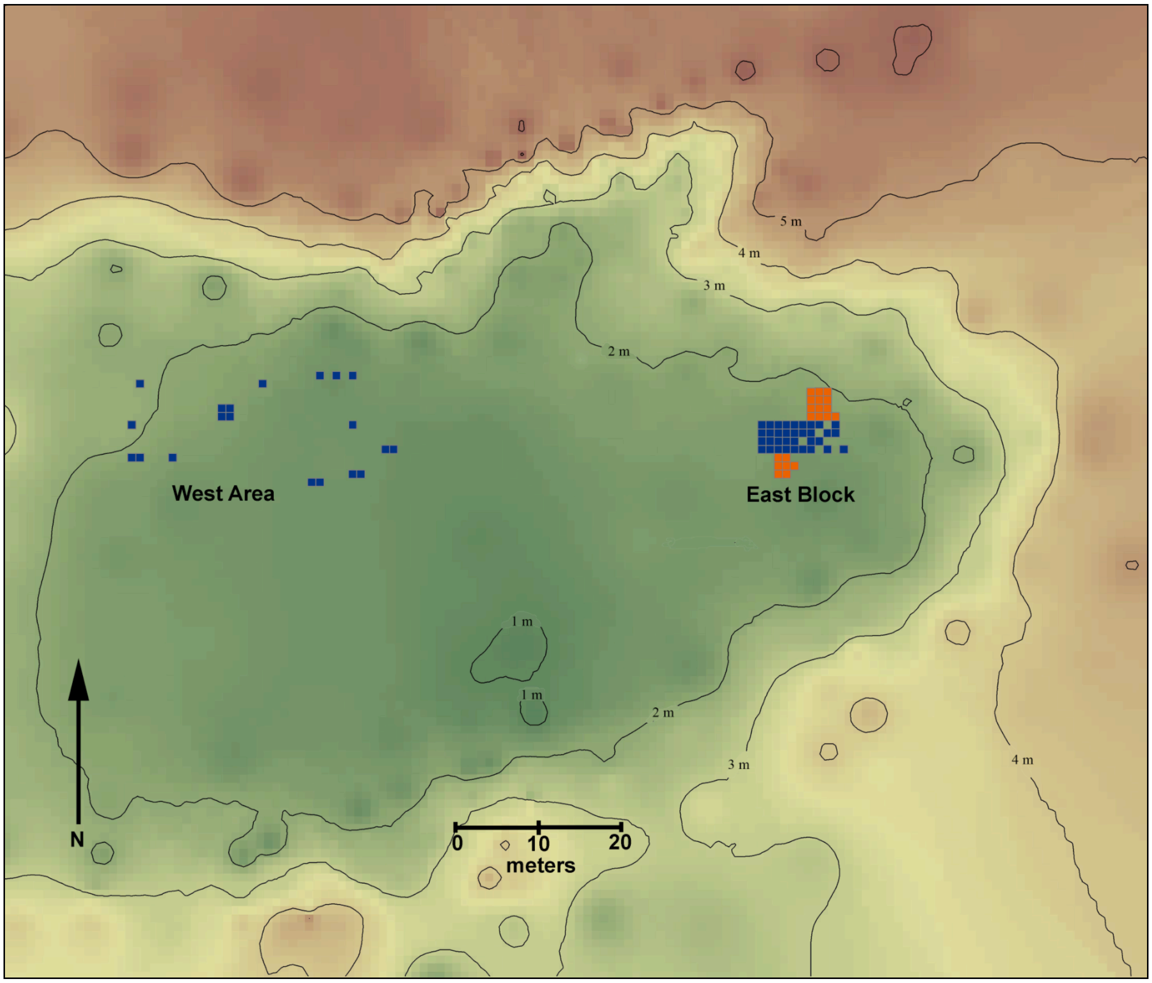

Figure 3.2. Fincastle site excavations in parabolic sand dune, plan view. Archaeological excavations in 2004 are represented by the blue units, and the 2006 units by the red units. This contour map was created by measuring the relief of the dune with a Total Station every 3 m. Generated in ArcGis 9, the contours depict elevation changes. The crest of the dune is approximately 4 m higher than the lowest point inside the parabolic sand dune.

Figure 3.3. View NE of the Fincastle site, set within parabolic sand dune.

Figure 3.4. The Oldman River 3 km north of the Fincastle site.

After reviewing the distinctive projectile points from the Fincastle site, the site was deemed of high significance to Alberta's prehistory by the Historical Resources Management Branch, Alberta Community Development and the University of Lethbridge. Preliminary assessment of the Fincastle site by archaeologists resulted in the tentative assignment of the site to the Sonota/Besant archaeological culture (2000 – 1300 B.P.) of the late Middle Prehistoric Period. Distinctive features of the lithic tool assemblage from Fincastle supported a link to the Sonota archaeological culture, known from North Dakota, based upon the unique projectile point morphology, and exotic raw materials found in the lithic assemblage. The overwhelming majority of the stone tools were produced from Knife River Flint, quarried from deposits in North Dakota. Other exotic materials included obsidian, porcellainite, and a variety of other cherts. The extensive reliance on exotic raw materials primarily known from the Northeastern Plains supported a connection to the Sonota archaeological culture known in North Dakota, in contrast to the widespread Besant archaeological culture commonly found across the Alberta Plains at this time. Besant projectile forms, although also side-notched, were proportionally shorter and broader, and tended to rely heavily upon local raw materials for stone tool production. In contrast, the Fincastle Site after preliminary examination marked a departure from what was commonly seen in Alberta during this period. At this point, based on the 2003 work, preparations were made for a field school to recover a controlled sample for further analysis in the following year, before the site was entirely destroyed by pothunting.

Environmental Setting

Modern flora/fauna

The Fincastle site lies in a protected native grassland, designated by the province as a sensitive environmental zone in southeastern Alberta. The nearby Fincastle Marsh attracts migrating waterfowl, and supports a diverse range of bird species, including pelicans, ducks, grebes, burrowing owls, cliff swallows, and prairie chicken. Antelope are among the larger mammal species here, along with coyote and deer. Rattlesnakes and spade-footed toads are also indigenous to the area. The well drained sandy soils also now provide a specialized microhabitate for a range of flora, including the sand verbena.

Paleoenvironment

The southern Alberta plains, where the Fincastle site is located, were covered by the Laurentide icesheet during the Late Pleistocene as late as 12000 B.P. (Beaty 1975:63). Beaty (1975:12) noted that after the deglaciation, glacial meltwater formed into lakes along the edge of the receding Laurentide glacier in southern Alberta, eventually draining as the icesheet receded. Stagnant ice remained in south-central Alberta after 11000 B.P., melting slowly and leaving glacio-lacustrine deposits ranging in thickness from 5 m to 25 m (Harris 1985; Eyles *et al.* 1998).

The Fincastle site is located within sand hills south of the Oldman River and north of Purple Springs, Alberta. At present, the dunes are stabilized by overlying vegetation. This dune field primarily contains longitudinal dunes, with the long axes paralleling the strong Chinook winds out of the southwest (Beaty 1975:71). There are four such dune fields known in southern Alberta, all oriented in a north east-southwest alignment (Beaty

1975:71-72). The dune fields in southern Alberta were created by wind carrying sediments thousands of years ago, possibly from proglacial lake beds after the Laurentide glaciation, but before vegetation became well established on the Plains (Beaty 1975:72).

Archaeological Excavations

Field Methodology

Objectives of the excavations at the Fincastle site included obtaining a representative sample of the archaeological remains from across the site area, and the field methods were designed to fulfill this goal. The dune was mapped with a total station prior to the archaeological excavations. Five datum stakes were laid out around the dune in order to do this, and these datum points were also used to establish the site grid.

Excavation units at the Fincastle site were the standard 1 m by 1 m square units. Units were excavated in a checkerboard grid pattern (Figure 3.5), in order to record the stratigraphic profiles from the four unit walls. Units were excavated in 5 cm in arbitrary levels, primarily using trowels. In the bonebed, other tools used included brushes, skewers, and spoons. Shovels and trowels were used for a testing programme outside of the excavation areas.

Archaeological artifacts included stone tools, primarily projectile points, as well as debitage produced by tool resharpening. Faunal remains were abundant, ranging from complete, articulated elements, to fragmentary burnt and calcined pieces.

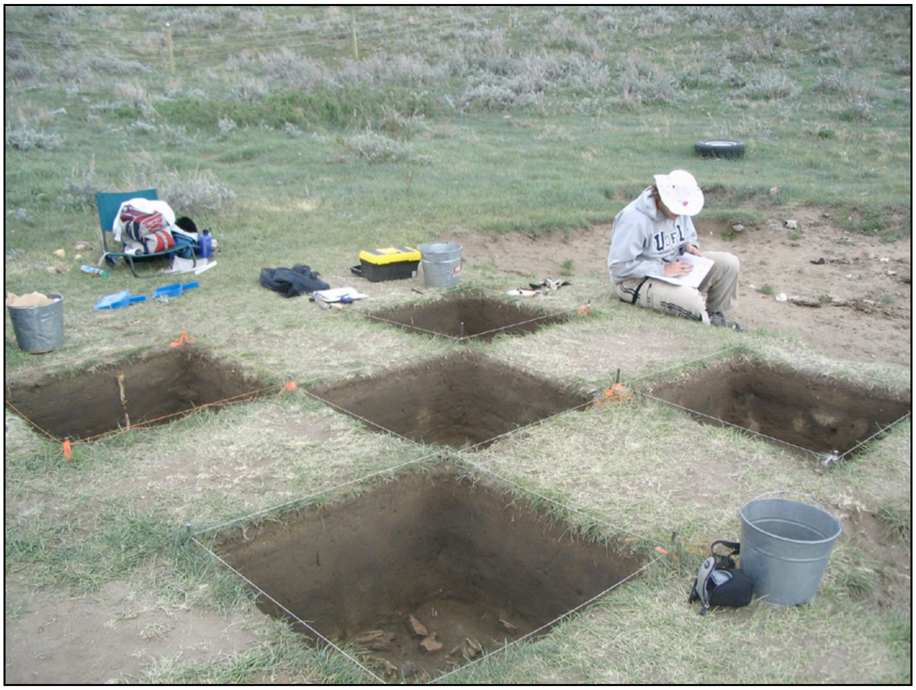

Figure 3.5. Checkerboard excavation grid, North Extension of the East Block.

Figure 3.6. All sediments were screened using 1/8 inch mesh.

Sediments were screened using 1/8 inch mesh, in order to ensure that these small items were recovered (Figure 3.6). Nearly all of the debitage, along with the burnt and calcined bone fragments, would have fallen through the ¼ inch mesh that is more typically used during Plains excavations.

Meticulous field records were maintained during the Fincastle site excavations. Standard level record forms were used to systematically record level depths, artifacts, features, photography, and sediments. An excavation notebook was also maintained for each unit, to describe in greater detail the data recorded on the level record form. Artifacts were assigned unique field numbers to track each item, and their proveniences were recorded in the notebooks.

In each level, the spatial location of each artifact was recorded by measuring northing and easting coordinates in cm. Elevation heights were measured from the southwest stake of each unit, and recorded as below datum; the elevation of each unit's datum was shot in using the total station, and tied to the 5 site datum pegs.

Artifacts were mapped at a 1:5 scale on mm graph paper, by level and in plan view to provide a detailed record of the Fincastle site. All identifiable fauna was mapped, including unidentifiable bone fragments greater than 5 cm in length. All fire-broken rock larger than 2 cm was also mapped. Lithic tools and debitage were always mapped, irrespective of size. Features were also recorded with a high level of detail.

In addition to the written records, plans were drawn for each level that had *in situ* artifacts. The plans were drawn using a 1:5 scale on waterproof graph paper, to have a permanent record that accurately depicted the archaeological finds, as well as for post-excavation digitizing into a GIS program for three-dimensional site modeling (Lieff

2006). A standard legend was used, in order that the same conventions were used among all of the excavators to represent archaeological finds. All artifacts mapped on the level plan were labeled with their unique assigned field number, in order that it could be cross-referenced with the accompanying excavation notebook. The field methods were successful at obtaining a representative permanent record of the Fincastle site.

2004 Field Season

In May 2004 the University of Lethbridge and Red Crow College Field School provided an initial sample of 40 1 m x 1m excavation units in two excavations areas, designated the West Area and East Block. Volunteers from the Archaeological Society of Alberta, Lethbridge and Medicine Hat Centres, also supported the field school excavations. Investigations at the Fincastle site in 2004 initially focused upon the West Area, placing 20 units spread within and adjacent to the disturbed site area, in order to test the extent and depth of the disturbance produced by pothunting. Subsequent shovel testing 50 m east of the West Area revealed an intact, dense bone bed. An additional 20 m were placed in the newly designated East Block to test the intact deposits.

In June 2004, the Heritage Resources Management Branch, Alberta Community Development, granted additional funds in order to complete the field school units and to increase the sample size from the Fincastle site. An additional 16 m^2 were excavated June through August 2004. The summer excavation was conducted by a combination of

Figure 3.7. Fincastle site 2006 excavations in progress, East Block in foreground, view to the west.

volunteers and paid field assistants. In total, 56 m^2 were excavated by the end of the 2004 field season.

2006 Field Season

In May 2006, archaeological excavations resumed at the Fincastle Site, with the University of Lethbridge Archaeological Field School (Figure 3.7). Research objectives in 2006 included continuing to delimit the size of the Fincastle site, increasing the archaeological sample, and assessing the stratigraphy. The East Block was expanded, as an intact area of the Fincastle site. After the 2004 season, pothunting had occurred once again, causing some damage to the edges of the East Block, as well as units in the West Area; cows also had impacted the previous excavation area.

Archaeological units were placed along the north and south edges of the East Block, designated the North Expansion and the South Expansion areas. The units were placed adjacent to the portions of the East Block where the bone bed had been deepest. Both areas were rich in archaeological finds; the stratigraphy in the North Expansion appeared intact, in comparison with the deflated South Expansion. More units were placed in the North Expansion area as a result, for a total of 13 m^2 units. In the South Expansion, a total of 7 m^2 units were excavated. In 2006, 20 m^2 were excavated at the Fincastle site, bringing the total number of units excavated between the two field seasons to 76 m^2.

Artifacts

Archaeological remains recovered from the Fincastle site fall primarily into three categories: lithic remains, faunal remains, and fire-broken rock. All artifacts were recovered from a single occupational layer.

Lithic artifacts include both large and small stone tools. Large stone tools from Fincastle include hammerstones, that may have been used to smash bison bones for grease extraction. Small stone tools include projectile points, scrapers, and debitage. The projectile points (n=72, complete and fragmentary) recovered from the Fincastle excavations will be discussed in detail in Chapter 4. Typically, projectile points from the Fincastle site were made from Knife River Flint, quarried from North Dakota. Several endscrapers were also recovered, dominated by Knife River Flint and Swan River Chert raw materials. The debitage at the Fincastle site was mainly Knife River Flint (nearly 80% in 2004), from tool-sharpening in the bone bed.

The faunal remains, presently under analysis, are dominated by *Bison bison*. Canid remains have also been recovered. Butchering units were evident in the bone bed, including lower limb articulations. Additionally, bison elements were used in four vertical bone upright features at the Fincastle site, as described below.

Fire-broken rock was also recovered from the Fincastle site, although not in association with any particular archaeological feature. Fire-broken rock was recovered from the bone bed.

Features

Five features were documented at the Fincastle site. Four bone upright features were recorded, one in the West Area, and three in the East Block.

One of features, a processing-related feature, was located in 556N 570E, along Transect #1 of the 2006 shovel-testing programme, between the West Area and the East Block. The feature is best described as ephemeral, located approximately 5 cm below the modern surface (Figure 3.8a, 3.8b). The stratigraphy appeared compressed and the feature probably deflated. A thin ash lens, with a scatter of small fire-broken rock fragments was documented. Microdebitage and two retouched flakes made from Knife River Flint were also recovered from this feature.

The first vertical bone upright feature was in the West Area, at the junction of four units: 564N 528E, 564N 529E, 563N 528E, and 563N 529E (Figure 3.9a, 3.9b).

Figure 3.8a. Overview of processing feature in Unit 556N 570E.

Figure 3.8b. Detail of stain in processing feature.

Figure 3.9a. Plan view of bone upright feature #1.


Figure 3.9b. Upright feature #1 with vertical mandibles.

Figure 3.10. Upright feature #2 in Unit 559N 599E, Level 9
with metacarpals.

The upper portion of the four adjacent units had been impacted by shoveling from the pothunter. Beneath the disturbance, several vertically oriented elements were recovered, tightly clustered together. Larger elements included a canid cranium, a bison mandible, and a bison scapula, at 25-60 cm below datum. No clearly defined edges of the feature were evident in the sandy deposits.

The second bone upright feature was in the East Block, in 559N 599E, at the bottom of the bone bed. Two vertically oriented *Bison bison* metacarpals, in tight proximity, had been pressed into the underlying clay deposits (Figure 3.10). One of the metacarpals was submitted for radiocarbon dating. The proximal ends of the metacarpals began in Level 7 (32 cm below datum), and they ended in Level 10 (50 cm below datum), with the distal ends missing.

The third bone upright feature was also in the East Block, in 559N 604E (Figure 3.11a, 3.11b). It was also in association with the bone bed. It included three vertically oriented bison scapulae, with overlying rib fragments. The feature was fully exposed by Level 8, after first appearing in Level 4, 20-45 cm below datum.

The fourth bone upright feature was at the bottom of the bone bed in the North Extension of the East Block, in 565N 600E. The feature began in Level 13 and continued to Level 25 (Figure 3.12a, 3.12b, 3.12c). The depth of the feature was 60-130 cm below datum, including a metatarsal, an atlas vertebra, a projectile point base, two mandibles, and a scapula. The scapula was perfectly vertical, with the atlas over the glenoid fossa; immediately adjacent to the scapula were the two mandibles. One of the mandibles was oriented with the incisors pointing down, and another with its incisors pointing upward. All of the faunal remains in these feature were identified as *Bison bison*.

The vertical uprights are of unknown function; researchers at other sites have suggested that they served as possible anvils for stone tool sharpening in bone beds (Gruhn 1969; Neuman 1975). Some of the uprights may have also been made for ideological reasons. No hearth features or pit features have been located at the Fincastle site, although the significant quantity of fire-broken rock found in the North Extension provides indirect evidence for secondary processing activities.

Figure 3.11a. Bone upright feature #3 with vertical scapulae.

Figure 3.11b. Vertical scapulae detail.

Figure 3.12a. Top of vertical upright feature #4, originally identified as a krotovina.


Figure 3.12b. Detail of excavation in progress of upright feature #4.

Feature 4.12c. Vertical complete mandibles and scapula at bottom of vertical upright feature #4, 85 to 125 cm below datum.

Cultural Stratigraphy

The cultural stratigraphy at the Fincastle site is relatively straight-forward. Archaeological excavations in the East Block suggest that the Fincastle site represents a single kill event. The homogeneity of the projectile point types and the overall stone tool assemblage confirms this interpretation. This assessment is further supported by the two radiocarbon dates, dating the site to *c*. 2500 B.P.

As mentioned above, the Fincastle site is situated in low sand hills south of the Oldman River. The site is set in a parabolic sand dune, mostly stabilized by vegetation today, in a large dune field that has been present for thousands of years. The archaeological site has been impacted strongly by aeolian processes, instigated by the powerful Chinook winds that blow from the west. At Fincastle, the wind has eroded sediments from the West Area and southern portions of the East Block nearly to the underlying clay deposits. The fragmentary bone in the West Area showed evidence of being highly weathered, as did the top of the bone bed in the East Block's South Extension, suggesting that the bone bed either lay exposed after the kill, or was soon covered by sand that mostly eroded away at a later time, before another episode of deposition. Overlying aeolian deposits, thicker to the north and east, have protected most of the East Block. It is likely that the wind exposed deposits in the western area of the site, redepositing small bone fragments and debitage in the aeolian overburden atop the Fincastle bone bed to the east.

Bioturbation is very evident in the Fincastle site deposits in the East Block. Krotovinas are present, presumably from burrowing arthropods, worms, rodents, and the ubiquitous Richardson's ground squirrels, although no contemporary burrows of these rodents were encountered during the excavations. This had led to some minor mixing of the stratigraphy. Trampling by cattle has resulted in two blowouts in the dune area, along the north and south arms of the dune.

The typical stratigraphic profile (Figure 3.13a, 3.13b) at the Fincastle site from the East Block includes a modern A horizon of dark brown silty sand, with the present land surface covered by grasses and the occasional shrub. The B horizon is a light brown fine sand of varying thickness throughout the site. There are occasional bone fragments and debitage in the B horizon, so placed by either wind or bioturbation. At the bottom of the B horizon is a thin paleosoil, an old A Horizon, that contains the bone bed, up to 15 cm atop the paleosoil. Immediately beneath the paleosoil is the C horizon, a mottled orange/grey gleyed clay of glacial origin. The C horizon is very thick, and its maximum

Figure 3.13a. Unit 562N 599E, East wall profile.

Figure 3.13b. Unit 562N 603E, South wall profile.

depth is unknown; it continues for at least 60 cm, sometimes containing fine gravel lenses and the occasional cobble. Presumably the C horizon represents glacial clay, approximately 25 – 30 m in thickness.

Radiocarbon Dating

Two samples were selected from the 2004 excavations at the Fincastle site for radiocarbon dating. Charcoal was not recovered in 2004. Instead, two bison elements were selected from the East Block bone bed, both found in direct association with projectile points.

Radiocarbon samples were submitted to Beta Analytic, with funding support from the Heritage Resources Management Branch, Alberta Community Development. Standard radiometric dates were obtained, using collagen analysis, and the collagen samples were extracted with alkali. The conventional dates from the Fincastle site are reviewed below.

A *Bison bison* lumber vertebra was selected from 561N 602E, Level 7, at 40 cm below datum. This element was chosen as it was part of an articulation of bison vertebrae that represented a butchering unit within the bone bed. The date returned was 2540+/-50 B.P. (Beta-201909).

A *Bison bison* metacarpal from 559N 599E, Levels 7-10, at 32-50 cm below datum was submitted for a second radiocarbon date. The metacarpal was from an archaeological feature of two vertically oriented metacarpals (Feature #2), at the bottom of the bone bed. The base of the feature had been excavated into the clay deposits underlying the bone bed, although the feature was associated with the bone bed. The date from the metacarpal was 2490+/-60 B.P. (Beta-201910).

Summary

The Fincastle site is an unusual archaeological site on the southern Alberta Plains, due to its projectile point morphology, raw material selection, and its radiocarbon dates at *c.* 2500 B.P. Comparisons to similar site assemblages are best made to collections appearing 1000 years later on the Northwestern Plains, at sites such as Muhlbach, Fitzgerald, and Melhagen, as outlined in Chapter 2. The material remains from the Fincastle site do not fit in with Pelican Lake or Sandy Creek, and arguably do not fit into Besant, typically held to begin in Alberta at 2000 B.P. The Fincastle case study provided an impetus to make a comparison of Besant and Sonota projectile points on the Northwestern Plains, in order to refine the chronology at this period. In Chapters 4 and 5, the methodology and analysis of the Fincastle and comparative projectile point assemblages, along with their correlating stratigraphic position, radiocarbon dates, and temporal distribution, is presented.

CHAPTER 4: PROJECTILE POINT DATA

Introduction

The projectile point study was designed to meet several research objectives. Primary research objectives pertain to the Fincastle site. The first of the Fincastle site objectives is to establish the site's cultural affiliation, based on the projectile point assemblage. Does the projectile point assemblage represent Pelican Lake, Besant, Sonota or another archaeological culture, based on the typology. The second of the Fincastle site research objectives is to address whether the variation in projectile point forms represents different kinds of lithic technology, such as arrows, atlatl darts, and knives, or other technological choices. Broader objectives of the comparative study include determining whether the projectile points at Fincastle are similar or dissimilar to other archaeological sites in Alberta at *c.* 2500 - 1250 B.P. Comparisons will be made on the basis of raw material choices, overall typology, and projectile point attributes.

Archaeological sites from Alberta were the focus in order to place the Fincastle site in context with other archaeological sites in the province during the late Middle Prehistoric Period. The primary objective of the projectile point study is to place the Fincastle site in context with contemporaneous archaeological sites of *c*. 2500 B.P. on the Northwestern Plains, with a focus on Alberta sites, and the relationship to Besant/Sonota. Archaeological cultures in the literature that fall within this time span include Pelican Lake, Sandy Creek, Besant/Sonota, and the 'Unnamed Complex' defined by Dyck (1983), that he later integrated into what was termed the 'Besant Series' (Dyck and Morlan 1995). In this chapter, the analytical methodology is outlined, including both metric and non-metric attributes. Furthermore, projectile point curation, projectile point technology, the significance of Knife River Flint, and trade networks to the Northeastern Plains periphery are also discussed.

Further objectives of the projectile point study include classifying the projectile points into functional type, such as arrow, atlatl dart, or knife, as has been done by previous researchers on the Plains (Ramsey 1991; Hjermstad 1996). Another objective includes determining how the curation of projectile points, their resharpening and reuse, complicates assigning cultural affiliation. The attribute criteria were modeled after the projectile point analyses by Ramsey (1991) and Hjermstad (1996), with modifications made to their original study attributes to meet the objectives of the present study to gather broadly comparative data. Questions that shaped the present study were geared toward assessing cultural affiliation, while their analyses tended to be more descriptive; both the present study and the previous research have considered projectile point technology within the assemblages under examination. Due to the typically small comparative samples yielded by each archaeological site in the current analysis, the utility of a statistical study is limited. Furthermore, metric studies of this nature best reflect the technological function of the projectile point assemblage, i.e. arrow vs. atlatl dart, as opposed to determining projectile point types and interpreting their cultural association (Ramsey 1991).

More broadly, further objectives are to assess whether Besant and Sonota projectile points can be distinguished through a comparative metric and non-metric analysis, or whether these projectile point types are identical. The need for this kind of study has been recognized and urged by other researchers (Cloutier 2004), while the relationship between Besant and Sonota has remained contentious in the academic literature for decades (Cloutier 2004; Duke 1991; Dyck 1983; Hjermstadt 1996; Joyes 1984; Ramsey 1991; Reeves 1983a; Shortt 1993; Syms 1977). The present study will attempt to address these questions. In Chapter 5, the results from the projectile point study from Fincastle and other sites will be expanded to include radiocarbon dates, geographic distribution, and stratigraphic seriation to further explore archaeological modeling as relevant to interpreting the late Middle Prehistoric Period archaeological cultures on the Alberta Plains.

Methodology

The methods were designed to first meet the Fincastle site research objective, as outlined above, and secondly, to address the issue of the Besant/Sonota relationship on the Northwestern Plains. In this section, the site selection process is reviewed. Next, the attributes for the quantitative and qualitative analysis are outlined. Attributes selected in the projectile study are modeled after Ramsey (1991) and Hjermstad (1996).

Site Selection

The Fincastle site (Figure 4.1) is the main focus of the projectile point analysis. Initial assessment of the projectile points from the Fincastle site in 2003 and 2004 suggested comparisons with the Muhlbach site (Gruhn 1969; Figure 4.1), near Stettler, Alberta, as well as with the Sonota Complex sites in North and South Dakota (Neuman 1975). Fincastle projectile point samples were collected from surveys and excavations in 2003, 2004, and 2006.

To assess whether Fincastle fits in with either the Sonota Complex or Besant, or with another archaeological culture, it was necessary to select comparative archaeological sites. Comparative sites were selected based upon their spatial distribution and chronological association: as other researchers have noted, undertaking this kind of study is difficult due to problems with accessing collections and the time-consuming nature of the analysis (Hjermstad 1996; Ramsey 1991). With these considerations in mind, the emphasis of this analysis is limited to sites within Alberta.

Tracking down archaeological collections proved to be very challenging. Many of the sites short-listed for the present analysis pre-dated the 1973 *Historical Resources Act* in Alberta, meaning that collections were not necessarily housed at the Royal Museum of Alberta, the provincial repository for archaeological artifacts. As it turned out, some of the collections have been entirely or partially lost, misplaced, or are otherwise unavailable for physical study.

Comparative collections, contemporaneous with the Fincastle site, were first selected from within Alberta at *c*. 2500 B.P. As Fincastle is a kill site, comparative data was sought from other kill/processing sites, rather than from campsites or other site types. Short-listed Alberta projectile point collections at this time included: Happy Valley (EgPn-290); EbPi-63, a Little Bow site; and Head-Smashed-In Buffalo Jump (DkPj-1).

There were few sites in the province that date to *c*. 2500 B.P., contemporaneous with the Fincastle site. Furthermore, this challenge was compounded by the fact that the Happy Valley projectile points, also dating to *c*. 2500 B.P., could not be located for the comparative analysis. Additionally, the Head-Smashed-In projectile points from the north and south excavations conducted by Reeves (1990) are also missing. The only available comparative projectile points dating to this time comes from the recently excavated EbPi-63 (Figure 4.1).

Several later Alberta sites, dating to *c*. 1500 B.P., were also selected for study. The later sites were chosen because some of them feature projectile point assemblages with high frequencies of Knife River Flint, as well as being ‘classic’ Besant sites, such as Kenney (DkPj-1; Figure 4.1). Additional sites examined for the comparative study included (Figure 4.1): EgPn-111, Muhlbach (FbPf-1), and Smith-Swainson (FeOw-1). EgPn-111 was excavated during the 1990s. As noted above, the Kenney site is the classic Besant site in Alberta, and necessary to include in a study of Besant/Sonota. Muhlbach was chosen due to its high quantities of Knife River Flint and similar projectile point forms in comparison with Neuman’s (1975) Sonota Complex sites. Unfortunately, part of the Muhlbach site projectile point collection is missing from the Royal Alberta Museum in Edmonton, although the remainder was available for study. Smith-Swainson is a large surface collection gathered in the 1970s from near the Muhlbach site, featuring very similar projectile points, and this collection was available for study at the Royal Alberta Museum.

The Leavitt site projectile point assemblage (Figure 4.1) is a surface collection gathered near Chester, Montana in the northeastern area of the state near the Missouri River. This collection was included as it demonstrates clear technological variability between the atlatl darts and arrow points within a collection. As well, the Leavitt collection shows some shared projectile point attributes with the Fincastle site.

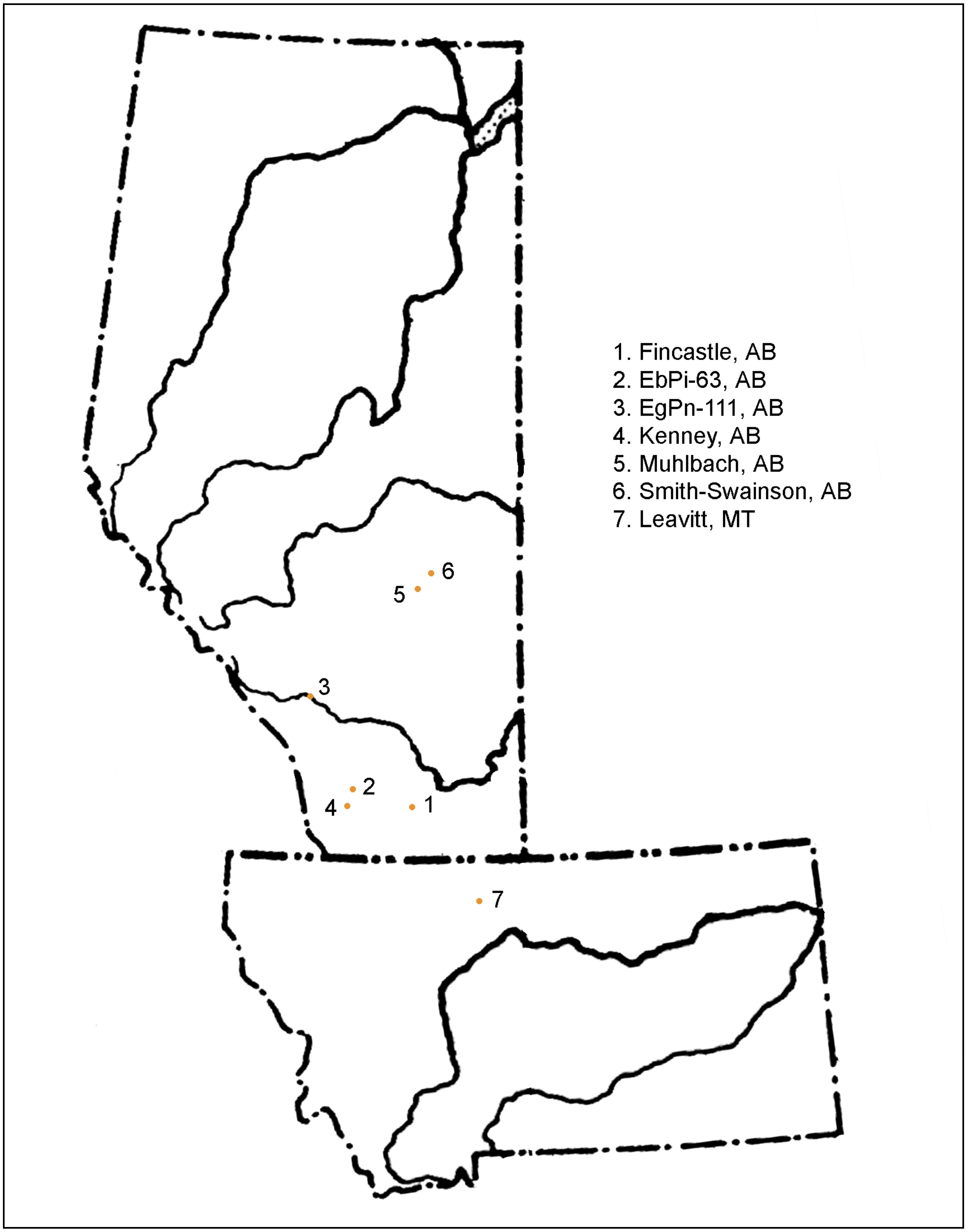

Figure 4.1. Study sites in Alberta and Montana.

In total, 7 projectile point collections were examined from Alberta and Montana. The quantitative and qualitative study results were based upon 498 complete and fragmentary projectile points. Figure 4.2 illustrates the terminology used in reference to projectile point in this study. The criteria and procedures for the analysis follows.

Metric (Quantitative) Criteria

In order to study the projectile point attributes from Fincastle and other sites in a comparative manner, metric criteria were modeled after Ramsey (1991) and Hjermstadt (1996), who had each examined one Besant/Sonota locality in Saskatchewan. Modeling the present analysis after the work done at the Melhagen site and the Fitzgerald sites was to provide a comparable body of data built upon their findings. Several attributes are standard in projectile point analyses, with the most common attributes examined being length, width, thickness and weight: these four attributes are also the minimum level of analysis required according to provincial guidelines by the Heritage Resources Management Branch, Alberta Community Development.

For the present study, 16 attributes were selected in total for the quantitative analysis. The 16 attributes include: catalogue/field number, maximum length, maximum width, maximum thickness, body length (left), body length (right), notch height (left), notch height (right), notch depth (left), notch depth (right), shoulder width, maximum base width, neck width, basal height (left), basal height (right), and weight (Figure 4.3). Lithic analysis data forms were created with the 16 attributes to facilitate the analysis. The forms were entered into a Microsoft Excel spreadsheet.

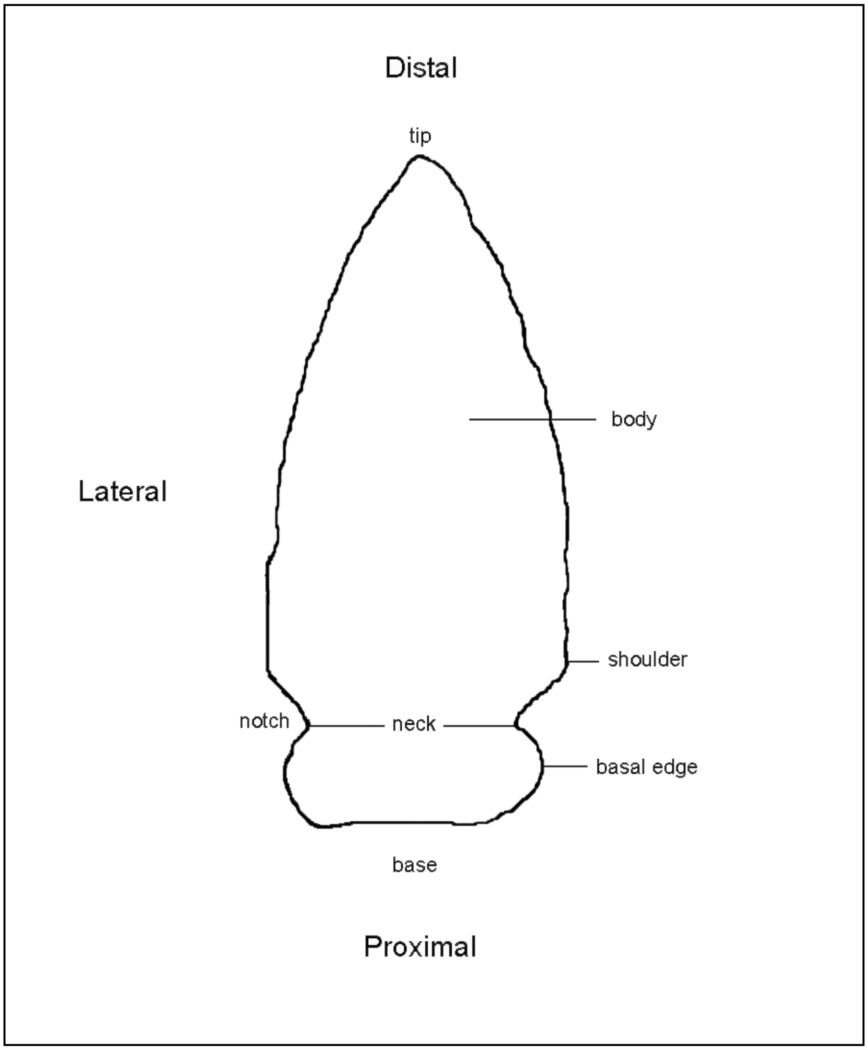

Figure 4.2. Projectile point terms.

Both incomplete and complete projectile point specimens were examined, although only complete specimens could be examined for all 16 attributes. Attributes that were missing on fragmentary projectile points were designated with a '-'. An effort was made not to overanalyze fragmentary projectile points.

All measurements are metric, and digital calipers were used to obtain measurements to the tenth of a millimetre. All weights were made using grams (g), to the tenth of a gram.

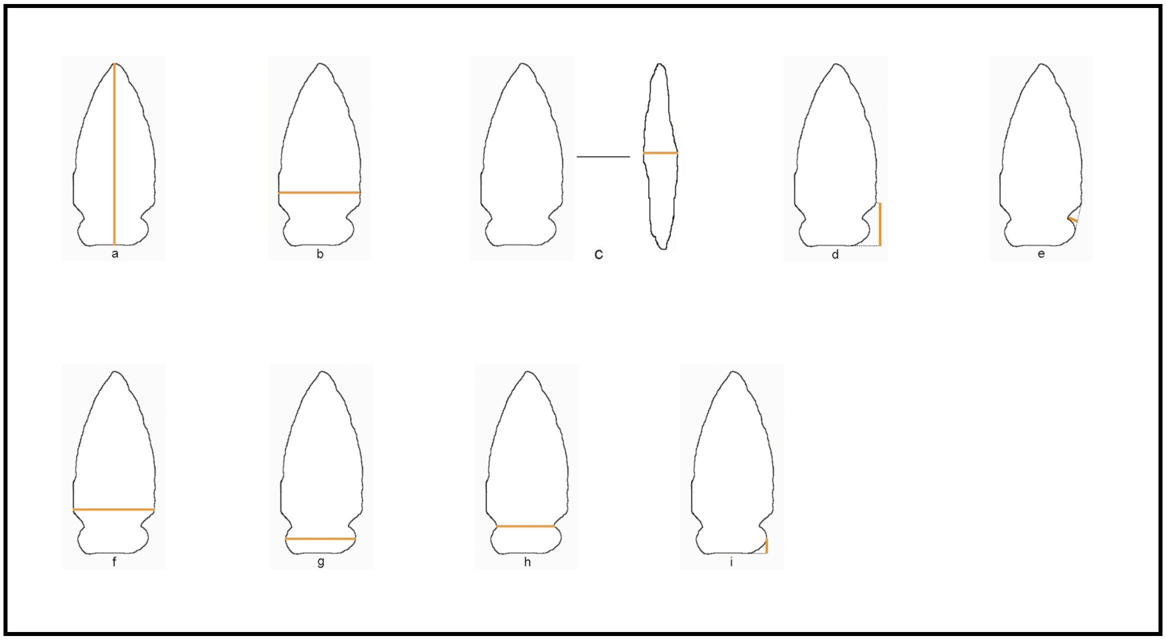

Figure 4.3. Projectile point measurements in metric analysis: a) maximum length, b) maximum width, c) maximum thickness, d) notch height, e) notch depth, f) shoulder width, g) basal width, h) neck width, and i) basal height.

Measurements were taken in two ways: the first method was to physically measure each projectile point for each attribute, while the second method involved obtaining measurements from scanned TIFF image files of the projectile points. The second method was created out of necessity, due to the time-intensive nature of conducting the projectile point analysis, and proved to be much more expedient and cost-effective when traveling to see collections. In those cases on site, only weight and thickness measurements were made, and cross-sections analyzed. Otherwise, a high quality Canon scanner with Canon PhotoStudio and Adobe Elements 4.0 software was used to scan each projectile point individually from within a site, and saved by catalogue number. In the interest of expediency, only one side of the projectile points was scanned; this was the side that did not have the catalogue number written upon the projectile point. If possible, the accompanying catalogue card with field provenience and other data was scanned alongside each projectile point. Later, each point was printed out at actual size using Microsoft Office Document Imaging software. The accuracy of this method was checked using the Fincastle site projectile points, and no distortion was evident; if any, it was less than a millimeter. Additional benefits to this second method included having an image to refer to while writing up the results, images for publication, and reduced handling of the projectile point collection. It was in fact easier and quicker to take measurements two dimensionally.

Finally, although other researchers have attempted to determine the dorsal and ventral sides of projectile points, it has also been noted that sometimes it is impossible to distinguish the dorsal and ventral faces (Ramsey 1991). Not wanting to be inconsistent or inaccurate in identifying the dorsal or ventral faces, no such efforts were made with the present analysis. One face was selected for study, and then examined along the left/right lateral margins for the 16 attributes, as outlined above. The proximal end of the projectile point was always the base; the distal end of the point is the tip, following the typical pattern of projectile point manufacture. No significant difficulties were encountered during the course of the analysis. In terms of the actual measurements, the basal height measurements were the most difficult to obtain, due to the wide variation in basal forms in the study points. Overall, the measurements are accurate, minimally to the millimetre and gram level, and offer a tangible basis from which to derive the technological functions and cultural affiliation of the projectile points in the study.

Non-metric (Qualitative) Criteria

As was the case with the metric criteria, the non-metric (qualitative) criteria were closely modeled on Ramsey (1991) and Hjermstad (1996), in the interest of creating a comparable body of data. More revisions were made here, and greater difficulties encountered in outlining the qualitative criteria for the projectile point study. This was mainly due to the different research questions being asked by Ramsey and Hjermstad, in comparison with the present study: they were interested in presenting in detail their respective projectile point assemblages from single sites, while the objective here was a comparative study that did not necessitate the inclusion of all of their attributes, and in fact required some new attributes to address the cultural affiliation question. Additionally, neither Ramsey (1991) nor Hjermstad (1996) explicitly outlined their definitions for each non-metric attribute, which posed a problem with replicating their methodology for the present study. Non-metric fields selected for study followed Ramsey (1991) and Hjermstad (1996) as closely as possible; however, Binford (1963) and Reeves' (1970) provided the basis for attribute definitions used in the present analysis. Changes from Ramsey's (1991) and Hjermstad's (1996) studies included selecting which fields to use, creating several new fields, and creating a key for coding the analysis attributes to attempt to have a comparable set of data with the quantitative attributes. Generally, the set of possible options within each variable was simplified for greater ease in comparison, a significant consideration with the hundreds of points examined in the study. The intent behind the selected set of attributes is to distinguish patterns and preferences within the projectile point assemblages.

In total, 23 attributes were selected for the qualitative analysis portion of the projectile point study. These attributes include: catalogue/field number, unit, level, inferred type, material type, part, body shape, symmetry, transverse section shape, longitudinal section shape, shoulder shape (left), shoulder shape (right), notch orientation (left), notch orientation (right), notch shape (left), notch shape (right), base type, basal edge shape (left), basal edge shape (right), retouch, utilization, quality of raw material, and quality of workmanship. Analysis data forms were prepared with the 23 fields to accompany the study, while a coding key was also used for both expediency and comparability. Once the 23 attributes and their subsequent acceptable options were worked out, there were no significant difficulties encountered in the analysis.

Twenty-three fields were selected for the qualitative study, as outlined below. Abbreviations used in reference to the non-metric attributes are summarized in Table 4.1. 'Catalogue/ field number' refers to the unique catalogue or field number assigned by the site investigator to each projectile point. 'Unit' refers to the excavation unit that the point was recovered from, and may also include location details about the excavation area within the site. 'Inferred type' is the cultural affiliation assigned by the original lithic analyst, when available: i.e., Besant, Sonota, Pelican Lake. 'Level' is the assigned level, or depth, that the projectile was recovered from. 'Material type' refers to the raw material that the projectile point was made from, and may include coding from the original analyst, as well as colour: i.e. grey siltstone (J). 'Part' refers to the completeness of the projectile point being studied, i.e. complete, body, or base. 'Body shape' refers to the lateral edges of the blade portion of the projectile point. Options include: ovate (OVT), excurvate (EXC), and triangular (TRI). Ovate describes when the lateral edges are

Table 4.1. Abbreviations used for attributes in the non-metric analysis.

Abbreviation	Term
ANG	angled
ASY	asymmetrical
BI	biconvex
CCV	concave
COR	corner
COR/SKWDST	corner notched/skewed distally
COR/SKWPRX	corner notched/skewed proximally
COR/SYM	corner notched/symmetrical
CVX	convex
CX/CV	convex/concave
DST	distal
EXC	excurvate
H	high
M	medium
OBT	obtuse
OVT	ovate
P	poor
PLCX	plano-convex
PLTR	plano-triangular
PRX	proximal
RET	retouched
RND	rounded
SKW	skewed
SIDE/SYM	side notched/symmetrical
SIDE/SKWDST	side notched/skewed distally
SIDE/SKWPRX	side notched/skewed proximally
SLASY	slightly asymmetrical
SQR	squared
STR	straight
SYM	symmetrical
TRI	triangular
Y	yes

convex, with the shoulder the widest portion. Excurvate is noted when the lateral edges are deeply convex, and the widest portion falls between the tip and the shoulder. Triangular is noted when there is a straight line from the tip to the shoulder. ‘Symmetry’ refers to the overall symmetry of the projectile point being studies: options include symmetrical (SYM), asymmetrical (ASY), and slightly asymmetrical (SLASY). ‘Tranverse section shape’ refers to the cross-section of the width of the point: options include biconvex (BI), plano-convex (PLCX), plano-triangular (PLTR), and convex/concave (CV/CX). Biconvex was noted when both faces are convex. Plano-convex was noted when one of the section faces is flat, and the other section face is convex. Plano-triangular refers to one flat face, and one triangular in section. Convex/concave refers to having a c-shaped cross section, as seen with more expedient flake points. ‘Longitudinal section shape’ refers to the cross-section lengthwise of a projectile point. The analysis options are as outlined above for tranverse section shape. Shoulder shape (left/right) refers to the angle of the lateral edge from the proximal end of the blade at the juncture, with the distal end of the notch. Analysis options include rounded (RND), angled/obtuse (ANG/OBT), angled/right (ANG/RT), and angled/acute (ANG/ACT). Rounded is selected when there is no distinct angle from the proximal blade to the distal notch juncture. The varying degrees of angle are otherwise noted: obtuse (angle greater than 90°), right (90° angle), and acute (angle smaller than 90°). ‘Notch orientation’ (left/right) notes whether the notch is on the side or corner, and whether it is oriented proximally or distally on the projectile point. Analysis options include side-notched (SIDE/) or corner-notched (COR/). Additionally, observations were made whether the notch orientation was symmetrical (/SYM), skewed proximally toward the base (/SKWPRX), or skewed distally toward the tip (/SKWDST). 'Notch shape' (left/right) refers to the following shapes: squared (SQR), rounded (RND), and angled (ANG). 'Base type' refers to the shape of the basal edge. Options included straight (STR), convex (CVX), or concave (CCV). 'Basal edge shape' (left/right) refers to the lateral edges of the projectile point above the basal edge, and beneath the notches. Analysis options included angled (ANG), rounded (RND), squared (SQ), squared/contracting (SQ/CON), and squared/expanding (SQ/EXP). Squared contracting refers to a narrower basal edge in comparison with the distal portion of the squared basal edge. Squared expanding refers to a broader basal edge in comparison with the distal portion of the squared basal edge. 'Retouched' was noted when the projectile point had been resharpened and reworked. 'Utilized' was noted when projectile points had been used for other purposes, such as cutting. 'Quality of raw material' refers to the ease of working the raw material in producing chipped stone tools, and reflects the degree of microcrystalline structure in the stone. Heat-treated Knife River Flint was considered a high quality raw material, while coarse quartzite was considered a poor quality raw material. Analysis options included high (H), medium (M), and poor (P). 'Quality of workmanship' refers to the to degree of workmanship on the projectile point. Bifacially worked projectile points that were symmetrical and obviously produced with skill were considered high quality. Expedient, unificially worked points that were worked only along the lateral margins were considered poor quality. Analysis options included high (H), medium (M), and poor (P).

It is in the nature of qualitative analyses to be more subjective and have greater risks of bias per analyst; there is bias in quantitative studies as well, but it is more implicit rather than overt, in the selection of attributes for study. It is intended that by outlining the definitions for each attribute for the qualitative analysis that it would be possible for other researchers to replicate both the metric and non-metric components of the present study.

As described with the metric analysis, the analysis occurred by using one of the following two options by: 1) physically examining each point and assessing each attribute; or 2) examining the hard copy of the TIFF file (actual size) for each projectile point. As was the case with the metric study, benefits of the second method included having a permanent record with which to double check the original assessment, as well as creating images for publication. When the second method was used, three-dimensional attributes were recorded through the physical examination of the actual collection, including tranverse section shape and longitudinal section shape. It was also easier to assess the quality of raw material and quality of workmanship attributes when physically viewing the collection. Overall, the second method was far more expedient and practical when traveling to view multiple collections. The accuracy of the second method was checked against the Fincastle site collection before using it to examine other collections.

Projectile Point Life Cycle

Artifacts have a life cycle from their intial manufacture, through use, reworking and discard: projectile points are a good example of this. Projectile points are manufactured according to a mental template, or an ideal type, by flintknappers. This mental template can reflect technological choices, ideas held by the flintknapper, and cultural affiliation. Once the point is produced, it is then hafted to an atlatl dart or arrow shaft and used in a hunt. Occasionally projectile points are lost in the kill, and never recovered by the hunters. Often projectile points are recovered and saved for future hunts; the points may have remained intact or sustained damage during the kill. Some scholars argue that the hunters only rarely collected their points after a kill. Projectile points may be saved for reworking for a future hunt, or repurposed at the kill as knives, awls, or other tools. If the projectile point is reworked, it finally reaches a stage when there is no longer enough material to be worked; they can no longer be resharpened, and are ultimately discarded. This processes is by no means unique to Fincastle or the study sites, and has been well documented by other researchers in the literature (Andrefsky 1998; Dibble 1988; Duke 1991; Hughes 1981; Kooyman 2000; Reeves 1983a).

The reworking of projectile points has obvious implications when making typologies that are integrated into culture histories (Duke 1991; Hughes 1981; Zeier 1983). Inadvertently, typologies could be made that reflect the stage in an artifact's lifecycle, rather than a specific projectile point form. Certain attributes, like length and body shape, change with reworking. Other attributes, such as projectile point notches and basal edges, will essentially stay the same. Projectile point reworking needs to be taken into account when examining points for the purpose of assigning a specific cultural affiliation.

A method to work towards an interpretation, acknowledging the changes that occur to a projectile point from its original creation to its final discard, is to consider the entire assemblage, accompanying absolute dates in stratigraphic context, as well as the geographic distribution of the projectile points. Most significantly, an assemblage of projectile points must be recovered from within the same stratigraphic context and radiocarbon date when making cultural affiliation assignments—the projectile point assemblage must be considered as a whole, not on the basis of a single specimen. Projectile points even within the same time period and stratigraphic context may show great diversity, and this may be the case of one specimen being substantially reworked, while another is at a relatively early stage in its life cycle. It is urged that extreme caution is used when determining the cultural affiliation of an archaeological site on the basis of one or two projectile points. Defining cultural affiliation on the basis of a single specimen may lead to some erroneous conclusions; any such interpretations should be viewed with great caution. Projectile points must first be identified to a type, which requires an assemblage of points. Once an assemblage of projectile points has been classified into a typology, then the assemblage can be further examined, in context with its temporal association with other contemporaneous sites, and then assigned to an archaeological culture. It is difficult to reliably type a single projectile point to an archaeological phase or complex.

Archaeological sites with larger points samples from a discrete stratum with dates are the only reliable way to use projectile points in a typology when constructing culture history and sequences on the Plains. Samples greater than 10 projectile points from a single stratum and context begin to provide a more reliable assessment of cultural affiliation, although the greater the number of projectile points, the stronger the resulting interpretations are, taking into account the variability produced through reworking. For example, the 75 projectile points recovered from the single component Fincastle site offer a large number of points suitable for assessing cultural affiliation. Kill sites tend to offer the highest number of projectile points, in comparison to other site types, such as camp sites.

Technology

A significant issue in the examination of the Fincastle site assemblage, along with the archaeological sites selected for the comparative study, is that of projectile point technology. A study based upon projectile point teypology would be remiss in not discussing technology, as relevant to framing Plains culture history. It was clear from the initial examination of the Fincastle site projectile point assemblage that there was a significant range of variation. The single component archaeological site included a large assemblage of projectile points (n=75) with diverse forms that need to be accounted for. During the course of the projectile point analysis, it became evident that part of the variation was due to technological differences within the assemblage.

As outlined earlier, Plains prehistory is organized into three periods, reflecting the dominant weapon technology in use. The Early Prehistoric Period was named for the spear technology, the Middle Prehistoric Period for the atlatl, and the Late Prehistoric Period for the bow and arrow. At the Fincastle site, during the late Middle Prehistoric Period when the atlatl was the dominant technology in use, both large atlatl darts and either smaller darts or arrow points were present in the projectile point assemblage. Ramsey's (1991) analysis of Melhagen site projectile point assemblage identified technological variation in the assemblage, rather than drawing out cultural affiliation. In her study, she identified darts and arrows, as well as knives, through her statistical analysis (Ramsey 1991).

Thomas' (1978) study involving ethnographic projectile point collections indicated that arrows and atlatls could be distinguished on the basis of their neck widths and weights. Five attributes were examined in Thomas' statistical analysis, including length, width, thickness, neck width, and weight. Thomas' (1978:469) means from the arrows (n=132) were: length=31.1 mm, width=14.7 mm, thickness= 4.0 mm, neck width=10.0, and weight=2.07 g. Thomas' analysis of darts, admittedly a smaller sample, indicated the following means: length=46.2 mm, width=22.9 mm, thickness=4.9 mm, neck width=13.7 mm, and weight=4.38 g (Thomas 1978:469). Thomas (1978:470) also noted in a discriminant function analysis of his arrow and dart data that body width was the most important attribute in distinguishing arrows and atlatls, while length was the least significant. This also serves to minimize the difficulties due to projectile point reworking, as length is the most changeable attribute, while body width and neck width remain relatively constant (Thomas 1978). Building upon this work with a larger sample of darts and a variety of statistical tests, Shott (1997:99) notes that "shoulder width alone yields results as satisfactory as any multiple-variable model" when distinguishing arrows and darts. In Shott's (1997:91) study, the mean shoulder width of the arrows (n=132) was 14.7 mm, while the mean shoulder width of the darts (n=39) was 23.1 mm. In both Thomas' (1978) and Shott's (1997) studies, the difference between the means of the arrows and the means of the darts were 8 and 10 mm. The average means for darts and arrows needs to be assessed within an archaeological collection.

Christenson's (1986) study on projectile point size and aerodynamics noted that it was difficult to reliably distinguish atlatl darts from knives within an assemblage of projectile points. Following Thomas (1978), he examined projectile points from surface collections in the Sangamon River Valley, Illinois. Christenson (1986:113) found that the mean weight of projectile points from the Sangamon River Valley during the Early and Middle Woodland was 10.6 g (n=38), while the mean of the neck widths of projectile points was 18.3 mm (n=89). In comparison, Late Woodland/Mississippian projectile points from the Sangamon Valley had a mean weight of 1.9 g (n=48), and mean neck width of 9.6 mm (n=38). Christenson (1986:114) noted that weight alone cannot be used to identify arrows versus darts within an assemblage, but that darts tend to be heavier than arrows. Christenson's (1986) study shows that attributes such as weight and neck width vary through time, and that the relationship between these two variables is culturally and temporally specific. There is no universal weight or neck width cut off in distinguishing an arrow from a dart. Determinations between these two kinds of technology must be examined within a single site assemblage and time period.

Bradbury (1997) reviews the origin of the bow and arrow in the Eastern Woodlands, and there are several key points from this work that are relevant to the present study. In an overview of the adoption of the bow and arrow in the Eastern Woodland, Bradbury notes that there is a debate among researchers about the timing of its appearance. Researchers such as Christensen (1986:121) hypothesize a late adoption of the bow and arrow after *c.* 1500 B.P., and a quick replacement of the atlatl dart, while a second hypothesis advocates an earlier introduction during the late Archaic Period after 3500 B.P. (Bradbury 1997:227). Relevant to the present study, Bradbury (1997) summarized Christenson's (1986) review of the advantages of each technology. Advantages of the bow are:

> 1) an arrow is more accurate than a dart because of its higher velocity and because it can be back sighted; 2) an arrow has a longer effective range

> than a dart; 3) a bow and arrow are easier to use than an atlatl and dart in wooded areas or cramped situations; 4) an archer can carry a larger supply of projectiles than can a person using an atlatl and can fire more projectiles at a rapid rate; 5) arrow points are easier to make and require less raw material than dart points; 6) arrow shafts use less material and may be easier to make than dart shafts; 7) a bow and arrow is easier to master than an atlatl and dart; and 8) the use of a bow and arrow requires no violent movement on the part of the user. The advantages of the atlatl are that: 1) the atlatl requires only one hand for use; 2) an atlatl is easier to manufacture and maintain than a bow; and 3) a dart has a higher impact force than an arrow (Bradbury 1997:210).

Significantly, Bradbury (1997) notes that the two kinds of technologies may be used contemporaneously within the same toolkit. In the Eastern Woodlands, Bradbury (1997:224) notes that his research supports an Archaic date at *c*. 3500 B.P. for the initial adoption of bow and arrow technology, and points out that research by Odell (1988) showed the use of retouched flakes as arrows during this early time, with bificially worked arrows appearing later in prehistory. Finally, Bradbury (1997) observes that the early use of bow and arrow does not mean that they quickly replaced the preceding atlatl technology; instead, they were used concurrently for a period of time.

In a recent study, primarily focused upon projectile points recovered from the Late Prehistoric Period at Head-Smashed-In Buffalo Jump, Dawe (1997) interprets some of the non-bificially worked, asymmetrical flake points as toys. Citing ethnographic accounts from across North America, documenting the use of smaller bows by children, Dawe (1997) argues that the small, less well-made projectile points represent archaeological toys. Dawe (1997:316) remarks: "Tiny, poorly made projectile points are relatively common in prehistoric Plains assemblages. The morphology of these small points is often the result of selecting a flake blank from which a desired form can readily be achieved with a little marginal, often only unifacial, retouch." Additionally, small points are singled out and identified in comparison to the overall assemblage; this example is extended into the late Middle Prehistoric Period with projectile points from the Muhlbach site. Dawe makes several assumptions in his study: 1) that smaller bows mean smaller arrows; and 2) that the parallel from the ethnographic period can be applied to the Late Prehistoric Period, and earlier. The arrows appear to be functional, and this application of the idea of play and toy manufacture is a construct of modern lifeways, and may not be applicable to the prehistoric lifeways of hunter-gatherer groups.

Dawe (1997:316) warns against making determinations of ethnicity and culture histories based on metric analysis, recommending that small and expedient points be excluded from statistical analyses. However, making this kind of division also increases bias, excluding what is often more than one or two poorly made projectile points in an assemblage, skewing interpretations in favour of the bifacially worked tools. Interpreting smaller, expedient projectile points in late Middle Prehistoric sites as toys excludes their possible interpretation as efforts toward arrow manufacture. Poorly made projectile points may reflect an emerging technology. The combination of well made projectile points and more expedient forms is a phenomenon seen at archaeological sites across the Plains. As remarked by Christenson (1986) and Bradbury (1997), arrows can be produced much more quickly and expediently. If the expedient forms can function as effectively as well made arrows, with limited raw materials, it is possible that flintknappers wouldn't spend much time on their workmanship if it was not necessary.

Gregg and Picha (1989:43) observed that Sonota Complex projectile points included the Besant side notched projectile point and the smaller Samantha side notched point, used as smaller and lighter projectiles (Christenson 1986:121). These projectile point types were used concurrently during the late Middle Prehistoric Period and the Early and Middle Woodland Period at Sonota Complex sites. The co-occurrence of dart and arrow points is also seen at archaeological sites on Alberta's Northwestern Plains.

It is necessary to include the more expedient forms of projectile points in the present analysis. Omitting these expedient forms, well represented in several of the study sites, would introduce a greater amount of bias than excluding them, particularly since they may represent emergent arrow technology. At the Fincastle site, and other sites used in the comparative study at *c*. 2500 – 1250 B.P., dart and arrow points are frequently coeval in archaeological assemblages, and need to be taken into account when assessing the technology and cultural affiliation of an archaeological site.

Knife River Flint

Knife River Flint is a distinctive raw material, recognized as a dark brown, translucent material that often contains small inclusions. This raw material is nearly as distinctive as obsidian, and prized for the fine microcrystalline structure that made it very suitable for knapping tools such as projectile points and scrapers. Due to the fact that the majority of the Fincastle site projectile points are made of Knife River Flint, a brief discussion of this raw material and its origin is needed.

Knife River Flint quarries have been located in Dunn and Mercer Counties, North Dakota; the quarry depressions were often 20 feet in diameter and up to 4 feet in depth (Clayton *et al.* 1970; Gregg 1987). Prehistoric peoples for over 12000 years have been utilizing these quarries for raw materials for flintknapping (Gregg 1987). Artifacts made from Knife River Flint have been found far from the quarries themselves, including archaeological sites in Alberta, Missouri and Ohio (Clayton *et al.* 1970).

Occurring in secondary deposits of silicified lignite from the Golden Valley Formation, from an Eocene age sedimentary bedrock, Knife River Flint has a unique petrography as seen under a polarizing microscope: bedding planes are made from plant detritus, giving the Knife River Flint its dark brown colour (Clayton *et al.* 1970; Gregg 1987). Another characteristic includes irregular parallel layers. Clayton *et al.* (1970) observed that other siliceous materials can be mistaken for Knife River Flint, including Miocene flint, petrified wood, Arenaceous chert, chert in drift, natural brick, and Rocky Mountain gravel. The only way to identify Knife River Flint with greater certainty would be through chemical analysis, but its chemical signature has not been determined yet. There are two reasons why this kind of analysis on Knife River Flint samples has not taken place. The first reason is that the quarries in Dunn and Mercer counties are not the primary bedrock source of Knife River Flint, but secondary deposits instead; no parent bedrock source for Knife River Flint has been identified. The Knife River Flint quarries in North Dakota are secondary deposits of silicified lignite, the parent source is believed to have eroded away. A second reason is that it is believed that Knife River Flint would not have a distinctive chemical signature to distinguish it from other similar chalcedonies and cherts. There is need for further research in identifying Knife River Flint with greater certainty.

Furthermore, Gregg (1987) noted that Knife River Flint is also available further east and south than the North Dakota quarries, in cobbles moved by glacial and alluvial action along the James and Sheyenne Rivers. He offers a method for distinguishing locally collected versus non-local Knife River Flint through the identification of attributes on the cortex (local tends to be water-worn and smooth), and the frequency of cortical fragments in a lithic assemblage. However, the method Gregg proposes to distinguish the two types of Knife River Flint is problematic. At many sites, such as kill sites, the entire lithic reduction sequence is not part of the archaeological record at that locale. The resulting assemblage is therefore unlikely to contain cortical fragments from early in the reduction sequence. Also, the cortex may have been subjected to different types of weathering and abrasion, meaning a cobble of Knife River Flint in the James River may have a cortex distinct from a cobble collected at the Sheyenne River. Knife River Flint cobbles from different alluvial settings and at the primary North Dakota quarries likely came from the same parent bedrock, so there may be no satisfactory way to distinguish between local and non-local Knife River Flint.

Heat Treatment

Johnson (1980) conducted a series of experiments to test the benefits of thermally altering chalcedony to enhance its workability for flintknapping. Johnson noted that there has been considerable effort since the early 1960s to study the heating of lithic raw materials by prehistoric peoples. It is agreed that heating raw materials makes the stone easier to work, due to the fact that heating a raw material creates a more consistent molecular structure. Based on his experiements, Johnson concluded that the range of 260°C to (preferably) 315°C was sufficient to improve the chalcedony, and made it easier to work. Temperatures in excess of 315°C caused the chalcedony to explode. He also noted that it was not necessary to sustain the chalcedony at 315°C for any length of time.

In his study area of the Great Sand Hills in Saskatchewan, Johnson did not observed any evidence for hearths used to heat-treat lithic raw materials. One consideration here is that the archaeological visibility of a hearth fire for altering chalcedony would be difficult to distinguish from any other type of hearth, or may have occurred at a hearth also used for other purposes. Presumably, the heated chalcedony would have been removed and worked, possibly elsewhere, leaving no unique evidence for heat altering, aside from a hearth. Moreover, the preservation and detection of hearths on the Plains is limited. Hearths are found rarely in archaeological contexts as they are ephemeral, thin features that may represent a single use, with low archaeological visibility, and factors such as wind erosion and reuse of hearth stones into other features may impede hearth preservation. The best way to find evidence of thermally altered chalcedony would be to study the lustre and minerology of the lithic material in question, including considerations of how brittle it is in comparison to the material in its unaltered state. Examining the lithic assemblage from the Fincastle site for thermally altered material may provide insight into techniques used by prehistoric hunters in manufacturing stone tools.

Trade

Clark (1984) examined the presence of stone tools made from Knife River Flint in archaeological sites that were part of the Hopewellian Interaction Sphere. Artifacts produced from this raw material type have been found in Hopewellian sites at Wisconsin burials. In this setting, Knife River Flint was an exotic trade good. Several prehistoric cultures existed between the Knife River Flint quarries in North Dakota and Wisconsin during the Middle Woodland. One of these groups was identified as the Sonota Complex, characterized by mound burials and bison kills (Neuman 1975). Sonota sites have been found in North and South Dakota, as well as in Canada according to Clark, where Knife River Flint has been found to dominate lithic assemblages by at least 80%. Clark applies trade models created by Colin Renfrew in order to describe the movement of Knife River Flint from North Dakota. In the 'Down the Line Trade Model,' the frequency of a trade item will decrease with distance. The 'Directional Trade Model' features targeted distribution to distant sites, excluding local sites. Renfrew posited in his 'Prestige Chain Exchange Model' that trade goods were targeted to status individuals in a group, who may then pass the object on through ceremony to another status individual further away. Hopewellian sites fall under the 'Prestige Chain Exchange,' with unmodified items appearing exclusively in burials.

Knife River Flint was sought after by prehistoric groups for its utilitarian and ideological qualities. Hopewellian groups quarried or traded for Knife River Flint for ceremonial use, while Sonota groups used Knife River Flint for utilitarian purposes and may have used it for ceremonial purposes as well. Sonota may have held an ideological value in Knife River Flint. One significant problem with the application of Renfrew's trade models by Johnson (1980) in the context of the Northeastern Plains region is that the models used were not intended to describe prehistoric exchange among mainly band-level societies in the Plains and Eastern Woodlands, but rather for trade among ancient state-level cultures in the Mediterranean. Despite this caveat, determining the source of all raw materials within a site's assemblage, whether local or exotic, does provide insight into trade networks and social arrangements. Projectile points and scrapers are utilitarian items essential to all bison hunters, including Besant and Sonota; high quality material was certainly a prized trade item. Perhaps more suitable criteria to assess trade activities would be examining which items within a lithic assemblage are made from exotic materials, such as certain tools, when compared to the total assemblage including debitage, or the curation of the overall toolkit. At the Fincastle site, the high quantities of Knife River Flint are due to either extensive trade networks, or an intrusion of people in the Northwestern Plains from the North Dakota area.

Results

Findings from the projectile point study at the Fincastle site are presented below. Comparative projectile point data is presented from the three seasons' work at Fincastle (DlOx-5), as well as EbPi-63, EgPn-111, Kenney (DjPk-1), Muhlbach (FfPb-1), Smith-Swainson (FeOw-1), and Leavitt. The results are presented by site, including accompanying figures of the projectile points, with tables of the metric and non-metric data with each summary. For the Fincastle site, the assemblage was subdivided by field seasons as the excavations are ongoing, and a detailed analysis of the stratigraphical context of the lithic assemblage is pending.

Fincastle site (DlOx-5)

Archaeological investigations were conducted at the Fincastle site, Alberta in 2003, 2004, and 2006. The projectile points from the Fincastle site were recovered from a single stratum. Survey and excavation over three seasons yielded a total of 75 fragmentary and complete projectile points: 2003 (Figure 4.4; Tables 4.2a, 4.2b, 4.3a, 4.3b, 4.3c), 2004 (Figures 4.5a, 4.5b; Tables 4.4a, 4.4b, 4.5a, 4.5b, 4.5c), and 2006 (Figures 4.6a, 4.6b; Tables 4.7a, 4.7b, 4.7c). Of the 75 projectile points and fragments recovered, 28 were complete. Many of the projectile points feature impact fractures, with tips missing, or only projectile point body portions. The mean for the shoulder widths is 20.2 mm (n=45), ranging from 14.5 mm to 26.9 mm. The mean for the neck widths is 14.3 mm (n=45), ranging from 7.2 mm to 18.7 mm.

Raw materials represented in the Fincastle sample included Knife River Flint (n=62), porcellainite (n=1), siltstone (n=1), chert (n=6), silicified mudstone (n=2), chalcedony (n=1), obsidian (n=1), and quartzite (n=1). Body shapes were ovate (n=37), straight (n=1) and triangular (n=4). Basal edge forms were straight (n=34), convex (n=6), and concave (n=6). Left shoulder shapes were angular-obtuse (n=35), angular-right (n=3) and round (n=6). Right shoulder shapes were angular-obtuse (n=39), angular-right (n=3) and round (n=2). Left notch shapes were rounded (n=16), angled (n=12), and square (n=16). Right notch shapes were rounded (n=24), angled (n=8), and square (n=9). Left notch orientations were side-symmetrical (n=11), side-skewed proximally (n=3), side-skewed distally (n=1), corner-symmetrical (n=19), corner-skewed proximally (n=), and corner-skewed distally (n=1). Right notch orientation were side-symmetrical (n=12), side-skewed proximally (n=5), corner-symmetrical (n=16), corner-skewed proximally (n=7), and corner-skewed distally (n=1).

Overall, the projectile points from Fincastle represent an atlatl dart technology, as well as a few arrow points. Projectile points tend to be straight-based with elongated ovate bodies. The shoulders are usually slightly wider than the bases, and therefore classified as corner notched. The notching on the points tends to be symmetrical, with a tendency to be skewed proximally. Notch shapes are usually rounded or squared. There is a heavy reliance on Knife River Flint within the projectile point assemblage, representing a total of 83% of the points. No Pelican Lake points were recovered (corner notched points with acute shoulders).

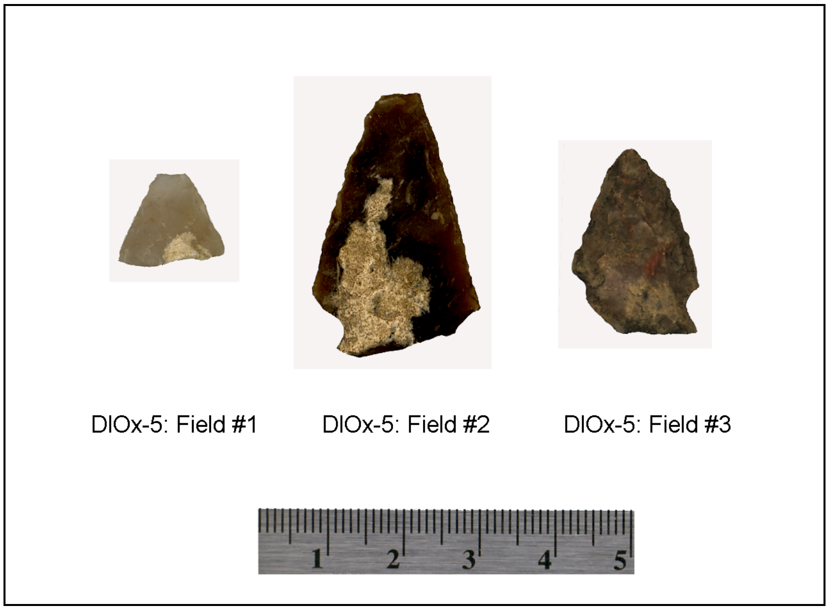

Figure 4.4. Projectile points, Fincastle site 2003 (DlOx-5), AB.

Table 4.2a. Fincastle site (DlOx-5) 2003, AB: Metric Data.

Field No.	Max. Length	Max. Width	Max. Thick	Body Length Left	Body Length Right	Notch Height Left	Notch Height Right
1	-	-	5.7	-	-	-	-
2	-	22.3	3.8	-	-	-	-
3	25.4	16.7	3.9	18.8	20.8	-	5.9

Table 4.2b. Fincastle site (DlOx-5) 2003, AB: Metric Data.

Field No.	Notch Depth Left	Notch Depth Right	Shoulder Width	Max. Base Width	Neck Width	Basal Height Left	Basal Height Right	Wgt (g)
1	-	-	-	-	-	-	-	0.9
2	-	-	22.3	-	-	-	-	3.3
3	-	1.5	16.7	-	13.8	-	-	1.6

Table 4.3a. Fincastle site (DlOx-5) 2003, AB: Non-metric Data.

Field No.	Unit	Level	Inferred Type	Material Type	Part	Body Shape	Symmetry
1	17	surface	-	chalcedony	body	-	-
2	18	surface	Sonota	KRF	body	TRI	-
3	118	surface	Sonota	chert	1/3 base missing	OVT	SLASY

Table 4.3b. Fincastle site (DlOx-5) 2003, AB: Non-metric Data.

Field No.	Tranverse Sec. Shape	Longitudinal Sec. Shape	Left Shoulder Shape	Right Shoulder Shape	Left Notch Orient.	Right Notch Orient.
1	-	-	-	-	-	-
2	PLTR	CX/CV	ANG/OBT	ANG/OBT	-	-
3	PLTR	CX/CV	-	ANG/OBT	-	SIDE/ SKWPRX

Table 4.3c. Fincastle site (DlOx-5) 2003, AB: Non-metric Data.

Field No.	Left Notch Shape	Right Notch Shape	Base Type	Left Basal Edge Shape	Right Basal Edge Shape	Ret.	Util.	Qual. of Raw Material	Qual. of Work.
1	-	-	-	-	-	-	-	H	H
2	-	-	-	ANG	-	Y	-	H	M
3	-	RND	STR	-	ANG	-	-	M	P

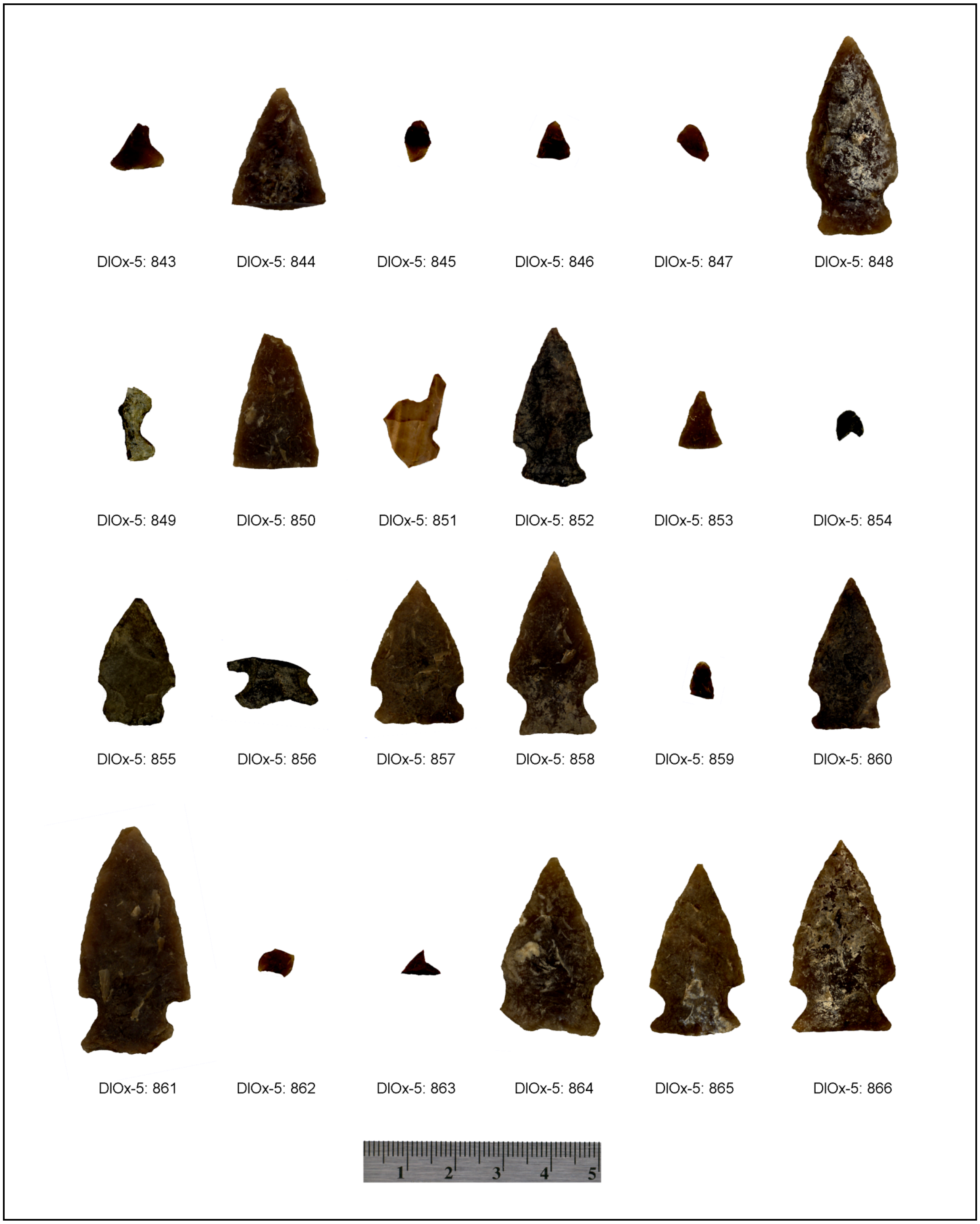

Figure 4.5a. Projectile points, Fincastle site 2004 (DlOx-5), AB.

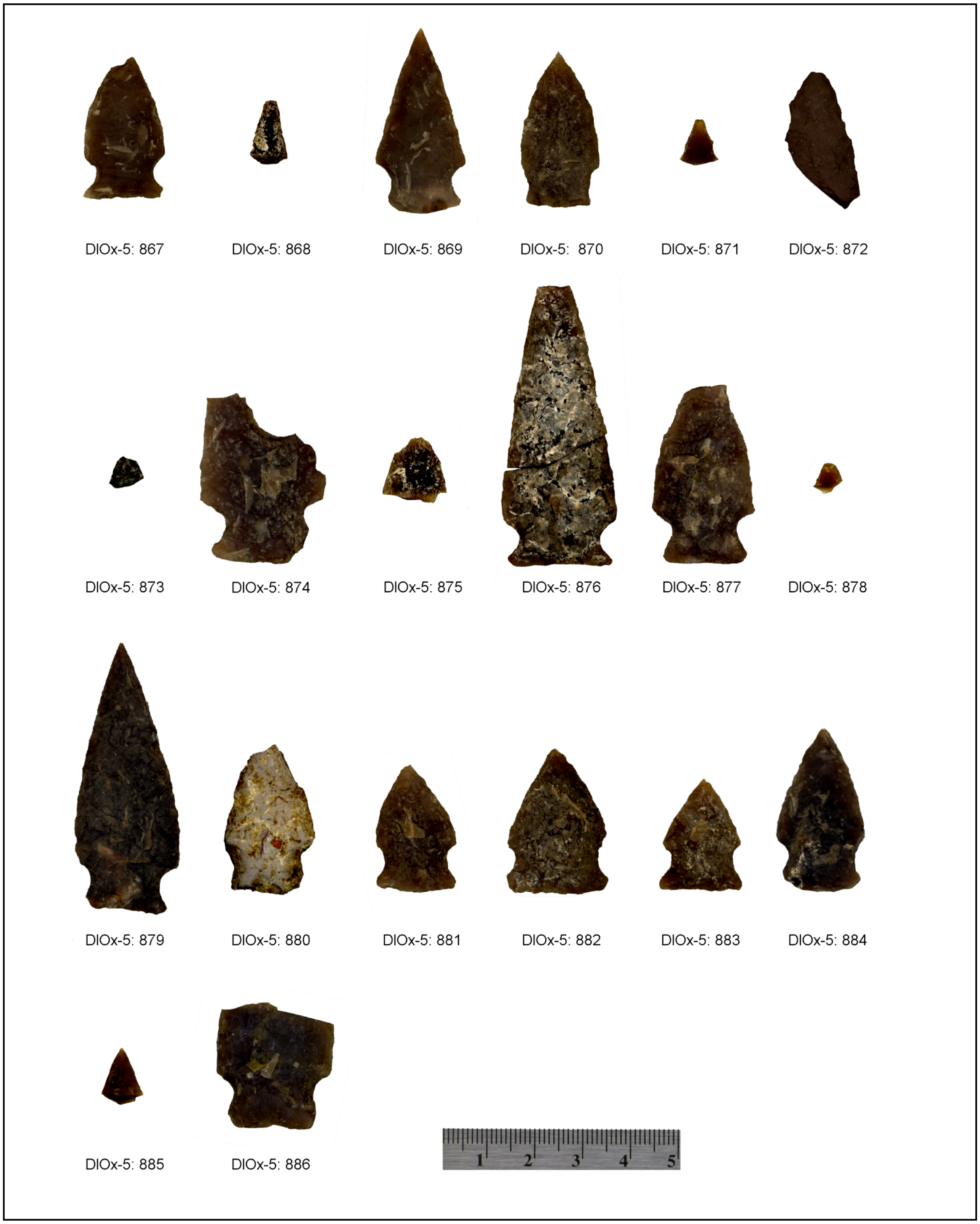

Figure 4.5b. Projectile points, Fincastle site 2004 (DlOx-5), AB.

Table 4.4a. Fincastle site (DlOx-5) 2004, AB: Metric Data.

Cat. No.	Max. Length	Max. Width	Max. Thick	Body Length Left	Body Length Right	Notch Height Left	Notch Height Right
843	-	-	3.9	-	-	-	-
844	-	-	4.6	-	-	-	-
845	-	-	3.1	-	-	-	-
846	-	-	2.9	-	-	-	-
847	-	-	3.2	-	-	-	-
848	42.2	19.8	5.8	31.4	32.2	12.5	12.0
849	-	-	3.1	-	-	-	-
850	-	-	4.2	-	-	-	-
851	-	14.5	4.0	-	-	10.2	-
852	33.9	17.5	4.4	25.6	23.1	9.1	10.9
853	-	-	3.2	-	-	-	-
854	-	-	1.9	-	-	-	-
855	26.7	16.5	4.3	19.2	18.5	9.3	9.3
856	-	17.8	4.0	-	-	-	8.3
857	30.1	20.0	5.7	22.3	21.9	8.1	9.1
858	39.0	20.0	4.3	28.2	27.6	11.4	11.2
859	-	-	2.4	-	-	-	-
860	31.8	17.6	4.9	23.1	23.3	9.2	9.9
861	48.2	24.0	4.8	37.4	37.2	11.7	12.1
862	-	-	3.3	-	-	-	-
863	-	-	1.8	-	-	-	-
864	37.8	22.4	6.8	24.9	23.7	13.7	13.1
865	36.4	20.6	4.9	26.4	26.8	10.5	11.7
866	40.3	22.7	6.0	31.9	28.9	10.4	11.4
867	30.1	17.7	5.5	21.8	19.1	9.2	8.5
868	-	-	3.4	-	-	-	-
869	38.9	19.5	5.9	30.5	30.1	10.7	11.4
870	33.4	17.2	5.2	25.5	26.2	7.7	8.9
871	-	-	3.6	-	-	-	-
872	-	-	5.5	27.5	-	-	-
873	-	-	2.7	-	-	-	-
874	-	26.9	6.1	-	-	13.7	12.7
875	-	-	4.0	-	-	-	-
876	58.7	24.6	7.0	50.0	50.2	9.7	10.1

Cat. No.	Max. Length	Max. Width	Max. Thick	Body Length Left	Body Length Right	Notch Height Left	Notch Height Right
877	38.2	22.8	6.6	-	-	11.2	11.7
878	-	-	2.6	-	-	-	-
879	57.5	22.9	7.2	47.6	49.4	13.1	10.0
880	31.7	19.7	7.1	-	-	12.8	9.7
881	27.2	17.3	5.5	18.7	19.4	10.2	10.3
882	30.5	21.9	6.4	23.0	21.8	11.6	13.2
883	23.8	18.1	5.2	16.6	16.7	10.1	9.8
884	34.4	18.9	4.8	24.9	25.3	12.1	10.8
885	-	-	3.3	-	-	-	-
886	25.1	24.7	7.0	-	-	11.9	11.7

Table 4.4b. Fincastle site (DlOx-5) 2004, AB: Metric Data.

Cat. No.	Notch Depth Left	Notch Depth Right	Shoulder Width	Max. Base Width	Neck Width	Basal Height Left	Basal Height Right	Wgt (g)
843	-	-	-	-	-	-	-	0.3
844	-	-	-	-	-	-	-	2.1
845	-	-	-	-	-	-	-	0.1
846	-	-	-	-	-	-	-	0.1
847	-	-	-	-	-	-	-	0.1
848	2.2	1.6	19.8	16.1	13.4	5.3	3.3	4.7
849	-	-	-	-	-	-	-	0.2
850	-	-	-	-	-	-	-	2.2
851	2.8	-	14.5	-	7.2	-	-	0.8
852	2.0	2.7	17.5	14.5	11.3	2.5	2.5	2.4
853	-	-	-	-	-	-	-	0.3
854	-	-	-	-	-	-	-	0.1
855	1.2	1.3	16.5	13.1	11.9	4.2	3.2	1.6
856	-	4.0	-	17.8	12.5	1.9	3.1	0.9
857	2.2	1.5	20.0	19.2	15.9	2.3	4.1	3.2
858	2.7	2.9	20.0	16.9	12.6	0.5	2.0	3.1
859	-	-	-	-	-	-	-	0.1
860	1.8	2.0	17.6	14.7	12.3	0.5	2.5	2.4
861	3.2	3.6	24.0	20.0	15.0	5.6	2.2	5.4
862	-	-	-	-	-	-	-	0.1
863	-	-	-	-	-	-	-	0.1
864	-	2.1	22.4	21.6	18.7	-	3.7	5.2
865	3.0	3.2	20.6	19.7	13.9	2.5	3.5	3.3
866	3.6	3.5	22.7	21.4	14.7	1.5	1.3	5.0
867	2.2	2.6	17.6	17.7	12.7	2.6	0.9	2.9
868	-	-	-	-	-	-	-	0.3
869	2.1	1.7	19.5	15.8	13.1	3.2	4.7	3.5
870	1.1	1.1	17.2	14.7	13.6	1.3	1.3	3.0
871	-	-	-	-	-	-	-	0.1
872	-	-	-	-	-	-	-	2.1
873	-	-	-	-	-	-	-	0.1
874	-	4.2	26.9	17.7	17.3	-	2.8	5.7
875	-	-	-	-	-	-	-	0.7

Cat. No.	Notch Depth Left	Notch Depth Right	Shoulder Width	Max. Base Width	Neck Width	Basal Height Left	Basal Height Right	Wgt (g)
876	2.5	2.9	24.6	22.5	17.6	2.0	1.4	9.5
877	3.2	2.9	22.8	18.8	14.6	2.6	2.7	5.6
878	-	-	-	-	-	-	-	0.1
879	-	3.1	22.9	18.2	15.3	-	1.9	8.4
880	1.5	1.2	19.7	15.0	14.6	5.0	1.4	3.4
881	2.0	1.7	17.2	17.3	13.4	1.9	2.5	2.4
882	1.6	2.2	21.4	21.9	17.9	4.8	3.8	3.8
883	1.8	2.3	16.9	18.1	13.3	1.8	1.9	1.9
884	1.4	1.9	18.9	16.8	14.2	3.4	4.3	3.0
885	-	-	-	-	-	-	-	0.2
886	2.3	1.9	24.7	18.9	17.2	3.7	3.2	4.9

Table 4.5a. Fincastle site (DlOx-5) 2004, AB: Non-metric Data.

Cat. No.	Unit	Level	Inferred Type	Material Type	Part	Body Shape	Sym-metry
843	562N 517E	3	-	KRF	base	-	-
844	558N 518E	3	-	KRF	body	-	-
845	558N 522E	1	-	KRF	tip	-	-
846	558N 522E	3	-	KRF	tip	-	-
847	558N 522E	3	-	KRF	base	-	-
848	564N 528E	3	Sonota	KRF	complete	OVT	SYM
849	564N 529E	1	-	KRF	side	-	-
850	567N 533E	4	-	KRF	body	OVT	SYM
851	555N 539E	1	-	chert, unknown variety	body	-	ASYM
852	555N 540E	2	Sonota	KRF	complete	OVT	SLASY
853	556N 545E	2	-	KRF	tip	-	-
854	559N 549E	2	-	obsidian	tip	-	-
855	562N 594E	4	Sonota	silcified mudstone	complete	OVT	SYM
856	562N 594E	5	Sonota	black chert	base	-	-
857	560N 594E	3	Sonota	KRF	complete	OVT	SYM
858	559N 594E	3	Sonota	KRF	complete	OVT	SYM
859	560N 595E	1	-	KRF	tip	-	-
860	560N 595E	3	Sonota	KRF	complete	OVT	SYM
861	561N 596E	2	Sonota	KRF	complete	OVT	SLASY

Cat. No.	Unit	Level	Inferred Type	Material Type	Part	Body Shape	Sym-metry
862	560N 596E	3	-	KRF	base	-	-
863	562N 598E	3	-	chert	body	-	-
864	562N 598E	6	Sonota	KRF	1/3 base missing	STR	SLASY
865	562N 598E	8	Sonota	KRF	complete	OVT	SYM
866	560N 598E	5	Sonota	KRF	complete	OVT	SYM
867	559N 598E	2	Sonota	KRF	tip missing	OVT	SLASY
868	559N 599E	5	-	KRF	tip	-	-
869	562N 599E	7	Sonota	KRF	complete	OVT	SYM
870	562N 599E	8	Sonota	KRF	complete	OVT	SYM
871	562N 600E	2	-	KRF	tip	-	-
872	561N 600E	3	-	chert	tip	-	-
873	561N 600E	8	-	chert	tip	-	-
874	560N 600E	4	Sonota	KRF	tip missing; 1/3 base missing	-	-
875	559N 600E	5	-	KRF	body	-	-
876	559N 600E	6	Sonota	KRF	tip missing	OVT	SYM
877	562N 601E	5	Sonota	KRF	tip missing	OVT	SLASY
878	561N 602E	5	-	KRF	tip	-	-
879	561N 602E	8	Sonota	KRF	complete	OVT	SYM
880	562N 603E	8	Sonota	porcellainite	tip missing	OVT	SLASY
881	562N 603	8	Sonota	KRF	complete	OVT	SYM

Cat. No.	**Unit**	**Level**	**Inferred Type**	**Material Type**	**Part**	**Body Shape**	**Sym-metry**
882	562N 603	8	Sonota	KRF	complete	TRI	SLASY
883	559N 604E	4	Sonota	KRF	complete	TRI	SYM
884	Test Pit #5	-	Sonota	KRF	complete	OVT	SYM
885	Test Pit #5	-	-	KRF	tip	-	-
886	-	sur-face	Sonota	KRF	base	-	-

Table 4.5b. Fincastle site (DlOx-5) 2004, AB: Non-metric Data.

Cat. No.	Tranverse Sec. Shape	Longitudinal Sec. Shape	Left Shoulder Shape	Right Shoulder Shape	Left Notch Orient.	Right Notch Orient.
843	-	-	-	-	-	-
844	BI	-	-	-	-	-
845	-	-	-	-	-	-
846	-	-	-	-	-	-
847	-	-	-	-	-	-
848	PLCX	PLCX	RND	ANG/OBT	COR/ SKWPRX	SIDE/ SYM
849	-	-	-	-	-	-
850	PLCX	-	-	-	-	-
851	PLCX	-	RND	ANG	-	-
852	PLTR	CX/CV	ANG/OBT	ANG/OBT	SIDE/ SYM	COR/ SKWPRX
853	-	-	-	-	-	-
854	-	-	-	-	-	-
855	PLCX	CX/CV	ANG/OBT	ANG/OBT	COR/ SYM	COR/ SKWPRX
856	-	-	-	-	SIDE/ SYM	-
857	PLCX	BI	ANG/OBT	ANG/RT	SIDE/ SYM	SIDE/ SYM
858	BI	CX/CV	ANG/OBT	ANG/OBT	COR/ SYM	SIDE/ SYM
859	-	-	-	-	-	-
860	BI	BI	ANG/OBT	ANG/OBT	SIDE/ SYM	COR/ SKWPRX
861	BI	BI	ANG/RT	ANG/RT	SIDE/ SKWPRX	SIDE/ SYM
862	-	-	-	-	-	-
863	-	-	-	-	-	-
864	PLCX	PLCX	ANG/OBT	ANG/OBT	-	SIDE/ SYM
865	PLCX	PLCX	ANG/OBT	ANG/OBT	SIDE/ SYM	SIDE/ SYM
866	PLCX	PLCX	ANG/OBT	ANG/RT	SIDE/ SKWPRX	SIDE/ SKWPRX
867	PLTR	PLCX	RND	ANG/OBT	SIDE/ SYM	SIDE/ SYM
868	-	-	-	-	-	-

Cat. No.	Tranverse Sec. Shape	Longitudinal Sec. Shape	Left Shoulder Shape	Right Shoulder Shape	Left Notch Orient.	Right Notch Orient.
869	BI	BI	ANG/RT	ANG/OBT	COR/ SKWDST	COR/ SKWPRX
870	PLCX	CX/CV	ANG/RT	RND	COR/ SYM	COR/ SKWDST
871	-	-	-	-	-	-
872	-	-	-	-	-	-
873	-	-	-	-	-	-
874	BI	-	ANG/OBT	ANG/OBT	COR/ SYM	-
875	-	-	-	-	-	-
876	BI	BI	ANG/OBT	ANG/OBT	COR/ SYM	COR/ SYM
877	BI	PLTR	ANG/OBT	ANG/OBT	COR/ SKWPRX	COR/ SKWPRX
878	-	-	-	-	-	-
879	BI	BI	RND	ANG/OBT	COR/ SKWPRX	COR/ SKWPRX
880	PLCX	BI	RND	ANG/OBT	COR/ SYM	COR/ SKWPRX
881	PLCX	PLCX	ANG/OBT	ANG/OBT	SIDE/ SYM	SIDE/ SYM
882	BI	BI	ANG/OBT	ANG/OBT	SIDE/ SKWDST	SIDE/ SKWPRX
883	PLCX	PLCX	ANG/OBT	ANG/OBT	SIDE/ SYM	SIDE/ SKWPRX
884	BI	PLCX	ANG/OBT	ANG/OBT	COR/ SYM	SIDE/ SYM
885	-	-	-	-	-	-
886	BI	-	ANG/OBT	ANG/OBT	COR/ SKWPRX	COR/ SYM

Table 4.5c. Fincastle site (DlOx-5) 2004, AB: Non-metric Data.

Cat. No.	Left Notch Shape	Right Notch Shape	Base Type	Left Basal Edge Shape	Right Basal Edge Shape	Ret.	Util.	Qual. of Raw Material	Qual. of Work.
843	-	-	-	-	-	-	-	H	H
844	-	-	-	-	-	-	-	H	H
845	-	-	-	-	-	-	-	H	H
846	-	-	-	-	-	-	-	H	H
847	-	-	-	-	-	-	-	H	H
848	ANG	SQR	STR	SQ/CON	RND	-	-	H	H
849	RND	-	-	RND	-	-	-	M	H
850	-	-	-	-	-	-	-	H	H
851	SQR	-	-	ANG	-	-	-	M	H
852	RND	SQR	CVX	ANG	RND	-	-	M	M
853	-	-	-	-	-	-	-	H	H
854	-	-	-	-	-	-	-	H	H
855	ANG	RND	STR	SQ/CON	SQ/CON	-	-	M	M
856	ANG	-	CCV	SQ/CON	ANG	-	-	M	M
857	RND	RND	STR	SQ/CON	SQR	-	-	H	H
858	ANG	RND	STR	ANG	RND	-	-	H	H
859	-	-	-	-	-	-	-	H	H
860	SQR	ANG	STR	SQ/CON	ANG	-	-	H	H
861	SQR	SQR	STR	-	RND	-	-	H	H
862	-	-	-	-	-	-	-	H	H
863	-	-	-	-	-	-	-	H	H
864	SQR	RND	CCV	SQ/CON	-	-	-	M	H
865	SQR	SQR	STR	RND	ANG	-	-	M	H
866	ANG	ANG	STR	ANG	ANG	-	-	H	H
867	SQR	RND	STR	ANG	SQ/CON	-	-	H	H
868	-	-	-	-	-	-	-	H	H
869	RND	RND	CVX	SQ/CON	ANG	-	-	H	H
870	SQR	ANG	STR	ANG	ANG	-	-	H	H
871	-	-	-	-	-	-	-	H	H
872	-	-	-	-	-	-	-	H	H
873	-	-	-	-	-	-	-	H	H
874	SQR	-	STR	RND	-	-	-	H	H
875	-	-	-	-	-	-	-	H	H
876	RND	RND	STR	SQ/CON	ANG	-	-	H	H
877	ANG	ANG	STR	RND	RND	-	-	H	H
878	-	-	-	-	-	-	-	H	H
879	RND	RND	STR	SQ/CON	SQ/CON	-	-	H	H
880	ANG	ANG	STR	ANG	SQ/CON	-	-	M	M

Cat. No.	Left Notch Shape	Right Notch Shape	Base Type	Left Basal Edge Shape	Right Basal Edge Shape	Ret.	Util.	Qual. of Raw Material	Qual. of Work.
881	SQR	SQR	STR	SQ/CON	RND	-	-	H	H
882	RND	RND	STR	SQ/CON	SQ/CON	Y	-	H	H
883	SQR	SQR	STR	ANG	ANG	Y	-	H	H
884	RND	RND	CVX	RND	RND	-	-	H	H
885	-	-	-	-	-	-	-	H	H
886	SQR	ANG	STR	SQ/CON	SQ/CON	-	-	H	H

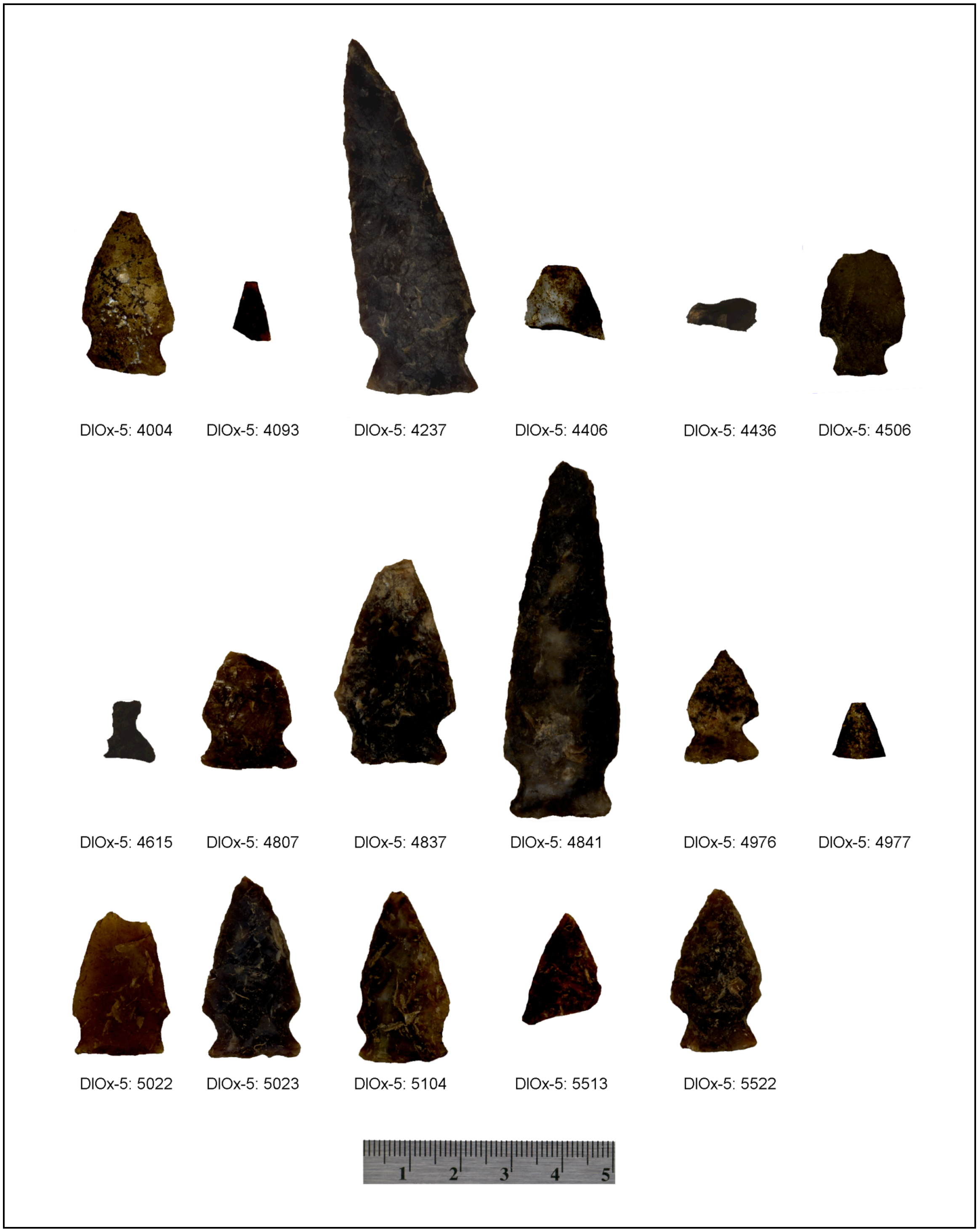

Figure 4.6a. Projectile points, Fincastle site 2006 (DlOx-5), AB.

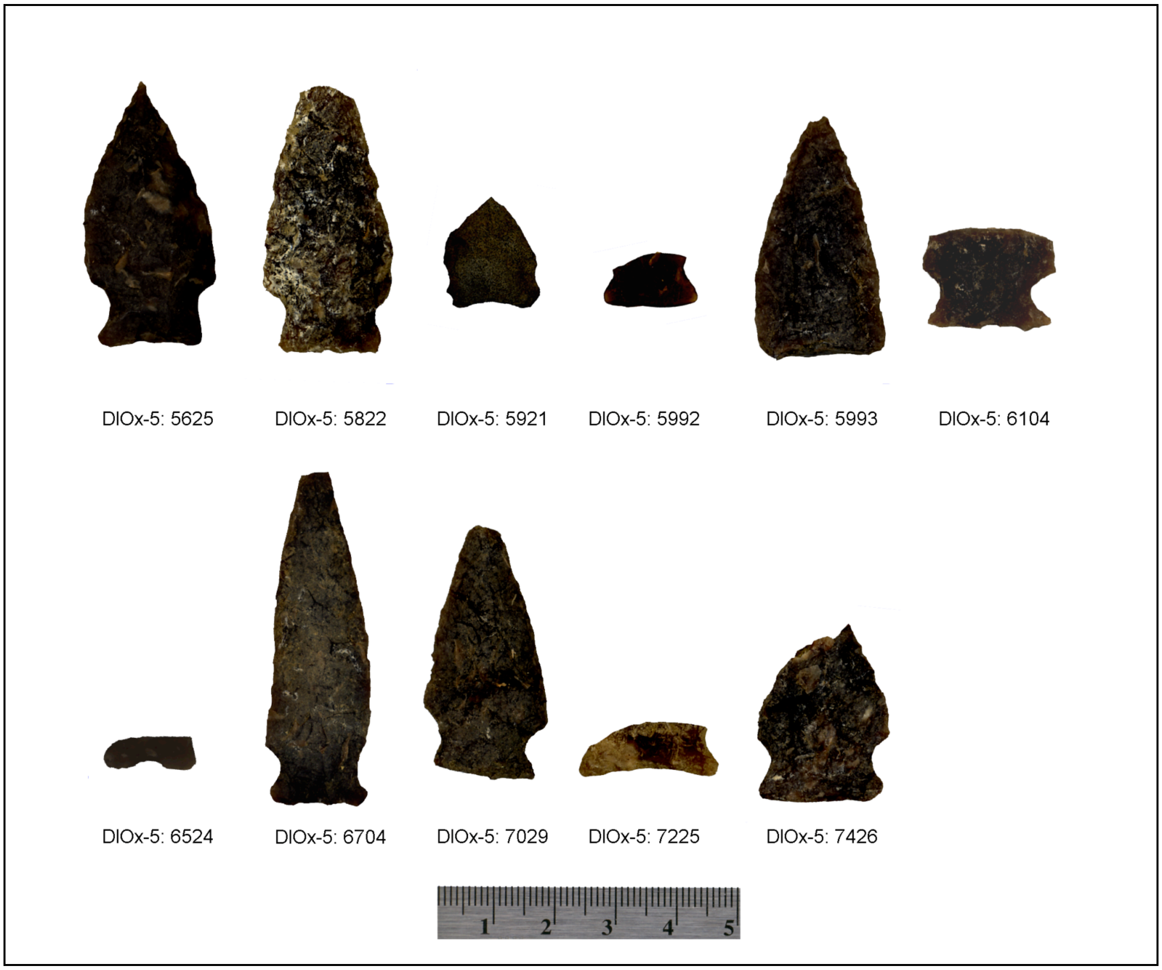

Figure 4.6b. Projectile points, Fincastle site 2006 (DlOx-5), AB.

Table 4.6a. Fincastle site (DlOx-5) 2006, AB: Metric Data.

Field No.	Max. Length	Max. Width	Max. Thick	Body Length Left	Body Length Right	Notch Height Left	Notch Height Right
4004	32.1	20.1	5.3	25.4	24.7	8.5	8.9
4093	-	-	3.0	-	-	-	-
4237	72.7	23.6	8.6	58.2	60.6	11.3	15.8
4406	-	-	5.6	-	-	-	-
4436	-	-	4.3	-	-	-	-
4506	-	17.2	3.2	-	-	7.9	7.2
4615	-	-	2.9	-	-	-	-
4807	-	19.5	5.7	-	-	9.1	9.5
4837	-	24.5	6.0	-	-	10.7	11.7
4841	71.0	23.0	6.5	60.5	57.4	11.5	12.7
4976	22.6	15.3	4.9	15.6	15.4	8.8	8.6
4977	-	-	3.5	-	-	-	-
5022	-	20.5	5.4	-	-	8.5	8.1
5023	36.4	20.2	7.0	29.6	30.0	9.1	9.3
5104	34.5	20.5	7.7	24.8	27.7	9.1	7.6
5513	-	-	3.3	-	-	-	-
5522	32.5	18.5	5.2	24.5	23.5	9.9	8.9
5625	43.8	21.7	8.3	35.4	34.1	10.2	10.8
5822	-	21.6	6.7	-	-	9.8	9.8
5921	17.7	15.8	4.9	14.2	14.0	7.3	7.5
5992	-	15.7	3.6	-	-	-	-
5993	-	21.5	6.4	39.3	39.5	-	-
6104	-	22.3	6.0	-	-	9.2	8.5
6524	-	15.5	2.6	-	-	-	-
6704	55.2	17.4	6.7	45.7	45.6	9.7	9.1
7029	41.8	20.7	6.2	32.0	30.9	8.5	9.3
7225	-	22.9	4.0	-	-	-	-
7426	-	22.5	5.3	-	-	10.6	10.1

Table 4.6b. Fincastle site (DlOx-5) 2006, AB: Metric Data.

Field No.	Notch Depth Left	Notch Depth Right	Shoulder Width	Max. Base Width	Neck Width	Basal Height Left	Basal Height Right	Wgt (g)
4004	2.4	1.5	20.1	17.3	14.5	3.3	2.9	2.9
4093	-	-	-	-	-	-	-	0.2
4237	2.9	2.4	23.6	22.9	17.5	5.5	1.5	13.7
4406	-	-	-	-	-	-	-	1.2
4436	-	-	-	-	-	-	-	0.3
4506	1.9	2.0	17.2	12.0	10.3	1.9	1.7	1.7
4615	-	-	-	-	-	-	-	0.2
4807	2.2	1.9	18.1	19.5	14.4	1.8	2.0	2.6
4837	1.0	3.0	24.5	19.3	17.1	3.1	2.8	5.9
4841	2.8	1.9	23.0	20.2	16.7	3.5	3.8	10.7
4976	1.5	3.2	14.9	15.3	9.7	3.2	1.7	1.5
4977	-	-	-	-	-	-	-	0.4
5022	1.4	1.5	20.5	18.8	17.4	1.9	1.2	3.4
5023	2.2	2.1	20.2	19.0	15.2	1.8	3.1	4.9
5104	1.3	1.7	20.5	19.2	16.6	1.5	1.0	4.7
5513	-	-	-	-	-	-	-	1.1
5522	2.5	2.5	18.5	15.4	12.1	1.3	1.2	3.1
5625	1.9	2.7	21.7	17.1	14.7	1.3	2.3	6.7
5822	2.2	1.6	21.6	17.1	15.4	1.8	4.0	6.7
5921	0.6	0.5	15.8	15.7	14.4	2.3	3.4	1.3
5992	-	-	-	15.7	11.7	2.8	2.5	0.6
5993	-	-	21.5	-	-	-	-	5.6
6104	2.4	3.7	22.3	20.7	15.2	1.9	1.2	2.2
6524	-	-	-	15.5	-	-	-	0.2
6704	1.7	2.1	17.4	16.7	13.4	3.1	2.8	5.7
7029	2.3	1.6	20.7	16.6	14.1	2.5	0.8	5.1
7225	-	-	-	22.9	-	-	-	0.9
7426	2.4	2.2	22.5	21.2	17.0	3.9	2.1	4.0

Table 4.7a. Fincastle site (DlOx-5) 2006, AB: Non-metric Data.

Field No.	Unit	Level	Inferred Type	Material Type	Part	Body Shape	Symmetry
4004	556N 596E	2	Sonota	KRF	complete	OVT	SLASY
4093	558N 596E	4	-	KRF	body	-	-
4237	564N 600E	8	Sonota	KRF	complete	OVT	ASYM
4406	565N 601E	3	-	KRF	body	OVT	-
4436	565N 601E	9	-	KRF	base	-	-
4506	566N 600E	2	Sonota	silicified mudstone	body/ base	OVT	SYM
4615	566N 602E	5	-	KRF	base		-
4807	564N 600E	10	Sonota	KRF	body/ base	-	SYM
4837	556N 597E	2	Sonota	KRF	complete	OVT	SLASY
4841	556N 597E	3	Sonota	KRF	complete	OVT	SYM
4976	563N 603E	8	Sonota	KRF	complete	OVT	SLASY
4977	563N 603E	8	-	quartzite	body	-	-
5022	557N 596E	2	Sonota	KRF	body/ base	TRI	SYM
5023	557N 596E	2	Sonota	KRF	complete	OVT	SYM
5104	558N 597E	2	Sonota	KRF	complete	OVT	SLASY
5513	557N 598E	2	-	KRF	body	-	-
5522	557N 598E	2	Sonota	KRF	complete	OVT	SYM
5625	566N 601E	7	Sonota	KRF	complete	OVT	SYM
5822	563N 601E	10	Sonota	KRF	body/ base	OVT	SLASY
5921	565N 600E	9	Sonota	siltstone	complete	OVT	SLASY

Field No.	Unit	Level	Inferred Type	Material Type	Part	Body Shape	Symmetr y
5992	565N 600E	10	-	KRF	base	-	-
5993	565N 600E	11	-	KRF	body	OVT	SYM
6104	558N 597E	2	Sonota	KRF	base	-	SYM
6524	564N 601E	8	Sonota	KRF	base	-	-
6704	565N 602E	12	Sonota	KRF	complete	OVT	ASYM
7029	564N 601E	9	Sonota	KRF	complete	OVT	SLASY
7225	565N 600E	13	-	KRF	base	-	-
7426	563N 602E	10	Sonota	KRF	body/ base	OVT	SLASY

Table 4.7b. Fincastle site (DlOx-5) 2006, AB: Non-metric Data.

Field No.	Tranverse Sec. Shape	Longitudinal Sec. Shape	Left Shoulder Shape	Right Shoulder Shape	Left Notch Orient.	Right Notch Orient.
4004	PLTR	PLCX	ANG/OBT	ANG/OBT	COR/ SYM	COR/ SYM
4093	-	-	-	-	-	-
4237	BI	PLCX	ANG/OBT	ANG/OBT	SIDE/ SYM	SIDE/ SYM
4406	PLTR	-	-	-	-	-
4436	-	-	-	-	-	-
4506	PLCX	CX/CV	ANG/OBT	ANG/OBT	COR/ SYM	COR /SYM
4615	-	-	-	-	-	-
4807	BI	-	ANG/OBT	ANG/OBT	SIDE/ SKWPRX	SIDE/ SKWPRX
4837	BI	CX/CV	ANG/OBT	ANG/OBT	COR/ SYM	COR /SYM
4841	BI	CX/CV	ANG/OBT	ANG/OBT	COR/ SYM	COR/ SYM
4976	PLCX	PLCX	ANG/OBT	ANG/OBT	SIDE/ SYM	SIDE/ SYM
4977	-	-	-	-	-	-
5022	PLTR	BI	ANG/OBT	ANG/OBT	COR/ SYM	COR/ SYM
5023	BI	BI	ANG/OBT	ANG/OBT	COR/ SYM	COR/ SYM
5104	BI	PLCX	ANG/OBT	ANG/OBT	COR/ SYM	COR/ SYM
5513	-	-	-	-	-	-
5522	BI	BI	ANG/OBT	ANG/OBT	COR/ SYM	COR/SY M
5625	BI	BI	ANG/OBT	ANG/OBT	COR/ SKWPRX	COR/ SYM
5822	BI	BI	ANG/OBT	RND	COR/ SKWPRX	COR/ SYM
5921	PLTR	BI	ANG/OBT	ANG/OBT	SIDE/ SYM	SIDE/ SYM
5992	-	-	-	-	-	-
5993	BI	BI	ANG/OBT	ANG/OBT	-	-
6104	BI	-	ANG/OBT	ANG/OBT	COR/ SYM	COR/ SYM
6524	-	-	-	-	-	-

Field No.	Tranverse Sec. Shape	Longitudinal Sec. Shape	Left Shoulder Shape	Right Shoulder Shape	Left Notch Orient.	Right Notch Orient.
6704	PLCX	CX/CV	RND	ANG/OBT	COR/ SYM	COR/ SYM
7029	BI	BI	ANG/OBT	ANG/OBT	COR/ SYM	COR/ SYM
7225	-	-	-	-	-	-
7426	PLCX	PLCX	ANG/OBT	ANG/OBT	COR/ SYM	COR/ SYM

Table 4.7c. Fincastle site (DlOx-5) 2006, AB: Non-metric Data.

Field No.	Left Notch Shape	Right Notch Shape	Base Type	Left Basal Edge Shape	Right Basal Edge Shape	Ret.	Util.	Qual. of Raw Mat.	Qual. of Work.
4004	RND	SQR	STR	SQ/ EXP	SQ/ CON	-	-	H	H
4093	-	-	-	-	-	-	-	H	H
4237	RND	SQR	CVX	SQ/ EXP	ANG	-	-	H	H
4406	-	-	-	-	-	-	-	M	M
4436	-	-	-	-	-	-	-	H	M
4506	SQR	RND	STR	SQ/ CON	ANG	-	-	M	M
4615	-	-	-	-	-	-	-	H	H
4807	ANG	RND	STR	SQ/ CON	SQ/ CON	-	-	H	H
4837	SQR	RND	STR	SQ/ CON	SQ/ CON	-	-	H	H
4841	RND	RND	STR	SQ/ CON	SQ/ CON	-	-	H	H
4976	ANG	ANG	STR	SQ/ EXP	ANG	-	-	H	M
4977	-	-	-	-	-	-	-	H	H
5022	RND	RND	STR	ANG	ANG	-	-	H	H
5023	SQR	RND	STR	SQ/ CON	SQ/ CON	-	-	H	H
5104	RND	RND	CVX	ANG	ANG	-	-	H	H
5513	-	-	-	-	-	-	-	H	H
5522	ANG	ANG	CVX	ANG	ANG	-	-	H	H
5625	ANG	RND	CCV	ANG	ANG	-	-	H	H
5822	ANG	SQR	STR	SQ/ CON	ANG	-	-	H	H
5921	SQR	RND	CCV	SQ/ CON	SQ/ CON	-	-	M	M
5992	-	-	STR	-	-	-	-	H	H
5993	-	-	-	-	-	-	-	H	H
6104	RND	RND	STR	ANG	ANG	-	-	H	H
6524	-	-	CCV	RND	SQ/ CON	-	-	H	H
6704	SQR	RND	STR	SQ/ CON	SQ/ CON	-	-	H	H

Field No.	Left Notch Shape	Right Notch Shape	Base Type	Left Basal Edge Shape	Right Basal Edge Shape	Ret.	Util.	Qual. of Raw Mat.	Qual. of Work.
7029	RND	RND	STR	SQ/ EXP	ANG	Y	-	H	H
7225	-	-	CCV	SQ/ CON	ANG	-	-	H	H
7426	RND	RND	STR	RND	SQ/ CON	-	-	H	H

EbPi-63

Archaeological investigations at EbPi-63 yielded a total of 45 projectile points, with 6 complete projectile points and the remainder fragmentary (Figures 4.7a, 4.7b; Tables 4.8a, 4.8b, 4.9a, 4.9b, 4.9c). The projectile points were recovered from two Cultural Units (CUs) in two separate excavation blocks that have been interpreted as contemporaneous, with supporting radiocarbon dates (Landals 2006a, 2006b). One projectile point (catalogue number 743) could not be located at the time of analysis, although provenience information was available from the EbPi-63 stone tools catalogue and included in this analysis. The mean for the shoulder widths is 18.7 mm (n=20), ranging from 14.1 mm to 24.7 mm. The mean for the neck widths is 12.8 mm (n=22), ranging from 9.7 mm to 14.8mm.

Raw materials represented in the projectile point assemblage include argillite (n=1), Avon chert (n=2), chert (n=8), chalcedony (n=1), Knife River Flint (n=6), obsidian (n=2), quartzite (n=3), silicified siltstone (n=2), and Swan River chert (n=20). Body shapes were ovate (n=9), and triangular (n=4). Basal edge forms were straight (n=9), convex (n=10), and concave (n=5). Left shoulder shapes were angular-obtuse (n=10), angular-right (n=2), angular-acute (n=6), and round (n=2). Right shoulder shapes were angular-obtuse (n=8), angular-right (n=3), angular-acute (n=1), and round (n=5). Left notch shapes were rounded (n=13), angled (n=5), and square (n=1). Right notch shapes were rounded (n=8), angled (n=5), and square (n=5). Left notch orientations were side-skewed proximally (n=1), corner-symmetrical (n=6), corner-skewed proximally (n=8), and corner-skewed distally. Right notch orientation were side-symmetrical (n=1), side-skewed proximally (n=1), corner-symmetrical (n=3), corner-skewed proximally (n=7), and corner-skewed distally (n=3).

At EbPi-63, Swan River Chert dominated the raw material used to produce projectile points, representing 44%. Various other cherts and Knife River Flint were the next most popular raw materials, representing 22% and 13% of the assemblage, respectively. Projectile point bodies tended to be ovate with either straight or convex bases; the assemblage from EbPi-63 represents both Pelican Lake and Besant projectile points. Several of the points exhibit reworking, and there is a range in the quality of workmanship within the assemblage. The diversity of projectile point morphology within the EbPi-63 assemblage is important to note, including Besant, Pelican Lake, and possibly Sandy Creek types represented a wide range of raw material use.

Figure 4.7a. Projectile points, EbPi-63, AB.

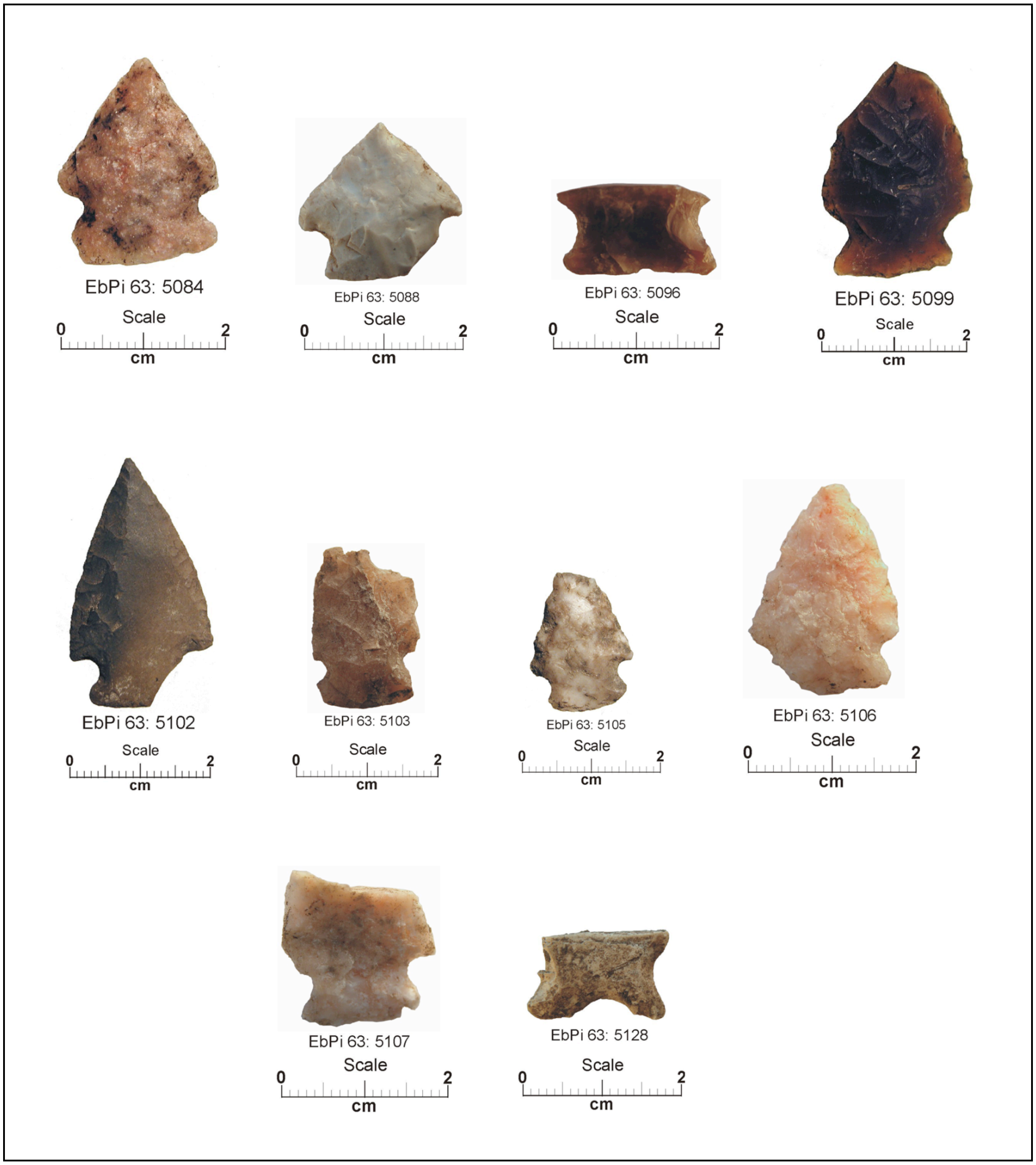

Figure 4.7b. Projectile points, EbPi-63, AB.

Table 4.8a. EbPi-63, AB: Metric Data.

Cat. No.	Max. Length	Max. Width	Max. Thick	Body Length Left	Body Length Right	Notch Height Left	Notch Height Right
740	-	-	4.3	-	-	-	-
743	-	-	-	-	-	-	-
745	32.7	19.2	5.9	26.6	26.2	5.9	4.8
755	-	-	5.6	-	-	-	-
758	-	16.4	6.5	-	-	4.9	5.5
5051	-	-	3.7	-	-	-	-
5052	-	-	6.3	-	-	-	-
5053	-	16.3	4.7	17.8	19.2	5.6	3.7
5055	-	-	3.5	-	-	-	-
5056	-	24.7	6.3	-	-	-	4.6
5057	-	-	4.7	-	-	-	-
5058	-	-	3.7	-	-	-	-
5059	-	-	7.7	-	-	-	-
5060	24.0	17.2	5.1	19.2	16.8	6.9	6.5
5061	-	21.5	5.1	20.5	21.7	-	-
5062	-	-	5.6	-	-	-	-
5064	-	15.0	4.9	-	-	5.4	6.2
5065	-	-	4.9	-	-	-	-
5066	-	-	4.8	-	-	-	-
5067	27.5	20.3	5.7	22.5	23.3	4.3	5.2
5070	-	17.3	4.8	-	-	8.2	8.9
5071	-	-	6.4	-	-	-	-
5072	47.3	22.3	6.2	39.9	38.3	4.0	4.6
5073	-	-	3.4	-	-	-	-
5075	-	-	3.2	-	-	-	-
5076	-	-	3.6	-	-	-	-
5077	-	-	5.0	-	-	4.2	-
5078	-	-	4.1	-	-	-	-
5079	-	-	5.8	-	-	-	-
5081	-	-	3.2	-	-	-	-
5082	-	17.7	5.4	-	-	6.6	7.6
5083	-	18.5	6.2	-	-	7.1	7.2
5084	24.8	19.4	6.2	19.0	18.2	6.1	4.5
5088	18.6	20.8	4.9	15.6	16.7	-	6.4

Cat. No.	Max. Length	Max. Width	Max. Thick	Body Length Left	Body Length Right	Notch Height Left	Notch Height Right
5096	-	18.4	4.8	-	-	7.1	-
5097	-	-	4.0	-	-	-	-
5099	-	20.5	6.5	-	-	6.3	7.4
5100	-	-	3.0	-	-	-	-
5102	36.3	21.0	3.9	30.7	30.2	4.8	-
5103	-	15.4	4.9	-	-	3.3	3.3
5104	-	-	3.3	-	-	-	-
5105	-	15.1	3.4	-	-	3.8	4.4
5106	25.0	17.9	4.5	19.8	21.1	4.8	-
5107	-	18.3	5.8	-	-	4.6	5.8
5108	-	-	4.7	-	-	-	-
5128	-	17.6	3.5	-	-	-	-

Table 4.8b. EbPi-63, AB: Metric Data.

Cat. No.	Notch Depth Left	Notch Depth Right	Shoulder Width	Max. Base Width	Neck Width	Basal Height Left	Basal Height Right	Wgt (g)
740	-	-	-	-	-	-	-	0.6
743	-	-	-	-	-	-	-	-
745	2.8	2.7	19.2	15.8	12.8	6.6	8.7	3.2
755	-	-	-	-	-	-	-	2.1
758	1.9	2.6	16.4	13.7	11.4	7.0	8.8	2.3
5051	-	-	-	-	-	-	-	0.6
5052	-	-	-	-	-	-	-	2.3
5053	1.7	1.2	16.3	11.9	11.4	6.9	6.2	1.7
5055	-	-	-	-	-	-	-	0.7
5056	-	3.3	24.7	-	17.1	11.8	8.4	5.5
5057	-	-	-	-	-	-	-	0.9
5058	-	-	-	-	-	-	-	0.4
5059	-	-	-	-	-	-	-	4.6
5060	2.2	2.4	17.2	11.1	10.9	7.2	8.4	1.8
5061	-	-	21.5	-	14.8	-	-	2.3
5062	-	-	-	-	-	-	-	2.9
5064	-	2.7	15.0	12.3	9.7	7.2	7.3	1.9
5065	-	-	-	-	-	-	-	0.5
5066	-	-	-	-	-	-	-	0.7
5067	3.6	-	20.3	5.3	11.7	7.0	6.0	2.3
5070	2.2	2.2	17.3	12.4	10.5	9.3	9.9	1.9
5071	-	-	-	-	-	-	-	2.4
5072	3.4	2.9	22.2	18.4	14.3	8.1	10.9	5.5
5073	-	-	-	-	-	-	-	0.3
5075	-	-	-	-	-	-	-	0.4
5076	-	-	-	-	-	-	-	0.8
5077	3.2	-	-	-	-	8.6	-	1.6
5078	-	-	-	-	-	-	-	0.9
5079	-	-	-	-	-	-	-	2.0
5081	-	-	-	-	-	-	-	1.2
5082	2.4	3.0	17.2	17.7	13.4	9.2	8.0	2.1
5083	2.3	1.7	18.5	18.2	14.5	8.2	8.9	1.5
5084	3.1	2.7	19.4	17.7	14.0	9.4	7.4	2.5
5088	-	2.4	20.8	-	14.0	-	6.8	1.7

Cat. No.	Notch Depth Left	Notch Depth Right	Shoulder Width	Max. Base Width	Neck Width	Basal Height Left	Basal Height Right	Wgt (g)
5096	3.0	-	-	18.4	14.6	9.8	-	1.2
5097	-	-	-	-	-	-	-	1.7
5099	2.8	3.3	20.5	16.4	13.2	7.6	10.2	3.8
5100	-	-	-	-	-	-	-	1.1
5102	3.4	-	21.0	-	12.4	6.2	-	2.5
5103	2.1	2.2	15.4	13.4	11.0	2.2	1.6	1.9
5104	-	-	-	-	-	-	-	0.2
5105	1.9	1.7	14.1	11.5	10.0	5.6	6.5	1.1
5106	2.0	-	17.9	-	13.1	6.3	-	1.9
5107	2.9	2.9	18.3	14.4	12.1	7.5	7.9	1.6
5108	-	-	-	-	-	-	-	3.8
5128	-	-	-	17.6	13.9	-	-	0.8

Table 4.9a. EbPi-63, AB: Non-metric Data.

Cat. No.	Unit	Level	Inferred Type	Material Type	Part	Body Shape	Symmetry
740	Block 1; CU 6; 400S 501E	12	-	obsidian (G1)	tip	-	-
743	Block 1; CU 6; 400S 502E	11	-	-	-	-	-
745	Block 1; CU 6; 401S 503E	12	Pelican Lake	mottled chert (E12)	complete	TRI	SLASY
755	Block 1; CU 6; 402S 500E	13	-	mottled chert (E12)	mid-section	-	-
758	Block 2; CU 10; 401S 602E	13	Sandy Creek?	Swan River chert (E15)	complete	OVT	SYM
5051	Block 1; CU 6; 398S 504E	7	-	Swan River chert (E15)	mid-section	-	-
5052	Block 1; CU 6; 398S 504E	8	-	quartzite (B1, B2)	mid-section	-	-
5053	Block 1; CU 6; 398S 506E	6	Besant	Swan River chert (E15)	no tip	OVT	SLASY
5055	Block 1; CU 6; 398S 508E	6	-	misc. chert (gray chal.) (E17)	tip	-	-

Cat. No.	Unit	Level	Inferred Type	Material Type	Part	Body Shape	Symmetry
5056	Block 1; CU 6; 398S 508E	7	Pelican Lake	Swan River chert (E15)	no tip; 1/3 base missing	OVT	SYM
5057	Block 1; CU 6; 398S 508E	7	-	misc. chert (gray chal.) (E17)	mid-section	-	-
5058	Block 1; CU 6: 399S 498E	8	-	quartzite (B1, B2)	tip	-	-
5059	Block 1; CU 6: 399S 501E	8	-	quartzite (B1, B2)	mid-section	-	-
5060	Block 1; CU 6: 399S 501E	8	Besant	yellow chal. (E6)	complete	OVT	ASYM
5061	Block 1; CU 6: 399S 501E	8	-	Avon chert (E3)	body	OVT	ASYM
5062	Block 1; CU 6: 399S 501E	9	-	obsidian (G1)	mid-section	-	-
5064	Block 1; CU 6; 399S 503E	7	Besant	argillite gray/ green (A2)	no tip; shoulder missing	-	ASYM
5065	Block 1; CU 6; 399S 504E	7	-	misc. chert (gray chal.) (E17)	base	-	-

Cat. No.	**Unit**	**Level**	**Inferred Type**	**Material Type**	**Part**	**Body Shape**	**Symmetry**
5066	Block 1; CU 6; 399S 505E	7	-	Swan River chert (E15)	base	-	-
5067	Block 1; CU 6; 399S 508E	7	Pelican Lake	Swan River chert (E15)	complete	TRI	SYM
5070	Block 1; CU 6; 400S 505E	9	Besant	Swan River chert (E15)	no tip	-	SYM
5071	Block 1; CU 6; 400S 508E	7	-	Swan River chert (E15)	no tip; shoulder missing; 1/3 base missing	-	-
5072	Block 1; CU 6; 401S 504E	10	Unusual Besant'	brown chal. (E1)	complete	OVT	SYM
5073	Block 1; CU 6; 401S 505E	9	-	Swan River chert (E15)	base	-	-
5075	Block 1; CU 6; 402S 499E	11	-	Swan River chert (E15)	tip	-	-
5076	Block 1; CU 6; 402S 506E	9	-	black chert (E11)	tip	-	-
5077	Block 2; CU 10; 393S 600E	9	-	opaque red chert (E9)	base	-	-

Cat. No.	Unit	Level	Inferred Type	Material Type	Part	Body Shape	Symmetry
5078	Block 2; CU 10; 393S 600E	9	-	opaque red chert (E9)	mid-section	-	-
5079	Block 2; CU 10; 393S 601E	9	-	Swan River chert (E15)	mid-section	-	-
5081	Block 2; CU 10; 393S 602E	9	-	brown chal. (E1)	tip	-	-
5082	Block 2; CU 10; 393S 603E	8	Besant	Swan River chert (E15)	no tip	-	SLASY
5083	Block 2; CU 10; 393S 604E	8	Besant	Swan River chert (E15)	base	-	-
5084	Block 2; CU 10; 393S 605E	7	Pelican Lake	Swan River chert (E15)	complete	TRI	SYM
5088	Block 2; CU 10; 394S 602E	8	Pelican Lake or Besant	Swan River chert (E15)	1/3 base missing	TRI	SYM
5096	Block 2; CU 10; 395S 602E	9	Besant	brown chal. (E1)	base	-	SYM
5097	Block 2; CU 10; 395S 602E	9	-	brown chal. (E1)	tip	OVT	-
5099	Block 2; CU 10; 395S 605E	8	Besant	brown chal. (E1)	no tip	-	SYM

Cat. No.	Unit	Level	Inferred Type	Material Type	Part	Body Shape	Symmetry
5100	Block 2; CU 10; 395S 607E	7	-	silicified siltstone (J)	tip	-	-
5102	Block 2; CU 10; 396S 601E	9	Pelican Lake	silicified siltstone (J)	1/2 base missing	OVT	SYM
5103	Block 2; CU 10; 397S 601E	9	Besant	Swan River chert (E15)	no tip	-	SLASY
5104	Block 2; CU 10; 397S 601E	10	Besant	Swan River chert (E15)	tip	-	-
5105	Block 2; CU 10; 397S 602E	10	Pelican Lake	Swan River chert (E15)	no tip	-	SYM
5106	Block 2; CU 10; 398S 600E	11	Besant	Swan River chert (E15)	1/3 base missing	OVT	SLASY
5107	Block 2; CU 10; 398S 600E	11	Pelican Lake or Besant	Swan River chert (E15)	no tip	-	SLASY
5108	Block 2; CU 10; 398S 604E	9	-	brown chal. (E1)	no tip; 1/2 base missing	-	-
5128	Block 2; CU 10; 397S 600E	10	Hanna-like form	Avon chert (E3)	base	-	SYM

Table 4.9b. EbPi-63, AB: Non-metric Data.

Cat. No.	Tranverse Sec. Shape	Longitudinal Sec. Shape	Left Shoulder Shape	Right Shoulder Shape	Left Notch Orient.	Right Notch Orient.
740	-	-	-	-	-	-
743	-	-	-	-	-	-
745	BI	PLCX	ANG/OBT	ANG/ACT	COR/ SYM	COR/ SKWPRX
755	BI	-	-	-	-	-
758	PLTR	BI	ANG/OBT	RND	COR/SYM	COR/ SKWPRX
5051	BI	-	-	-	-	-
5052	BI	-	-	-	-	-
5053	PLCX	BI	ANG/OBT	ANG/OBT	COR/ SKWPRX	COR/ SKWDST
5055	BI	-	-	-	-	-
5056	BI	PLCX	ANG/OBT	ANG/OBT	COR/ SKWDST	-
5057	-	-	-	-	-	-
5058	-	-	-	-	-	-
5059	BI	-	-	-	-	-
5060	BI	BI	ANG/OBT	ANG/OBT	COR/ SKWDST	COR/ STEM
5061	BI	-	RND	ANG/RT	-	-
5062	BI	-	-	-	-	-
5064	BI	-	ANG/OBT	-	COR/ SKWPRX	-
5065	-	-	-	-	-	-
5066	-	-	-	-	-	-
5067	BI	PLCX	ANG/ACT	ANG/ACT	COR/ SKWPRX	COR/ SKWPRX
5070	PLCX	-	ANG/OBT	ANG/OBT	COR/ SKWPRX	COR/ SKWPRX
5071	-	-	ANG/ACT	-	-	-
5072	BI	PLCX	ANG/OBT	ANG/RT	COR/ SKWPRX	COR/ SKWPRX
5073	-	-	-	-	-	-
5075	-	-	-	-	-	-

Cat. No.	Tranverse Sec. Shape	Longitudinal Sec. Shape	Left Shoulder Shape	Right Shoulder Shape	Left Notch Orient.	Right Notch Orient.
5076	-	-	-	-	-	-
5077	PLCX	-	-	RND	-	COR/ SKWDST
5078	-	-	-	-	-	-
5079	BI	-	-	-	-	-
5081	PLCX	-	-	-	-	-
5082	BI	-	ANG/ACT	RND	SIDE/ SKWPRX	SIDE/ SKWPRX
5083	BI	-	-	-	SKWPRX	SKWPRX
5084	BI	PLCX	ANG/ACT	RND	COR/SYM	COR/ SKWPRX
5088	PLTR	PLTR	ANG/ACT	ANG/ACT	COR/ SKWPRX	-
5096	BI	-	-	-	-	-
5097	PLCX	-	-	-	-	-
5099	PLCX	-	RND	ANG/OBT	COR/ SKWPRX	COR/ SKWDST
5100	BI	-	-	-	-	-
5102	PLTR	CX/CV	ANG/ACT	ANG/RT	COR/SYM	-
5103	BI	-	ANG/RT	ANG/OBT	COR/SYM	COR/ SYM
5104	-	-	-	-	-	-
5105	PLCX	-	ANG/OBT	ANG/ACT	COR/SYM	COR/ SKWPRX
5106	PLCX	PLCX	ANG/OBT	ANG/OBT	-	COR/ SYM
5107	PLCX	-	ANG/RT	RND	COR/SKW PRX	COR/ SYM
5108	-	-	-	ANG/OBT	-	SIDE/ SYM
5128	BI	-	-	-	-	-

Table 4.9c. EbPi-63, AB: Non-metric Data.

Cat. No.	Left Notch Shape	Right Notch Shape	Base Type	Left Basal Edge Shape	Right Basal Edge Shape	Ret.	Util.	Qual. of Raw Material	Qual. of Work.
740	-	-	-	-	-	RET	-	H	H
743	-	-	-	-	-	-	-	-	-
745	RND	RND	STR	RND	RND	-	-	M	H
755	-	-	-	-	-	RET	-	M	H
758	RND	SQR	CCV	SQ/ CON	SQ/ CON	-	-	M	M
5051	-	-	-	-	-	-	-	M	M
5052	-	-	-	-	-	-	-	P	M
5053	RND	RND	CCV	SQ/ CON	RND	-	-	M	M
5055	-	-	-	-	-	-	-	H	H
5056	RND	-	CVX	RND	-	RET	-	M	M
5057	-	-	-	-	-	-	-	H	H
5058	-	-	-	-	-	-	-	M	H
5059	-	-	-	-	-	-	-	M	H
5060	RND	ANG	CVX	SQ/ CON	ANG	RET	-	H	M
5061	-	-	-	-	-	RET	-	M	M
5062	-	-	-	-	-	-	-	H	H
5064	ANG	SQR	STR	SQ/ CON	ANG	RET	-	M	H
5065	-	-	CVX	SQR	RND	-	-	H	M
5066	-	-	CVX	ANG	RND	-	-	M	M
5067	ANG	SQR	STR	ANG	SQ/CON	RET	-	M	H
5070	ANG	RND	CVX	ANG	ANG	RET	-	M	M
5071	-	-	CVX	-	RND	RET	-	M	P
5072	ANG	ANG	CCV	SQ/ CON	SQ/CON	RET	-	H	H
5073	-	-	-	-	-	-	-	M	M
5075	-	-	-	-	-	-	-	-	-
5076	-	-	-	-	-	-	-	M	M
5077	-	RND	CVX	-	SQ/CON	RET	-	M	M
5078	-	-	-	-	-	-	-	M	M

Cat. No.	Left Notch Shape	Right Notch Shape	Base Type	Left Basal Edge Shape	Right Basal Edge Shape	Ret.	Util.	Qual. of Raw Material	Qual. of Work.
5079	-	-	-	-	-	-	-	M	M
5081	-	-	-	-	-	-	-	H	M
5082	ANG	SLANG	STR	ANG	RND	-	-	M	M
5083	-	-	CCV	ANG	ANG	RET	-	H	H
5084	RND	ANG	CVX	SQ/ CON	RND	-	-	M	M
5088	RND	-	STR	ANG	-	RET	-	H	H
5096	RND	-	STR	ANG	SQ/CON	RET	-	H	H
5097	-	-	-	-	-	RET	-	H	M
5099	SQR	RND	STR	ANG	RND	RET	-	H	H
5100	-	-	-	-	-	-	-	M	M
5102	RND	-	-	RND	-	-	-	M	M
5103	RND	RND	CVX	SQ/ CON	SQ/EXP	-	-	M	M
5104	-	-	-	-	-	-	-	M	M
5105	RND	RND	CVX	RND	RND	RET	-	M	M
5106	-	ANG	STR	-	SQ/CON	-	-	P	M
5107	RND	SQR	STR	RND	ANG	-	-	P	M
5108	-	SQR	-	-	-	-	-	H	H
5128	RND	RND	CCV	RND	RND	-	-	M	M

EgPn-111

A total of 34 projectile points were recovered during excavations at EgPn-111, located in Calgary, Alberta (Figure 4.8; Tables 4.10a, 4.10b, 4.11a, 4.11b, 4.11c). Of these points, 11 are complete and the remainder fragmentary. EgPn-111 was interpreted as representing a single kill event (Head *et al.* 2000, 2002). The mean for the shoulder widths is 16.2 mm (n=21), ranging from 10.9 mm to 22.3 mm. The mean for the neck widths is 11.2 mm (n=17), ranging from 8.5 mm to 16.1 mm.

Raw materials represented in the EgPn-111 projectile points include chalcedony (n=3), chert (n=11), Knife River Flint (n=15), quartzite (n=3), and siltstone (n=2). Body shapes were ovate (n=18), straight (n=1) and triangular (n=7). Basal edge forms were straight (n=11), convex (n=4), and concave (n=3). Left shoulder shapes were angular-obtuse (n=9), angular-right (n=1), angular-acute (n=5) and round (n=7). Right shoulder shapes were angular-obtuse (n=12), angular-right (n=2), angular-acute (n=3), and round (n=2). Left notch shapes were rounded (n=6), angled (n=7), and square (n=2). Right notch shapes were rounded (n=8), angled (n=3), and square (n=4). Left notch orientation were side-symmetrical (n=5), side-skewed proximally (n=5), side-skewed distally (n=0), corner-symmetrical (n=3), corner-skewed proximally (n=1), and corner-skewed distally (n=1). Right notch orientation were side-symmetrical (n=9), side-skewed proximally (n=2), corner-symmetrical (n=3), and corner-skewed proximally (n=1).

Knife River Flint (44%) and chert (32%) dominate the raw materials represented in the projectile point assemblage. As noted by Head *et al.* (2002), this is in contrast to the raw materials represented in the debitage, dominated by chert, quartzite, and siltstone. Projectile points types identified within the EgPn-111 include both Besant and Pelican

Lake forms within the single kill event. Besant body shapes are dominated by ovate forms, while Pelican Lake projectile point bodies tended to be triangular in shape. The Pelican Lake forms are dominated by acute shoulders with angled corner notches, while the Besant forms are side notched in a variety of shapes. As at EbPi-63, the mixing of the Pelican Lake and Besant projectile points, combined with the diversity of raw materials, is noteworthy. The projectile point assemblage from EgPn-111 is dominated by atlatl darts, although there are a few arrows.

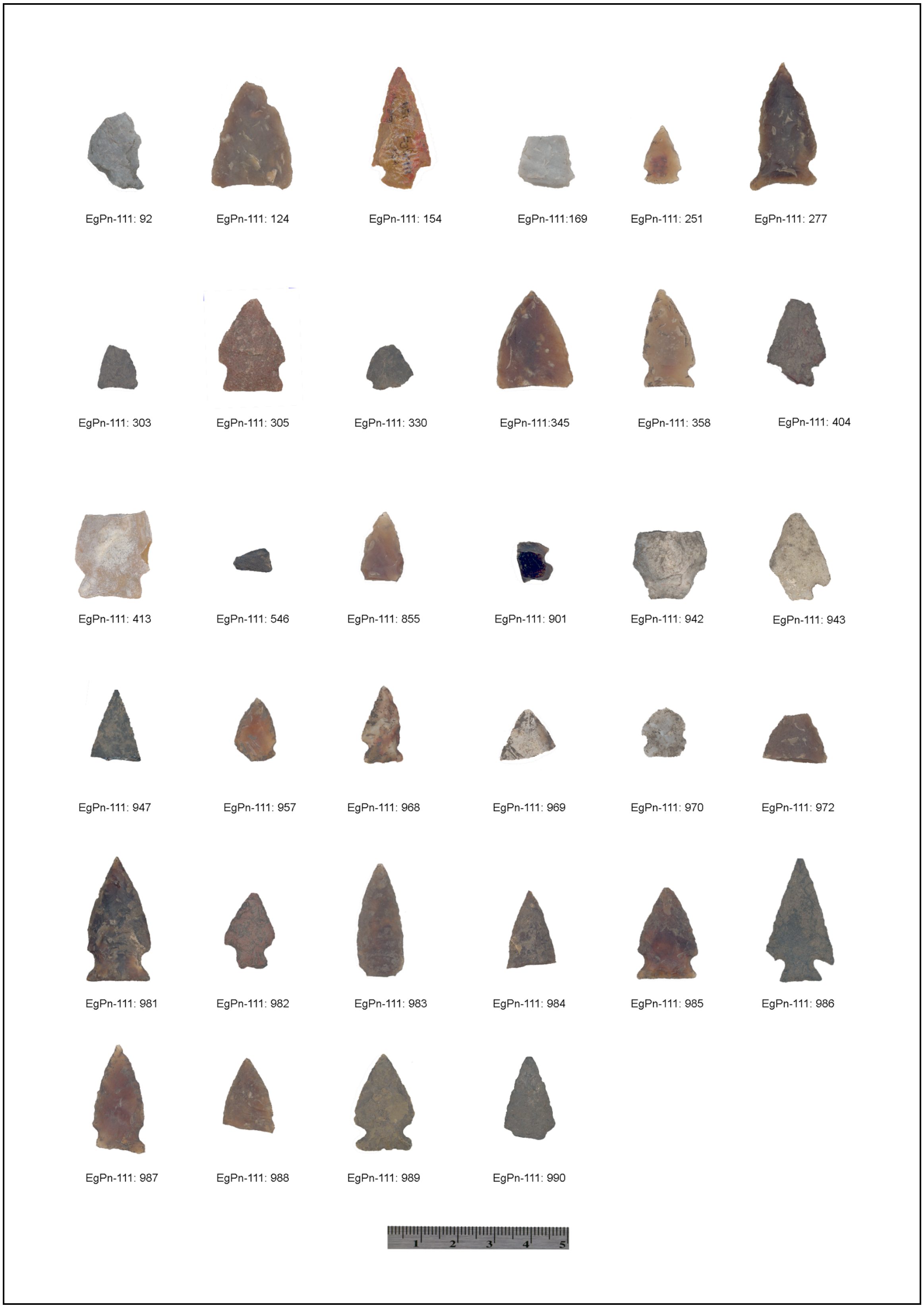

Figure 4.8. Projectile points, EgPn-111, AB.

Table 4.10a. EgPn-111, AB: Metric Data.

Cat. No.	Max. Length	Max. Width	Max. Thick	Body Length Left	Body Length Right	Notch Height Left	Notch Height Right
92	-	-	4.9	-	-	-	-
124	-	-	4.9	-	-	-	-
154	35.1	17.3	5.5	29.7	29.8	6.7	7.9
169	-	-	3.6	-	-	-	-
251	17	10.9	2.2	14.1	13.6	4.6	4.8
277	36.4	20.2	5.1	29.4	27.5	8	12.8
303	-	11.4	2.4	-	-	-	-
305	26.9	19.7	7.2	20.6	21.8	8.8	8.9
330	-	13.6	2.8	-	-	-	-
345	-	22.3	3.2	-	-	-	-
358	28.2	15.4	3.8	21	24.5	8.8	7
404	-	-	4.3	-	-	-	-
413	-	21.8	4.2	-	-	10.7	9.2
546	-	-	3.3	-	-	-	-
855	-	-	12.6	3.2	-	-	-
901	-	-	3.3	-	-	-	-
942	-	21.5	7.5	-	-	-	-
943	25.2	18.1	4.7	18.9	22.8	-	4.3
947	-	-	3.8	-	-	-	-
957	18.3	12.3	3.3	15.2	14.4	-	5.1
968	22.7	11.9	3.8	17.5	17.4	6.8	5.3
969	-	-	3.3	-	-	-	-
970	15	13.6	3.8	9.4	11.2	7.4	7.6
972	-	-	3.8	-	-	-	-
981	35.9	18.9	6.8	28.8	28.5	9.2	9.2
982	21.9	14.8	4.7	16	16.9	8.7	6.9
983	-	13.5	2.4	31.8	2.4	31.8	30.7
984	-	-	3.9	-	-	-	-
985	26.3	17.5	2.9	21.7	20.9	6.7	8.1
986	35.6	-	3.5	31.9	-	4.7	-
987	30.7	14.9	3.9	24.9	25.1	6.2	7.2
988	-	-	3.3	-	-	-	-
989	27.8	17.7	4	21.6	21.9	7.9	7.8
990	-	15	4.2	22.4	22.2	-	-

Table 4.10b. EgPn-111, AB: Metric Data

Cat. No.	Notch Depth Left	Notch Depth Right	Shoulder Width	Max. Base Width	Neck Width	Basal Height Left	Basal Height Right	Wgt (g)
92	-	-	-	-	-	-	-	1.6
124	-	-	-	-	-	-	-	3.5
154	2.2	-	17.3	-	9.5	2.2	-	2.7
169	-	-	-	-	-	-	-	1
251	0.6	0.7	10.9	9.9	8.5	3	2.4	0.4
277	2.5	2.1	17.4	20.2	14.4	4.5	4.6	3.2
303	-	-	-	-	-	-	-	0.4
305	1.5	1.9	19.7	17.6	15.3	6.6	6.9	3.2
330	-	-	13.6	-	-	-	-	0.5
345	-	-	22.3	-	-	-	-	2.3
358	1.4	2.2	15.4	14.5	11.6	4	5.1	1.6
404	-	-	-	-	8.8	-	-	1.7
413	1.9	1.6	21.8	18.4	16.1	6.6	6.5	2.9
546	-	-	-	-	-	-	-	0.1
855	-	-	12.6	-	-	-	-	0.9
901	-	-	-	-	-	-	-	0.4
942	-	-	21.5	-	-	-	-	3.6
943	-	2.2	18.1	-	-	-	1	1.9
947	-	-	-	-	-	-	-	1
957	-	0.6	12.3	-	-	-	2.1	0.6
968	1.5	1.2	11.6	11.9	8.8	4.5	3.8	0.9
969	-	-	-	-	-	-	-	0.7
970	0.9	1.4	13.6	13	10.9	5	3.4	0.8
972	-	-	-	-	-	-	-	1.1
981	2.4	2.2	18.9	18.6	14.3	4.3	3.8	3.8
982	1.6	1.9	14.8	9.4	8.5	4.9	4	1.3
983	-	-	13.5	-	8.7	-	-	1.2
984	-	-	-	-	-	-	-	1
985	1.8	2	17.5	17.3	13.2	4	4.4	1.6
986	4.1	-	-	12.1	8.5	6	6.9	2.3
987	0.8	1.8	14.9	14.1	11.8	4.4	3	1.7
988	-	-	-	-	-	-	-	1
989	2.6	2.7	17.7	16.3	11.2	3.9	3.2	1.8
990	-	-	15	-	10.1	-	-	1.3

Table 4.11a. EgPn-111, AB: Non-metric Data.

Cat. No.	Unit	Level	Inferred Type	Material Type	Part	Body Shape	Symmetry
92	225N 231W	2	unknown	chert	body/ base	-	-
124	223N 239N	2	Besant	KRF	body	OVT	SYM
154	224.5N 218W	2	Pelican Lake	chert	1/2 base missing	TRI	SLASY
169	210N 240W	1	Samantha?	chalcedony	body	-	-
251	216N 236W	1	Samantha	KRF	complete	OVT	SYM
277	218N 231W	2	Besant	KRF	complete	OVT	ASYM
303	220N 228W	1	Samantha?	chert	body	OVT	SYM
305	220N 229W	2	Besant	pink quartzite	complete	OVT	SYM
330	221N 229W	2	Samantha?	chert	body	OVT	SLASY
345	221N 236W	2	Besant	KRF	body	OVT	SYM
358	221N 238E	2	Besant	KRF	complete	OVT	SLASY
404	222N 238W	2	Pelican Lake	chert	body	TRI	-
413	222N 240W	1	Besant	chalcedony	tip missing	-	SLASY
546	218N 238W	2	Pelican Lake?	siltstone	base	-	-
855	238N 247W	1	Besant?	KRF	body	OVT	SLASY
901	236N 243W	1	Besant?	KRF	base	-	-
942	238N 246W	1	Besant?	quartzite	body/ base	-	-
943	237N 245W	2	Pelican Lake	quartzite	1/3 base missing	TRI	SLASY

Cat. No.	Unit	Level	Inferred Type	Material Type	Part	Body Shape	Symmetry
947	237N 242W	2	Pelican Lake?	chert	body	TRI	SYM
957	236N 244W	1	Samantha	KRF	1/3 base missing	OVT	SYM
968	217N 237W	1	Besant	chert	complete	TRI/ OVT	ASYM
969	220N 234W	2	Besant?	chert	body	TRI	-
970	216N 234W	2	Besant	chalcedony	complete	OVT	SLASY
972	219N 233W	2	Besant?	KRF	body	-	-
981	217N 235W	pedest al	Besant	KRF	complete	OVT	SYM
982	219N 233W	2	Pelican Lake	chert	complete	STR	SLASY
983	223N 234W	2	Besant?	KRF	body	OVT	SYM
984	221N 232W	2	Besant?	KRF	body	OVT	SYM
985	221N 234W	2	Besant	KRF	complete	OVT	SLASY
986	216N 233W	2	Pelican Lake	chert	missing shoulder	TRI	SYM
987	220N 239W	2	Besant	KRF	complete	OVT	ASYM
988	220N 235W	2	Besant?	KRF	body	OVT	SYM
989	218N 232W	2	Besant	chert	complete	OVT	SYM
990	219N 239W	2	Pelican Lake?	siltstone	body	TRI	SYM

Table 4.11b. EgPn-111, AB: Non-metric Data.

Cat. No.	Tranverse Sec. Shape	Longitudinal Sec. Shape	Left Shoulder Shape	Right Shoulder Shape	Left Notch Orient.	Right Notch Orient.
92	BI	PLCX	-	-	-	-
124	BI	PLCX	RND	ANG/OBT	-	-
154	BI	PLCS	ANG/ACT	ANG/ACT	COR/SYM	-
169	BI	-	-	-	-	-
251	PLTR	CX/CV	ANG/OBT	ANG/OBT	COR/ SKWDST	COR/ SKWPRX
277	PLCX	CX/CV	RND	-	SIDE/ SKWPRX	SIDE/ SYM
303	BI	-	-	-	-	-
305	BI	BI	ANG/OBT	ANG/OBT	SIDE/ SKWPRX	SIDE/ SKWPRX
330	PLCX	PLCX	ANG/ACT	ANG/ACT	-	-
345	PLTR	BI	-	-	-	-
358	PLTR	CX/CV	ANG/OBT	ANG/OBT	SIDE/ SKWPRX	SIDE/ SYM
404	PLCX	BI	ANG/ACT	-	-	-
413	PLCX	ASYM/PLCX	ANG/OBT	-	SIDE/ SYM	SIDE/ SKWPRX
546	-	-	-	-	-	-
855	BI	CX/CV	RND	RND	-	-
901	-	-	RND	-	COR/SYM	-
942	BI	-	ANG/ACT	ANG/OBT	-	-
943	PLTR	PLCX	-	ANG/ACT	-	COR/ SYM
947	BI	-	-	-	-	-

Cat. No.	Tranverse Sec. Shape	Longitudinal Sec. Shape	Left Shoulder Shape	Right Shoulder Shape	Left Notch Orient.	Right Notch Orient.
957	ASYM/ CX/CV	ASYM/ CX/CV	-	ANG/OBT	-	SIDE/ SYM
968	PLCX	CX/CV	ANG/RT	ANG/OBT	SIDE/ SYM	SIDE/ SYM
969	BI	-	-	-	-	-
970	BI	BI	ANG/OBT	ANG/RT	SIDE/ SYM	SIDE/ SYM
972	PLCX	-	-	-	-	-
981	PLTR	PLTR	ANG/OBT	ANG/OBT	SIDE/ SYM	SIDE/ SYM
982	BI	PLCX	RND	ANG/RT	COR/ SKWPRX	COR/SYM
983	PLCX	CX/CV	RND	RND	-	-
984	PLCX	-	-	-	-	-
985	CX/CV	PLCX	ANG/OBT	ANG/OBT	SIDE/ SKWPRX	SIDE/ SYM
986	BI	BI	ANG/ACT	-	COR/ SYM	COR/SYM
987	BI	CX/CV	ANG/OBT	ANG/OBT	SIDE/ SKWPRX	SIDE/ SYM
988	PLTR	-	-	-	-	-
989	BI	PLCX	RND	ANG/OBT	SIDE/ SYM	SIDE/ SYM
990	PLTR	BI	ANG/OBT	ANG/OBT	-	-

Table 4.11c. EgPn-111, AB: Non-metric Data.

Cat. No.	Left Notch Shape	Right Notch Shape	Base Type	Left Basal Edge Shape	Right Basal Edge Shape	Ret.	Util.	Qual. of Raw Mat.	Qual. of Work.
92	-	-	-	ANG	-	-	-	M	P
124	-	-	-	-	-	-	-	H	H
154	RND	-	CVX	ANG	-	-	-	M	M
169	-	-	-	-	-	-	Y	H	H
251	SQR	RND	CVX	ANG	ANG	-	-	H	M
277	RND	SQR	CCV	SQ/ CON	RND	Y	-	H	M
303	-	-	-	-	-	-	-	M	M
305	ANG	SQR	STR	RND	RND	-	-	P	M
330	-	-	-	-	-	-	Y	M	M
345	-	-	-	-	-	-	-	H	M
358	ANG	SQR	STR	ANG	SQR	-	-	H	M
404	-	-	-	-	-	-	-	M	M
413	ANG	ANG	STR	SQ/ CON	SQR	-	-	H	M
546	-	-	-	-	-	-	-	M	M
855	-	-	-	-	-	-	-	H	M
901	RND	-	CVX	ANG	-	-	-	H	M
942	-	-	STR	-	-	-	-	P	M
943	-	RND	STR	-	ANG	-	-	P	M
947	-	-	-	-	-	-	-	H	H
957	-	ANG	CVX	-	RND	-	-	H	M
968	ANG	RND	STR	RND	RND	Y	-	H	M
969	-	-	-	-	-	-	-	M	M
970	RND	RND	STR	SQ/ CON	SQ/CON	Y	-	H	M
972	-	-	-	-	-	-	-	H	H
981	SQR	SQR	STR	ANG	SQ/EXP	-	-	H	H
982	ANG	RND	CCV	ANG	RND	-	-	M	M
983	-	-	-	-	-	-	-	H	M
984	-	-	-	-	-	-	-	H	H
985	RND	RND	STR	ANG	ANG	-	-	H	M
986	ANG	ANG	STR	ANG	ANG	-	-	M	H
987	ANG	RND	CCV	ANG	SQR	-	-	H	H

Cat. No.	Left Notch Shape	Right Notch Shape	Base Type	Left Basal Edge Shape	Right Basal Edge Shape	Ret.	Util.	Qual. of Raw Mat.	Qual. of Work.
988	-	-	-	-	-	-	-	H	H
989	RND	RND	STR	RND	RND	-	-	M	M
990	-	-	-	-	-	-	-	M	M

Kenney site (DjPk-1)

A total of 39 projectile points were examined from the Kenney site, with 18 complete specimens (Figures 4.9a, 4.9b; Tables 4.12a, 4.12b, 4.13a, 4.13.b, 4.13c). Projectile points were recovered from two radiocarbon dated, stratified layers at the Kenney site, Levels 6 and 8. The mean for the shoulder widths is 19.3 mm (n=35), ranging from 10.1 mm to 25.1 mm. The mean for the neck widths is 14 mm (n=37), ranging from 7.7 mm to 19.0 mm.

Raw materials represented in the Kenney projectile points include a variety of cherts (n=31), Avon chert (n =1), quartzite (n=2), chalcedony (n=1), and jasper (n=3). Body shapes were ovate (n=23), and triangular (n=4). Basal edge forms were straight (n=27), convex (n=1), and concave (n=3). Left shoulder shapes were angular-obtuse (n=24), angular-right (n=3), angular-acute (n=4), and round (n=5). Right shoulder shapes were angular-obtuse (n=25), angular-right (n=2), angular-acute (n=6), and round (n=2). Left notch shapes were rounded (n=15), angled (n=11), and squared (n=8). Right notch shapes were rounded (n=12), angled (n=15), and squared (n=6). Left notch orientation were side-symmetrical (n=13), side-skewed proximally (n=10), side-skewed distally (n=1), corner-symmetrical (n=7), corner-skewed proximally (n=1), and corner-skewed distally (n=1). Right notch orientation were side-symmetrical (n=9), side-skewed proximally (n=15), side-skewed distally (n=3), corner-symmetrical (n=5), corner-skewed proximally (n=1).

Projectile point raw materials at the Kenney site were dominated by cherts, representing 85% of the point assemblage examined. Variable workmanship is apparent in the Kenney point assemblage. The Besant points tended to have ovate bodies, straight bases, and side notches. There were a few of Pelican Lake points within this assemblage from Layer 8, characterized by triangular bodies, and angled corned notches. Interestingly, there are a couple smaller projectile points from Layer 6 that may represent arrow points.

Figure 4.9a. Projectile points, Kenney site (DjPk-1), AB.

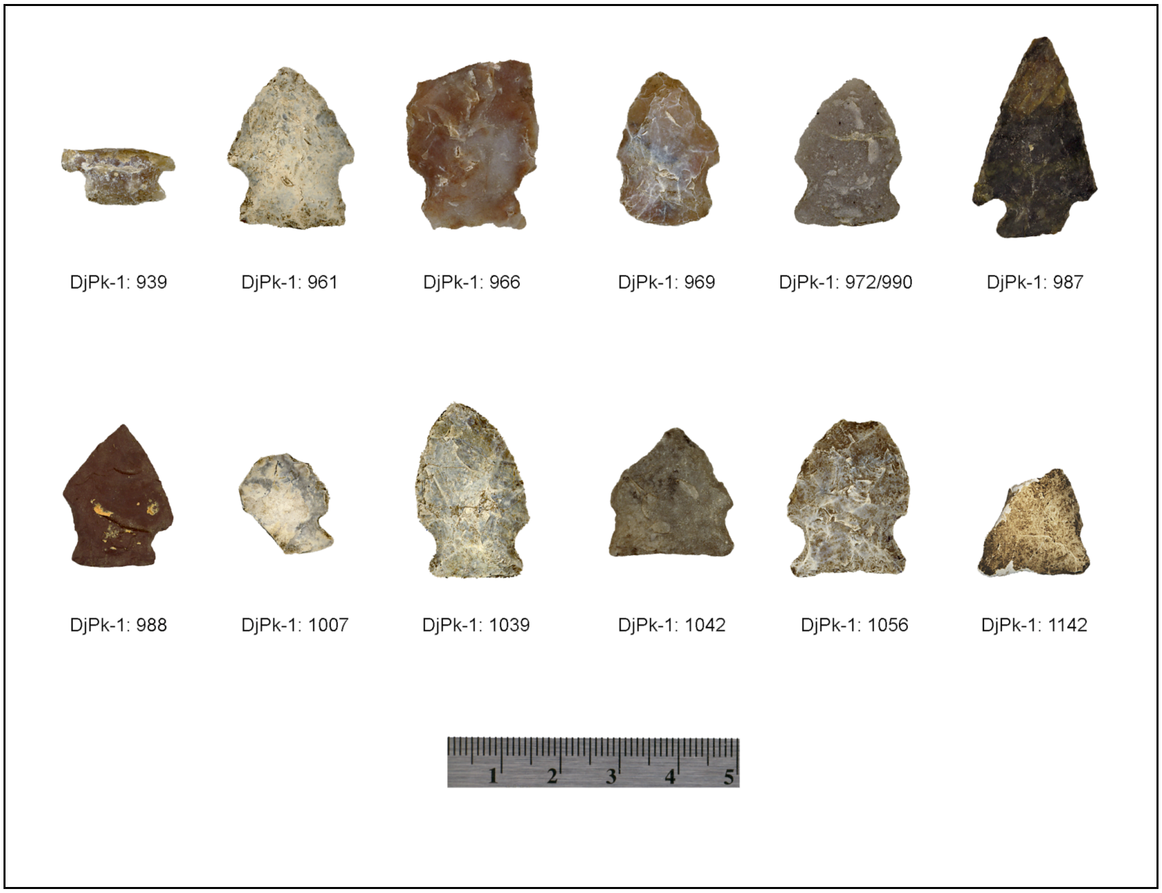

Figure 4.9b. Projectile points, Kenney site (DjPk-1), AB.

Table 4.12a. Kenney site, AB: Metric Data.

Cat. No.	Max. Length	Max. Width	Max. Thick	Body Length Left	Body Length Right	Notch Height Left	Notch Height Right
116	21.2	10.7	3.3	16.9	16.4	4.7	5.6
119	-	20.1	4.9	-	-	-	-
174	24.7	20.4	4.6	16.2	17.8	11.4	9.3
192	21.4	16.4	3.4	16.8	12.2	6.9	12.1
206	25.2	16.4	5.9	18.9	18.8	8.5	8.0
682	-	21.2	5.0	-	-	-	-
731	-	25.1	5.1	-	-	9.5	9.7
754	-	24.2	5.5	-	-	11.4	13.1
764	27.2	17.4	4.7	21.6	20.8	7.8	8.1
769	30.0	17.2	4.8	24.7	25.2	7.5	6.7
779	-	23.1	5.3	-	-	10.8	9.6
781	-	14.8	4.3	-	-	6.1	8.1
802	-	19.9	6.1	-	-	10.1	9.9
820	30.9	15.6	4.5	25.9	23.4	7.0	7.3
838	-	21.0	6.2	-	-	8.9	9.1
840	-	18.8	4.8	-	-	5.0	6.1
846	-	25.1	7.1	40.5	44.1	-	-
870	-	20.8	4.6	-	-	8.4	8.4
875	32.7	20.4	4.6	25.5	26.0	9.2	8.6
878	-	22.1	5.8	-	-	10.9	14.7
881	29.3	18.7	7.5	23.0	24.0	9.7	7.2
883	21.5	20.5	5.6	17.1	15.7	9.7	9.8
904	22.8	21.3	5.3	19.2	17.4	6.5	9.4
920	40.3	22.9	6.8	23.9	28.6	13.9	14.3
939	-	19.8	4.9	-	-	5.2	5.2
961	27.8	22.2	5.9	19.7	20.1	11.3	12.4
966	-	22.4	7.0	-	-	11.0	10.3
969	26.3	18.0	5.2	16.8	18.4	11.5	11.4
972/990	25.4	18.7	5.6	17.6	16.4	11.3	11.9
987	34.2	21.8	5.4	30.0	27.3	5.1	-
988	24.6	19.6	4.2	15.8	19.3	12.8	7.9
1007	17.8	-	4.1	-	12.6	-	6.1
1039	30.3	19.7	4.7	21.3	25.1	10.6	9.8
1042	22.0	21.2	5.7	17.9	16.6	1.5	2.0

Cat. No.	Max. Length	Max. Width	Max. Thick	Body Length Left	Body Length Right	Notch Height Left	Notch Height Right
1056	20.9	20.9	6.0	20.0	16.7	10.5	9.9
1142	-	19.4	5.7	-	-	-	8.7

Table 4.12b. Kenney site, AB: Metric Data.

Cat. No.	Notch Depth Left	Notch Depth Right	Shoulder Width	Max. Base Width	Neck Width	Basal Height Left	Basal Height Right	Wgt (g)
116	1.6	1.0	10.1	10.7	7.7	1.8	1.9	0.8
119	-	-	-	20.1	15.5	3.2	2.5	1.1
174	1.7	1.0	18.0	20.4	16.5	4.2	1.8	2.4
192	1.5	1.1	14.8	16.4	12.9	3.6	3.6	1.4
206	0.8	1.3	14.0	16.4	12.4	4.8	3.9	1.9
682	-	-	21.2	-	15.3	-	-	3.0
731	3.2	2.9	25.1	21.4	17.1	2.0	1.8	3.5
754	2.0	1.5	24.2	20.2	18.2	4.9	2.8	3.8
764	2.1	2.4	17.4	13.8	11.0	1.3	1.1	2.3
769	1.7	2.3	17.2	12.0	10.1	1.1	1.5	2.3
779	2.9	2.4	23.1	19.9	16.4	3.1	1.7	4.5
781	1.5	1.8	14.8	-	8.2	2.3	-	2.0
802	2.4	2.9	19.9	19.6	14.2	3.5	2.3	3.0
820	1.1	1.0	15.6	11.6	10.9	2.8	2.1	2.2
838	-	2.8	21.0	-	11.6	-	5.2	3.8
840	2.1	1.4	18.8	15.4	13.1	1.4	2.2	2.3
846	-	-	25.1	-	-	-	-	7.8
870	1.6	1.7	20.8	19.2	15.8	2.2	2.2	1.8
875	1.0	0.7	18.0	20.4	17.2	3.4	4.1	2.9
878	2.9	2.1	22.1	18.4	14.8	2.9	2.6	3.5
881	2.0	1.2	18.7	15.4	13.8	1.7	1.8	3.5
883	0.7	0.9	19.8	20.5	18.3	2.6	3.6	3.0
904	1.8	2.5	21.3	17.7	14.5	2.4	2.2	2.4
920	2.2	2.4	22.0	22.9	17.3	3.5	3.2	6.6
939	2.0	1.9	19.8	14.5	12.7	3.5	1.4	0.8
961	2.8	1.8	22.2	18.7	15.7	3.9	4.1	3.5
966	1.6	2.4	22.4	18.9	16.1	4.5	1.1	5.7
969	0.6	1.7	18.0	15.8	14.6	3.9	4.1	2.8
972/990	2.0	1.8	18.7	18.2	14.4	2.5	3.3	3.0
987	3.6	-	21.8	-	11.2	1.8	-	3.3
988	1.4	1.5	19.6	14.4	13.0	1.3	2.2	1.8
1007	-	2.1	-	-	-	-	1.7	1.1
1039	1.8	2.2	19.7	16.8	14.1	2.2	2.6	2.9
1042	0.7	1.0	20.8	21.2	19.0	1.5	2.2	2.8

Cat. No.	Notch Depth Left	Notch Depth Right	Shoulder Width	Max. Base Width	Neck Width	Basal Height Left	Basal Height Right	Wgt (g)
1056	2.6	2.5	20.9	20.3	15.5	2.5	2.7	3.5
1142	-	0.9	-	19.4	16.7	2.3	1.9	2.0

Table 4.13a. Kenney Site, AB: Non-metric Data.

Cat. No.	Unit	Level	Inferred Type	Material Type	Part	Body Shape	Symmetry
206	W15 S10	?	Besant	patinated chert	complete	TRI	SLASY
116	W20 N0	6	Besant	grey chalcedony	complete	OVT	SYM
119	W20 S10	6	-	white chert	base	-	-
682	10S 5W	6	Besant	patinated chert	body	OVT	SLASY
731	170S 10E	6	Besant	variegated chert	body/base	-	SYM
754	180S 10E	6	Besant	chert	body/base	-	SLASY
764	180S 10E	6	Besant	tan chert	tip missing	OVT	SLASY
769	180S 10E	6	Besant	tan chert	complete	OVT	SYM
779	190S 10E	6	Besant	tan quartzite	body/base	-	-
781	190S 10E	6	Besant	yellow jasper	body/base	-	SLASY
802	200S 10E	6	Besant	Avon chert	body/base	-	SLASY
174	W20 S10	8	Besant	grey chert	complete	OVT	SLASY
192	W15 S0	8	Besant	black chert	complete	OVT	SLASY
820	30S 10W	8	Besant	black chert	complete	OVT	SLASY
838	30S 10W	8	Pelican Lake?	variegated chert	body/base	TRI	SLASY
840	30S 10W	8	Pelican Lake?	chert	tip missing	OVT	SLASY
846	40S 10W	8	-	chert	body	OVT	SYM
870	10S 5W	8	Besant	patinated chert	body/base	-	SYM
875	10S 5W	8	Besant	grey chert	complete	TRI	SYM

Cat. No.	Unit	Level	Inferred Type	Material Type	Part	Body Shape	Symmetry
878	20S 5W	8	Besant	yellow jasper	body/base	-	ASY
881	20S 5W	8	Besant	black chert	complete	OVT	SLASY
883	150S 10E	8	Besant	grey chert	complete	OVT	SLASY
904	160S 10E	8	Besant	patinated chert	complete	OVT	SLASY
920	170S 10E	8	Besant	black chert	tip missing	OVT	SLASY
939	170S 10E	8	Pelican Lake?	chert	body/base	-	SLASY
961	180S 10E	8	Besant	patinated chert	complete	OVT	SYM
966	180S 10E	8	Besant	variegated chert	body/base	-	SLASY
969	180S 10E	8	Besant	chert	complete	OVT	SYM
972/ 990	180S 10E	8	Besant	quartzite	complete	OVT	SYM
987	180S 10E	8	Pelican Lake	patinated chert	1/3 base missing	TRI	SYM
988	180S 10E	8	Besant	maroon chert	complete	OVT	SLASY
1007	190S 10E	8	Besant	patinated chert	1/3 base missing	OVT	SLASY
1039	200S 10E	8	Besant	patinated chert	complete	OVT	SYM
1042	200S 10E	8	Besant	grey quartzite	complete	OVT	SLASY
1056	-	-	Besant	patinated chert	complete	OVT	SLASY
1142	150S 10E	8	Besant	patinated chert	body/ base	-	SLASY

Table 4.13b. Kenney Site, AB: Non-metric Data.

Cat. No.	Tranverse Sec. Shape	Longitudinal Sec. Shape	Left Shoulder Shape	Right Shoulder Shape	Left Notch Orient.	Right Notch Orient.
206	BI	BI	ANG/OBT	ANG/OBT	SIDE/ SKWPRX	SIDE/ SKWPRX
116	BI	CX/CV	ANG/RT	ANG/OBT	SIDE/ SKWPRX	SIDE/ SYM
119	BI	-	-	-	-	-
682	BI	BI	ANG/OBT	ANG/OBT	-	-
731	BI	-	ANG/OBT	ANG/OBT	SIDE/ SKWPRX	SIDE/ SYM
754	PLTR	-	RND	RND	SIDE/ SYM	SIDE/ SKWPRX
764	PLCX	PLCX	ANG/OBT	ANG/OBT	SIDE/ SKWPRX	SIDE/ SKWDST
769	BI	PLCX	ANG/OBT	ANG/ACT	COR/SYM	SIDE/ SKWPRX
779	-	-	ANG/OBT	ANG/OBT	SIDE/ SKWPRX	SIDE/ SYM
781	PLCX	PLCX	RND	ANG/OBT	SIDE/ SYM	SIDE/ SYM
802	BI	-	ANG/OBT	ANG/ACT	SIDE/ SYM	SIDE/ SKWPRX
174	BI	PLCX	ANG/OBT	ANG/OBT	SIDE/ SKWPRX	SIDE/ SKWPRX
192	PLCX	PLCX	ANG/OBT	RND	SIDE/ SYM	SIDE/ SKWDST
820	PLCX	CX/CV	ANG/OBT	ANG/OBT	COR/SYM	COR/ SYM
838	BI	BI	ANG/RT	ANG/ACT	-	COR/ SKWPRX
840	PLCX	BI	ANG/RT	ANG/ACT	COR/ SYM	COR/ SYM
846	BI	PLCX	RND	ANG/OBT	-	-
870	BI	-	ANG/OBT	ANG/OBT	SIDE/ SYM	SIDE/ SKWPRX
875	BI	CX/CV	ANG/OBT	ANG/OBT	SIDE/ SKWPRX	SIDE/ SKWPRX
878	PLCX	-	ANG/OBT	ANG/OBT	SIDE/ SKWDST	SIDE/ SKWPRX

Cat. No.	Tranverse Sec. Shape	Longitudinal Sec. Shape	Left Shoulder Shape	Right Shoulder Shape	Left Notch Orient.	Right Notch Orient.
881	BI	BI	ANG/OBT	ANG/OBT	COR/SYM	SIDE/ SYM
883	BI	PLCX	ANG/OBT	ANG/ OBT	SIDE/ SKWPRX	SIDE/ SKWPRX
904	BI	PLCX	ANG/OBT	ANG/ OBT	COR/SYM	SIDE/ SYM
920	BI	BI	ANG/OBT	ANG/OBT	SIDE/ SYM	SIDE/ SYM
939	BI	-	ANG/ACT	ANG/ACT	COR/SYM	COR/SYM
961	BI	BI	ANG/OBT	ANG/RT	COR/ SKWPRX	SIDE/ SKWPRX
966	BI	BI	ANG/OBT	ANG/OBT	SIDE/ SYM	SIDE/ SYM
969	PLCX	PLCX	ANG/OBT	ANG/OBT	SIDE/ SYM	SIDE/ SKWPRX
972/ 990	BI	CX/CV	ANG/OBT	ANG/OBT	SIDE/ SKWPRX	SIDE/ SKWDST
987	BI	PLCX	ANG/ACT	ANG/ACT	COR/SYM	COR/ SYM
988	PLCX	PLCX	ANG/OBT	ANG/OBT	COR/ SKWDST	COR/ SYM
1007	BI	PLCX	RND	-	SIDE/ SKWPRX	-
1039	PLCX	PLCX	ANG/OBT	ANG/OBT	SIDE/ SYM	SIDE/ SYM
1042	BI	BI	ANG/OBT	ANG/OBT	SIDE/ SKWPRX	SIDE/ SKWPRX
1056	BI	BI	ANG/OBT	ANG/RT	SIDE/ SYM	SIDE/ SKWPRX
1142	-	-	-	ANG/OBT	-	SIDE/ SKWPRX

Table 4.13c. Kenney Site, AB: Non-metric Data.

Cat. No.	Left Notch Shape	Right Notch Shape	Base Type	Left Basal Edge Shape	Right Basal Edge Shape	Ret.	Util.	Qual. of Raw Material	Qual. of Work.
206	ANG	ANG	STR	RND	RND	-	-	M	P
116	ANG	ANG	STR	RND	RND	-	-	M	M
119	-	-	STR	ANG	ANG	-	-	M	M
682	-	-	-	-	-	-	-	M	M
731	RND	SQR	CCV	RND	ANG	-	-	H	H
754	RND	ANG	STR	RND	RND	-	-	M	M
764	ANG	ANG	CCV	ANG	ANG	-	-	M	M
769	SQR	RND	STR	ANG	ANG	-	-	P	M
779	ANG	SQR	CCV	RND	RND	-	-	P	M
781	RND	RND	-	RND	-	-	-	H	M
802	SQR	ANG	STR	ANG	ANG	-	-	P	M
174	ANG	RND	CCV	ANG	RND	Y	-	M	M
192	RND	ANG	CXV	ANG	ANG	-	-	M	M
820	RND	SQR	STR	SQ/ CON	ANG	Y	-	M	P
838	RND	ANG	-	-	SQR	-	-	M	M
840	RND	RND	STR	ANG	SQ/ CON	-	-	M	M
846	-	-	-	-	-	-	-	M	M
870	ANG	ANG	STR	RND	RND	-	-	M	M
875	RND	RND	STR	SQ/ CON	RND	Y	-	M	M
878	RND	SQR	STR	RND	RND	-	-	M	M
881	SQR	RND	STR	ANG	ANG	Y	-	M	P
883	ANG	ANG	STR	RND	SQ/ CON	Y	-	P	M
904	RND	ANG	STR	RND	ANG	Y	-	P	M
920	SQR	RND	STR	RND	SQ/ CON	Y	-	M	M
939	SQR	SQR	STR	RND	ANG	-	-	M	M
961	ANG	ANG	STR	SQR	SQR	Y	-	M	M
966	SQR	RND	STR	SQ/ CON	RND	-	-	H	M
969	RND	ANG	CXV	RND	RND	Y	-	M	M
972/ 990	ANG	ANG	STR	RND	RND	-	-	P	M
987	RND	RND	STR	RND	-	-	-	M	M
988	ANG	SQR	STR	ANG	SQR	-	-	M	P

Cat. No.	Left Notch Shape	Right Notch Shape	Base Type	Left Basal Edge Shape	Right Basal Edge Shape	Ret.	Util.	Qual. of Raw Materia l	Qual. of Work.
1007	ANG	-	STR	ANG	-	Y	-	M	M
1039	SQR	SQR	STR	RND	RND	-	-	M	M
1042	ANG	ANG	STR	ANG	RND	-	-	P	M
1056	SQR	RND	STR	RND	RND	Y	-	M	M
1142	-	ANG	STR	RND	RND	-	-	P	M

Leavitt site (24LT22)

There are a total of 47 projectile points in the Leavitt site (24LT22) from northern Montana (Figures 4.10a, 4.10b; Tables 4.14a, 4.14b, 4.15a, 4.15b, 4.15c). Of these, 5 are complete, and the remainder fragmentary. The mean for the shoulder widths is 16.6 mm (n=23), ranging from 11.8 mm to 26.3 mm. The mean for the neck widths is 10.4 mm (n=19), ranging from 6.5 mm to 17.2 mm.

Raw materials represented in the Leavitt collection include chalcedony (n=11), chert (n=12), golden dendridic chert (n=1), Knife River Flint (n=11), and siltstone (n=1). Body shapes were ovate (n=24), and excurvate (n=1). Basal edge forms were straight (n=11), convex (n=2), and concave (n=4). Left shoulder shapes were angular-obtuse (n=20), angular-right (n=3) and round (n=2). Right shoulder shapes were angular-obtuse (n=17), angular-right (n=3) and round (n=2). Left notch shapes were rounded (n=3), angled (n=9), and squared (n=3). Right notch shapes were rounded (n=3), angled (n=5), and squared (n=3). Left notch orientation were side-symmetrical (n=3), side-skewed proximally (n=5), side-skewed distally (n=1), corner-symmetrical (n=4), and corner-skewed proximally. Right notch orientation were side-symmetrical (n=7), and corner-symmetrical (n=4).

Projectile point raw materials from the Leavitt site are dominated by chalcedony (23%), Knife River Flint (23%), and chert (26%). Although Knife River Flint is not as dominant when compared to the Muhlbach and Fincastle sites, high quality chalcedonies are preferred. Both atlatl darts and arrow points are represented within this assemblage, which is why this collection was included in the present study, as it demonstrates technological variability within a single assemblage late during the Besant Phase.

Projectile point bodies tend be ovate with obtuse shoulders, and feature straight bases from the Leavitt site. The atlatl forms and arrow forms have the same outline; the only difference is size. The projectile points are reminiscent of those from the Muhlbach and Fincastle sites, and the Leavitt site's location along the Missouri River is worthy of note, as the river may have served as a trade route from North Dakota to the Northwestern Plains.

Figure 4.10a. Projectile points, Leavitt collection, MT.

Figure 4.10b. Projectile points, Leavitt collection, MT.

Table 4.14a. Leavitt site, MT: Metric Data.

Cat. No.	Max. Length	Max. Width	Max. Thick	Body Length Left	Body Length Right	Notch Height Left	Notch Height Right
2?	-	13.5	2.9	-	-	5.1	4.8
4	-	15.5	3.3	-	-	-	-
5	-	-	2.9	-	-	-	-
7	-	11.0	3.6	-	-	7.2	-
10	-	24.1	5.3	61.7	61.2	-	-
11	-	23.6	6.4	36.1	35.6	-	-
12	-	-	3.7	-	-	-	-
13	38.3	22.1	5.4	30.5	29.6	10.6	11.1
14	-	22.8	6.4	-	-	9.0	9.1
16	-	14.1	3.7	-	-	4.4	4.9
17	21.7	15.2	3.8	17.9	16.4	6.7	5.6
19	-	19.5	4.3	36.0	34.1	-	-
21	-	14.0	4.1	-	-	-	-
23	16.4	13.8	4.1	12.3	-	6.2	-
26	-	26.3	5.7	-	-	8.6	8.8
27	-	-	4.4	-	-	-	-
28	-	-	4.4	-	-	-	-
30	20.6	13.1	3.4	15.3	15.6	6.1	7.9
32	25.4	12.9	3.4	18.5	19.3	6.3	7.5
34	14.0	13.7	2.3	11.1	9.9	5.8	7.6
35	-	-	3.3	-	-	-	-
36/42	-	-	3.0	-	-	-	-
38	-	-	2.7	-	-	-	-
40	-	15.3	3.0	-	-	-	-
41	-	-	2.1	-	-	-	-
44	-	-	4.8	-	-	-	-
45	-	12.7	3.6	-	-	5.6	4.9
46	-	-	3.3	-	-	-	-
47	-	14.9	3.4	22.3	22.8	-	-
48	-	16.0	3.9	-	-	6.2	5.6
50	-	12.5	3.8	-	-	-	-
51	20.5	10.9	3.9	15.8	-	5.7	-
52	-	11.8	2.6	-	-	5.0	5.0
53	22.1	12.2	3.3	18.3	17.2	6.0	5.5

Cat. No.	Max. Length	Max. Width	Max. Thick	Body Length Left	Body Length Right	Notch Height Left	Notch Height Right
54	-	22.3	4.4	-	-	-	-
56	-	21.5	5.9	45.2	42.0	-	-

Table 4.14b. Leavitt site, MT: Metric Data.

Cat. No.	Notch Depth Left	Notch Depth Right	Shoulder Width	Max. Base Width	Neck Width	Basal Height Left	Basal Height Right	Wgt (g)
2?	2.0	2.0	13.5	10.7	7.2	1.2	1.4	0.5
4	-	-	15.5	-	-	-	-	1.2
5	-	-	-	-	-	-	-	1.7
7	2.0	-	-	11.0	8.6	3.2	2.3	0.8
10	-	-	24.1	-	-	-	-	7.6
11	-	-	23.6	-	-	-	-	5.1
12	-	-	-	-	9.2	1.8	-	1.4
13	2.0	2.4	22.1	17.1	15.1	5.4	3.7	4.6
14	-	-	22.8	-	15.3	-	-	6.8
16	0.7	0.9	14.1	10.3	9.9	1.3	1.0	1.7
17	1.3	1.5	15.2	12.5	10.8	1.3	1.2	1.2
19	-	-	19.5	-	-	-	-	3.3
21	-	-	14.0	-	8.1	-	-	1.5
23	1.7	-	13.8	-	-	0.7	-	0.8
26	3.8	-	26.3	-	17.2	0.9	-	7.1
27	-	-	-	-	16.1	-	-	0.8
28	-	-	-	-	-	-	-	0.3
30	1.2	1.7	13.1	11.1	8.5	0.6	1.3	0.9
32	0.9	0.5	12.9	8.9	9.5	1.7	2.1	1.3
34	1.3	-	13.7	-	9.4	0.5	-	0.5
35	-	-	-	-	-	-	-	0.4
36/42	-	-	-	-	-	-	-	1.0
38	-	-	-	-	-	-	-	0.8
40	-	-	15.3	-	-	-	-	1.0
41	-	-	-	-	-	-	-	0.6
44	-	-	-	-	-	-	-	1.1
45	0.5	0.4	12.7	9.5	0.5	0.8	0.8	1.1
46	-	-	-	-	-	-	-	1.3
47	-	-	14.9	-	-	-	-	1.3
48	2.1	1.4	16.0	11.5	9.8	1.6	1.9	1.5
50	-	-	12.5	-	-	-	-	1.1
51	-	0.6	-	10.9	9.7	2.5	0.9	0.9
52	0.9	1.7	11.8	8.5	6.5	1.3	0.9	0.7
53	1.1	1.2	12.2	11.2	9.2	0.6	1.1	0.9

Cat. No.	Notch Depth Left	Notch Depth Right	Shoulder Width	Max. Base Width	Neck Width	Basal Height Left	Basal Height Right	Wgt (g)
54	-	-	-	22.3	16.5	-	-	1.2
56	-	-	21.5	-	-	-	-	6.5

Table 4.15a. Leavitt Site, MT: Non-metric Data.

Cat. No.	Unit	Level	Inferred Type	Material Type	Part	Body Shape	Symmetry
2?	-	44 cm BS	Samantha	KRF	body/ base	-	SYM
4	-	44 cm BS	-	chert	body	OVT	SYM
5	-	44 cm BS	-	chalcedony	body/ base	-	-
7	-	44 cm BS	Samantha	chalcedony	body/ base	-	-
10	-	44 cm BS	Besant	chert	body	OVT	SYM
11	-	44 cm BS	Besant	chert	body	OVT	SYM
12	-	44 cm BS	Besant	chert	body/ base	-	SYM
13	-	44 cm BS	Besant	KRF	complete	OVT	SLASY
14	-	44 cm BS	Besant	chalcedony	body/ base	OVT	SYM
16	-	44 cm BS	Besant	chalcedony	body/ base	OVT	SLASY
17	-	44 cm BS	Besant	chert	complete	OVT	SLASY
19	-	44 cm BS	-	KRF	body	OVT	SYM
21	-	44 cm BS	Besant	golden dendridic chert	body/ base	OVT	SYM
23	-	44 cm BS	Samantha	KRF	1/3 base missing	OVT	SLASY
26	-	44 cm BS	Besant	chert	body/ base	OVT	SYM
27	-	44 cm BS	Besant	KRF	base	-	-
28	-	44 cm BS	-	KRF	base	-	-
30	-	44 cm BS	Samantha	chalcedony	complete	OVT	SYM
32	-	44 cm BS	Besant	chert	complete	OVT	SLASY

Cat. No.	Unit	Level	Inferred Type	Material Type	Part	Body Shape	Symmetry
34	-	44 cm BS	Samantha	chert	body/ base	-	SLASY
35	-	44 cm BS	-	chert	body	-	-
36/42	-	44 cm BS	-	chalcedony	body	OVT	SYM
38	-	44 cm BS	-	chalcedony	body	-	-
40	-	44 cm BS	-	siltstone	body	OVT	SLASY
41	-	44 cm BS	-	KRF	body	OVT	SYM
44	-	44 cm BS	-	chert	body	-	-
45	-	44 cm BS	Besant	chert	body/ base	OVT	SLASY
46	-	44 cm BS	Besant	chalcedony	body/ base	OVT	-
47	-	44 cm BS	Besant	chalcedony	body	OVT	SYM
48	-	44 cm BS	Besant	KRF	body/ base	OVT	SYM
50	-	44 cm BS	-	chert	body	OVT	SYM
51	-	44 cm BS	Samantha	KRF	1/3 base missing	OVT	SLASY
52	-	44 cm BS	Samantha	chalcedony	body/ base	EXC	SYM
53	-	44 cm BS	Samantha	chalcedony	complete	OVT	SYM
54	-	44 cm BS	Besant	KRF	base	-	-
56	-	44 cm BS	Besant	KRF	body	OVT	SYM

Table 4.15b. Leavitt Site, MT: Non-metric Data.

Cat. No.	Tranverse Sec. Shape	Longitudinal Sec. Shape	Left Shoulder Shape	Right Shoulder Shape	Left Notch Orient.	Right Notch Orient.
2?	BI	BI	ANG/RT	ANG/OBT	SIDE/ SKWDST	SIDE/ SYM
4	BI	-	ANG/OBT	ANG/OBT	-	-
5	-	-	-	-	-	-
7	-	-	ANG/OBT	-	SIDE/ SYM	-
10	BI	BI	ANG/RT	ANG/RT	-	-
11	BI	BI	ANG/OBT	-	-	-
12	BI	-	-	ANG/OBT	-	-
13	BI	BI	ANG/OBT	ANG/OBT	COR/ SYM	SIDE/ SYM
14	BI	PLCX	ANG/OBT	ANG/OBT	-	-
16	PLCX	PLCX	ANG/RT	ANG/OBT	COR/ SYM	COR/ SYM
17	PLCX	BI	ANG/OBT	ANG/OBT	SIDE/ SKWPRX	SIDE/ SYM
19	BI	BI	-	-	-	-
21	PLCX	PLCX	ANG/OBT	ANG/OBT	-	-
23	BI	BI	ANG/OBT	-	SIDE/ SKWPRX	-
26	BI	BI	ANG/OBT	ANG/RT	COR/ SKWPRX	-
27	-	-	-	-	-	-
28	-	-	-	-	-	-
30	PLCX	PLCX	ANG/OBT	ANG/OBT	SIDE/ SKWPRX	SIDE/ SYM
32	BI	PLCX	RND	ANG/OBT	SIDE/ SYM	SIDE/ SYM
34	BI	-	ANG/OBT	ANG/OBT	SIDE/ SKWPRX	-
35	-	-	-	-	-	-
36/42	BI	-	ANG/OBT	-	-	-
38	BI	-	-	-	-	-
40	BI	PLCX	ANG/OBT	RND	-	-
41	BI	-	-	-	-	-

Cat. No.	Tranverse Sec. Shape	Longitudinal Sec. Shape	Left Shoulder Shape	Right Shoulder Shape	Left Notch Orient.	Right Notch Orient.
44	BI	-	-	-	-	-
45	BI	BI	ANG/OBT	ANG/OBT	SIDE/ SKWPRX	COR/ SYM
46	-	-	-	ANG/OBT	-	COR/ SYM
47	CX/CV	CX/CV	ANG/OBT	ANG/OBT	-	-
48	BI	BI	ANG/OBT	ANG/OBT	COR/ SYM	SIDE/ SYM
50	BI	-	RND	ANG/OBT	-	-
51	BI	BI	ANG/OBT	-	-	-
52	CX/CV	CX/CV	ANG/OBT	RND	COR/ SYM	COR/ SYM
53	BI	BI	ANG/OBT	ANG/OBT	SIDE/ SYM	SIDE/ SYM
54	-	-	-	-	-	-
56	BI	BI	ANG/OBT	ANG/RT	-	-

Table 4.15c. Leavitt Site, MT: Non-metric Data.

Cat. No.	Left Notch Shape	Right Notch Shape	Base Type	Left Basal Edge Shape	Right Basal Edge Shape	Ret.	Util.	Qual. of Raw Material	Qual. of Work.
2?	ANG	ANG	STR	ANG	ANG	-	-	H	H
4	-	-	-	-	-	-	-	H	H
5	-	-	-	-	-	-	-	H	H
7	ANG	-	STR	SQR	-	-	-	H	H
10	-	-	-	-	-	-	-	H	H
11	-	-	-	-	-	-	-	H	H
12	-	-	STR	RND	-	-	-	H	H
13	RND	RND	STR	SQ/CON	SQ/CON	-	-	H	H
14	-	-	CCV	-	-	-	-	H	H
16	SQR	SQR	CCV	RND	ANG	-	-	H	H
17	ANG	ANG	STR	ANG	ANG	-	-	H	M
19	-	-	-	-	-	-	-	H	H
21	-	-	-	-	-	-	-	H	H
23	RND	-	STR	ANG	-	-	-	H	H
26	ANG	-	-	ANG	-	-	-	H	H
27	-	-	-	-	-	-	-	H	H
28	-	-	-	ANG	-	-	-	H	H
30	ANG	RND	STR	ANG	ANG	-	-	H	M
32	SQR	SQR	CVX	SQR	SQR	-	-	M	M
34	SQR	-	STR	ANG	-	-	-	H	M
35	-	-	-	-	-	-	-	M	M
36/42	-	-	-	-	-	-	-	H	H
38	-	-	-	-	-	-	-	H	H
40	-	-	-	-	-	-	-	M	M
41	-	-	-	-	-	-	-	H	H
44	-	-	-	-	-	-	-	H	H
45	ANG	RND	CVX	ANG	ANG	-	-	M	M
46	-	ANG	-	-	-	-	-	H	H
47	-	-	-	-	-	-	-	H	M
48	RND	RND	STR	RND	ANG	-	-	H	M
50	-	-	-	-	-	-	-	M	M
51	ANG	ANG	CCV	-	ANG	-	-	H	H
52	ANG	ANG	STR	ANG	ANG	-	-	H	M
53	ANG	SQR	STR	ANG	ANG	-	-	H	H

Cat. No.	Left Notch Shape	Right Notch Shape	Base Type	Left Basal Edge Shape	Right Basal Edge Shape	Ret.	Util.	Qual. of Raw Material	Qual. of Work.
54	-	-	CCV	ANG	ANG	-	-	H	H
56	-	-	-	-	-	-	-	H	H

Muhlbach site (FbPf-1)

The Muhlbach site (FbPf-1) is located near Stettler, Alberta. Like the Fincastle site, Muhlbach is set within low sand hills. There are a total of 112 projectile points from the Muhlbach site (Figures 4.11a, 4.11b, 4.11c, 4.11d; Tables 4.16a, 4.16b, 4.17a, 4.17b, 5.17c). Thirty-five projectile points are missing; data for these points were gathered from catalogue records as available, and included in the projectile point study (Figures 4.12a, 4.12b; Tables 4.18a, 4.18b, 4.19a, 4.19b, 4.19c). Of these, 40 projectile points are complete, and the rest fragmentary. Gruhn (1969) interpreted the Muhlbach site as a single component site, representing one bison kill. The mean for the shoulder widths is 19.4 mm (n=71), ranging from 9.0 mm to 26.0 mm. The mean for the neck widths is 13.9 mm (n=71), ranging from 8.0 mm to 18.4 mm.

Raw materials represented in the Muhlbach projectile point assemblage include chert (n=4), chalcedony (n=2), golden dendridic chert (n=6), Knife River Flint (n=95), and petrified wood (n=1). Body shapes were ovate (n=78), and triangular (n=2). Basal edge forms were straight (n=50), convex (n=11), and concave (n=8). Left shoulder shapes were angular-obtuse (n=58), angular-right (n=2) and round (n=12). Right shoulder shapes were angular-obtuse (n=57), angular-right (n=1) and round (n=12). Left notch shapes were rounded (n=10), angled (n=37), and squared (n=17). Right notch shapes were rounded (n=20), angled (n=30), and squared (n=12). Left notch orientation were side-symmetrical (n=24), side-skewed proximally (n=6), side-skewed distally (n=3), corner-symmetrical (n=10), corner-skewed proximally (n=14), and corner-skewed distally (n=4). Right notch orientation were side-symmetrical (n=22), side-skewed proximally (n=6), side-skewed distally (n=2), corner-symmetrical (n=14), corner-skewed proximally (n=8), and corner-skewed distally (n=3).

Knife River Flint dominates the Muhlbach site projectile points, representing 85% of the total point assemblage. Muhlbach projectile points tend to have elongated bodies. Body shapes tend to be ovate with obtuse shoulders, and bases tend to be straight bases. Notches are usually angled and either side-symmetrical or corner-symmetrical. Projectile points were identified as corner notched when the shoulder width exceeded the basal width. The Muhlbach site projectile points include well-made bifacially worked projectile points, and expedient flake points that may represent arrow points. No Pelican Lake projectile points were recovered.

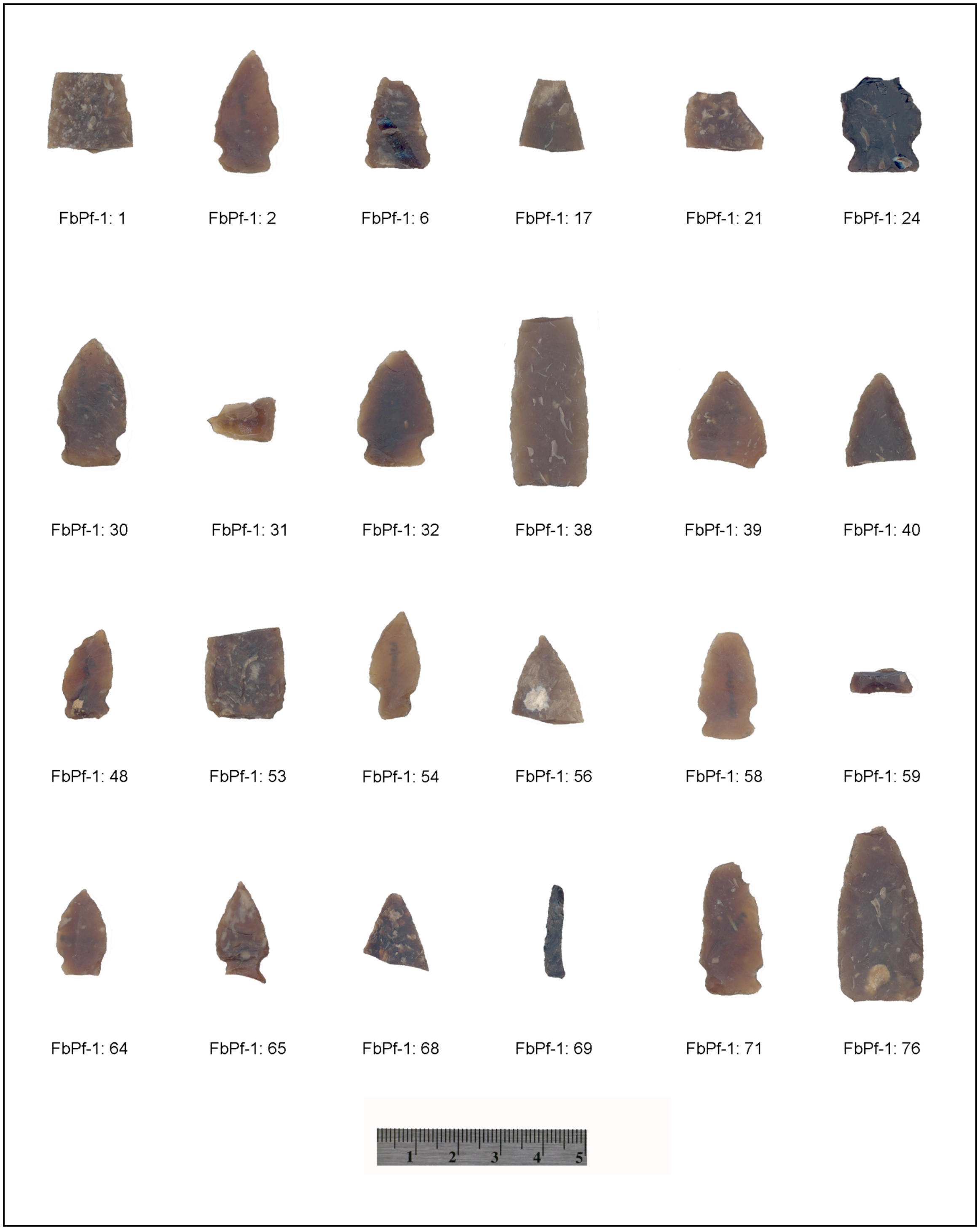

Figure 4.11a. Projectile points, Muhlbach site (FbPf-1), AB.

Figure 4.11b. Projectile points, Muhlbach site (FbPf-1), AB.

Figure 4.11c. Projectile points, Muhlbach site (FbPf-1), AB.

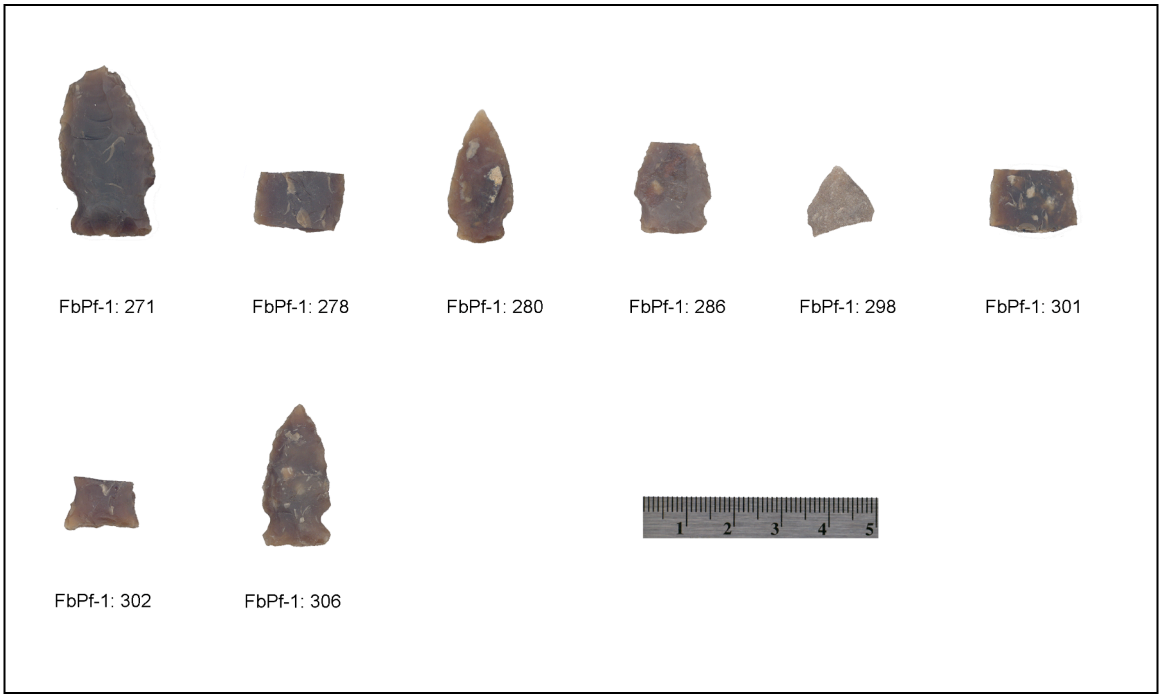

Figure 4.11d. Projectile points, Muhlbach site (FbPf-1), AB.

Table 4.16a. Muhlbach site, AB: Metric Data.

Cat. No.	Max. Length	Max. Width	Max. Thick	Body Length Left	Body Length Right	Notch Height Left	Notch Height Right
1	-	-	5.0	-	-	-	-
2	35.7	19.0	4.0	28.9	27.9	9.3	9.8
6	-	18.5	4.0	-	-	7.9	9.2
17	-	-	4.7	-	-	-	-
21	-	-	4.8	-	-	-	-
24	-	22.0	6.0	-	-	10.6	11.4
30	37.0	20.0	6.0	27.4	28.1	12.6	10.1
31	-	-	3.0	-	-	-	-
32	33.0	21.0	4.0	25.6	25.7	10.3	9.9
38	-	-	5.7	-	-	-	-
39	-	-	5.8	-	-	-	-
40	-	-	3.7	-	-	-	-
48	27.0	14.0	4.0	21.4	18.9	8.2	8.2
53	-	-	5.0	-	-	-	-
54	31.0	11.0	4.0	22.8	23.6	11.4	7.1
56	-	-	5.0	-	-	-	-
58	31.0	17.0	3.0	22.2	21.4	9.6	10.6
59	-	-	5.0	-	-	-	-
64	25.0	15.0	3.0	20.4	20.0	7.3	7.7
65	29.0	15.0	5.0	23.2	23.7	-	8.1
68	-	-	4.0	-	-	-	-
69	-	-	3.5	-	-	-	-
71	38.0	18.0	4.0	26.4	32.0	9.7	8.3
76	-	22.7	6.0	-	-	-	-
80	-	-	5.0	-	-	-	-
84	-	20.0	5.0	-	-	16.8	11.0
87	22.0	13.0	2.0	15.5	15.0	9.0	7.4
89	-	23.0	6.0	-	-	-	-
92	-	21.0	6.0	-	-	-	-
93	-	21.0	4.0	-	-	-	-
97	-	20.0	6.0	-	-	11.7	9.5
100	24.0	15.0	4.0	18.1	16.7	8.2	4.7
103	-	16.0	5.0	30.1	28.1	-	-
110	-	-	5.0	-	-	-	-

Cat. No.	Max. Length	Max. Width	Max. Thick	Body Length Left	Body Length Right	Notch Height Left	Notch Height Right
113	-	-	5.0	-	-	-	-
114	-	-	5.0	-	-	-	-
115	-	21.0	0	-	-	9.2	-
122	-	-	5.0	-	-	-	-
128	-	-	4.7	-	-	-	-
129	-	-	3.0	-	-	-	-
130	-	-	5.0	-	-	-	-
134	-	17.0	3.0	-	-	9.0	9.3
144	-	-	5.0	-	-	-	-
147	-	-	3.4	-	-	-	-
148	-	-	4.0	-	-	-	-
145	-	-	4.0	-	-	-	-
181	-	-	6.0	-	-	-	-
182	30.0	18.0	6.0	22.1	26.2	8.9	6.0
195	-	21.0	5.0	-	-	-	-
203	21.0	9.0	3.0	12.7	13.6	5.2	10.9
212	-	-	6.0	-	-	-	-
214	-	-	5.0	-	-	-	-
217	-	-	4.0	-	-	-	-
222	38.5	22.0	4.0	27.2	31.9	13.0	9.5
223	-	-	6.0	-	-	-	-
224	-	22.0	5.0	-	-	9.8	9.1
225	-	14.0	3.0	-	-	8.3	7.6
227	-	24.0	6.0	-	-	11.7	8.6
233	-	19.0	5.0	-	-	-	-
234	-	-	4.5	-	-	-	-
239	-	18.5	6.0	-	-	9.8	11.8
240	-	-	6.0	-	-	-	-
247	22.0	12.0	2.0	15.3	15.3	8.3	8.7
251	-	-	5.0	-	-	-	-
253	-	14.5	2.0	9.8	7.0	-	0.5
254	-	-	3.0	-	-	8.8	4.9
255	-	-	5.5	-	-	-	-
258	-	16.8	5.0	-	-	-	-
259	-	-	6.0	-	-	-	-
262	-	-	5.0	-	-	-	-
264	30.0	19.0	5.0	21.6	21.7	11.1	11.4

Cat. No.	Max. Length	Max. Width	Max. Thick	Body Length Left	Body Length Right	Notch Height Left	Notch Height Right
268	-	-	6.0	-	-	-	-
270	-	20.1	4.5	-	-	-	-
271	44.0	23.5	6.5	-	-	14.5	14.0
278	-	-	5.0	-	-	-	-
280	34.5	16.0	3.0	28.0	27.7	7.9	8.8
286	-	19.0	5.0	-	-	10.5	9.4
298	-	-	4.0	-	-	-	-
301	-	-	6.0	-	-	-	-
302	-	18.0	5.0	-	-	-	-
306	36.0	18.0	6.0	29.2	28.0	9.3	10.3

Table 4.16b. Muhlbach site, AB: Metric Data.

Cat. No.	Notch Depth Left	Notch Depth Right	Shoulder Width	Max. Base Width	Neck Width	Basal Height Left	Basal Height Right	Wgt (g)
1	-	-	-	-	-	-	-	3.7
2	1.7	0.8	19.0	15.0	13.7	4.4	2.2	2.1
6	0.9	0.8	17.8	18.5	16.8	2.8	2.7	2.5
17	-	-	-	-	-	-	-	2.1
21	-	-	-	-	-	-	-	2.1
24	2.6	2.3	22.0	20.0	16.0	1.0	1.0	4.5
30	1.6	2.0	20.0	14.0	16.0	2.0	3.0	4.4
31	-	-	-	-	-	-	-	0.9
32	1.7	2.3	21.0	17.0	15.0	3.0	1.0	2.9
38	-	-	-	-	-	-	-	8.7
39	-	-	-	-	-	-	-	2.2
40	-	-	-	-	-	-	-	2.9
48	0.6	1.0	14.0	13.0	11.0	1.0	2.0	1.3
53	-	-	-	-	-	-	-	4.3
54	1.6	1.1	16.0	9.0	8.0	1.0	1.0	1.5
56	-	-	-	-	-	-	-	2.5
58	1.7	1.6	17.0	15.0	12.0	1.5	2.4	1.7
59	-	-	-	-	-	-	-	0.6
64	1.1	0.4	15.0	11.0	11.0	2.8	2.0	1.4
65	-	2.2	15.0	-	9.0	-	0.7	1.7
68	-	-	-	-	-	-	-	1.5
69	-	-	-	-	-	-	-	0.5
71	1.1	1.5	18.0	16.0	15.0	2.9	2.4	2.9
76	-	-	22.7	-	-	-	-	8.3
80	-	-	-	-	-	-	-	1.6
84	2.8	2.6	20.0	17.0	12.0	-	3.0	3.3
87	1.0	1.1	13.0	12.0	1.0	3.7	2.0	0.9
89	-	-	23.0	-	-	-	-	8.5
92	-	-	21.0	-	-	-	-	4.5
93	-	-	-	21.0	18.0	1.8	1.9	1.1
97	1.7	1.2	20.0	17.2	15.0	3.0	3.0	4.4
100	1.3	1.7	15.0	-	8.0	2.0	-	1.0
103	-	-	16.0	-	12.0	-	-	3.3
110	-	-	-	-	-	-	-	1.9

Cat. No.	Notch Depth Left	Notch Depth Right	Shoulder Width	Max. Base Width	Neck Width	Basal Height Left	Basal Height Right	Wgt (g)
113	-	-	-	-	-	-	-	2.2
114	-	-	-	-	-	-	-	1.9
115	1.9	-	21.0	17.0	15.0	1.6	0.8	0.3
122	-	-	-	-	-	-	-	2.8
128	-	-	-	-	-	-	-	2.5
129	-	-	-	-	-	-	-	1.1
130	-	-	-	-	-	-	-	2.4
134	0.7	0.7	17.0	10.0	12.0	4.2	5.0	1.0
144	-	-	-	-	15.0	3.0	-	0.9
147	-	-	-	-	-	-	-	0.4
148	-	-	-	-	-	-	-	1.7
145	-	-	-	-	-	-	-	2.4
181	-	-	-	-	-	-	-	2.8
182	1.7	0.9	18.0	16.0	14.0	2.1	2.6	3.0
195	-	-	21.0	-	-	-	-	2.8
203	1.0	0.7	9.0	8.5	7.0	2.4	2.4	0.6
212	-	-	-	-	-	-	-	5.6
214	-	-	-	-	-	-	-	2.7
217	-	-	-	-	-	-	-	0.9
222	1.1	1.3	22.0	17.0	15.0	1.1	1.4	4.2
223	-	-	-	-	-	-	-	4.8
224	1.9	1.6	22.0	20.0	17.0	2.2	0.7	2.9
225	0.9	1.6	14.0	9.0	8.0	2.8	2.8	1.3
227	2.6	-	24.0	-	-	1.0	-	6.3
233	-	-	-	19.0	14.8	1.7	1.3	0.8
234	-	-	-	-	-	-	-	2.7
239	1.0	2.8	18.0	18.5	14.5	3.8	2.7	3.5
240	-	-	-	-	-	-	-	5.4
247	0.4	0.6	12.0	8.0	8.0	3.0	3.0	0.5
251	-	-	-	-	18.4	-	-	2.4
253	-	1.3	14.5	-	12.8	-	0.9	0.5
254	0.6	1.0	14.8	11.1	9.9	3.2	1.6	1.1
255	-	-	-	-	-	-	-	5.2
258	-	-	16.8	-	-	-	-	2.0
259	-	-	-	-	-	-	-	6.3
262	-	-	-	-	-	-	-	1.7
264	2.3	2.4	18.0	19.0	14.0	2.1	2.5	3.3

Cat. No.	Notch Depth Left	Notch Depth Right	Shoulder Width	Max. Base Width	Neck Width	Basal Height Left	Basal Height Right	Wgt (g)
268	-	-	-	-	-	-	-	2.1
270	-	-	20.1	-	14.9	-	-	3.2
271	2.7	2.4	23.5	20.5	17.0	4.3	1.9	8.3
278	-	-	-	-	-	-	-	2.9
280	0.7	1.0	16.0	12.0	11.0	2.4	3.1	2.1
286	0.8	1.1	19.0	15.0	16.0	1.7	2.5	2.8
298	-	-	-	-	-	-	-	1.2
301	-	-	-	-	-	-	-	2.6
302	-	-	-	18.0	15.0	1.0	1.1	1.6
306	1.8	2.1	17.8	18.0	12.9	3.4	3.5	4.0

Table 4.17a. Muhlbach site, AB: Non-metric Data.

Cat. No.	Unit	Level	Inferred Type	Material Type	Part	Body Shape	Symmetry
1	A11	46 cm	-	KRF	body	-	-
2	A10	15 cm	Besant	KRF	complete	OVT	SYM
6	A13	49 cm	Besant	KRF	body/ base	-	SYM
17	A14	43 cm	-	KRF	body	-	-
21	B11	70 cm	-	KRF	body	-	-
24	A13	59 cm	Besant	KRF	tip missing	-	SLASY
30	A10	69 cm	Besant	KRF	complete	OVT	SYM
31	A12	64 cm	-	KRF	body	-	-
32	A13	62 cm	Besant	KRF	complete	OVT	SYM
38	A14	37 cm	-	KRF	body	OVT	SYM
39	B10	70 cm	-	KRF	body	OVT	SYM
40	B10	74 cm	-	KRF	body	OVT	SYM
48	A14	47 cm	Besant	KRF	complete	OVT	ASY
53	C10	83 cm	-	KRF	body	-	-
54	B11	59 cm	Besant	KRF	complete	OVT	SLASY
56	A14	45 cm	-	KRF	body	OVT	SYM
58	B13	35 cm	Besant	KRF	tip missing	OVT	SLASY
59	B10	70 cm	-	KRF	base	-	-
64	B10	75 cm	Besant	KRF	complete	OVT	SLASY
65	B10	68 cm	Besant	KRF	body/ base	OVT	ASY
68	B10	71 cm	-	KRF	body	-	-
69	B13	56 cm	-	KRF	body	-	-
71	A10	-	Besant	KRF	tip missing	OVT	ASY
76	A11	68 cm	-	KRF	body	OVT	SYM
80	B14	41 cm	-	KRF	body	OVT	SYM
84	B13	57 cm	Besant	KRF	body/ base	OVT	ASY
87	B12	68 cm	Besant	KRF	complete	OVT	SLASY
89	B12	55 cm	-	KRF	body	OVT	SYM
92	backdirt	-	-	chalcedony	body	OVT	SYM

Cat. No.	**Unit**	**Level**	**Inferred Type**	**Material Type**	**Part**	**Body Shape**	**Symmetry**
93	N10	55 cm	Besant	red chalcedony	base	-	SYM
97	A11	77 cm	Besant	KRF	tip missing	OVT	SLASY
100	M12	60 cm	Besant	KRF	1/2 base missing	OVT	ASY
103	B13	59 cm	Besant	KRF	body	OVT	SYM
110	B13	62 cm	Besant	KRF	Body	OVT	SYM
113	A23	76 cm	Besant	red chert	body/ base	-	-
114	A22	78 cm	-	KRF	body	-	-
115	B14	38 cm	Besant	KRF	base	-	SYM
122	A22	79 cm	-	KRF	body	-	-
128	-	-	Besant	KRF	1/3 base missing	OVT	SLASY
129	A11	58 cm	-	KRF	body	OVT	SYM
130	A11	59 cm	-	buff chert	body	-	-
134	A20	66 cm	Besant	KRF	body/ base	-	-
144	C10	72 cm	-	KRF	base	-	-
145	A20	67 cm	-	KRF	body	OVT	SYM
147	backdirt	-	-	KRF	base	-	-
148	B10	72 cm	-	KRF	body	OVT	SYM
181	C10	70 cm	-	KRF	body	OVT	ASY
182	B14	48 cm	Besant	KRF	complete	TRI	ASY
195	B10	66 cm	-	golden dendridic chert	body	OVT	-
203	B21	77 cm	-	KRF	complete	OVT	ASY
212	B14	48 cm	-	KRF	body	OVT	SYM
214	B20	60 cm	-	KRF	body	OVT	SYM
217	A13	62 cm	-	KRF	body	OVT	SYM
222	A19	60 cm	Besant	golden dendridic chert	complete	OVT	SLASY

Cat. No.	Unit	Level	Inferred Type	Material Type	Part	Body Shape	Symmetry
223	A19	49 cm	-	golden dendridic chert	body	OVT	SLASY
224	D20	69 cm	Besant	golden dendridic chert	base	-	SLASY
225	B20	74 cm	Besant	black chert	tip missing	OVT	SLASY
227	B19	60 cm	Besant	white quartzite	body/ base	OVT	SLASY
233	D20	88 cm	Besant	KRF	base	-	-
234	B19	56 cm	-	KRF	body	OVT	SYM
239	C20	89 cm	-	KRF	base	-	ASY
240	E20	89 cm	-	KRF	body	OVT	SYM
247	B19	60 cm	Besant	KRF	body	TRI	SLASY
251	A14	67 cm	-	golden dendridic chert	body	-	-
253	A14	31 cm	-	KRF	body/ base	OVT	SLASY
254	B13	33 cm	Besant	KRF	complete	-	ASY
255	A13	47 cm	-	KRF	body	OVT	SYM
258	B13	39 cm	-	KRF	body	-	ASY
259	C19	74 cm	-	KRF	body	OVT	SYM
262	E20	84 cm	-	KRF	body	-	-
264	C19	85 cm	Besant	KRF	complete	OVT	SLASY
268	A11	53 cm	-	golden dendridic chert	body	OVT	SYM
270	A11	57 cm	Besant	KRF	body	OVT	SLASY
271	A13	66 cm	Besant	KRF	body/ base	OVT	SYM
278	B11	58 cm	-	KRF	body	-	-
280	A13	54.5 cm	Besant	KRF	complete	OVT	SLASY
286	B12	66 cm	Besant	KRF	tip missing	OVT	SLASY
298	A11	55 cm	-	tan quartzite	body	OVT	SLASY

Cat. No.	Unit	Level	Inferred Type	Material Type	Part	Body Shape	Symmetry
301	A14	16 cm; disturb-ed	-	KRF	body	-	-
302	B19	52 cm	Besant	KRF	base	-	SLASY
306	A14	55 cm	Besant	KRF	complete	OVT	SYM

Table 4.17b. Muhlbach site, AB: Non-metric Data.

Cat. No.	Tranverse Sec. Shape	Longitudinal Sec. Shape	Left Shoulder Shape	Right Shoulder Shape	Left Notch Orient.	Right Notch Orient.
1	BI	-	-	-	-	-
2	ASYM/ PLCX	ASYM/ CX/CV	ANG/OBT	ANG/OBT	COR/ SKWPRX	COR/ SKWPRX
6	PLCX	PLCX	ANG/OBT	ANG/OBT	SIDE/ SKWDST	SIDE/ SKWDST
17	BI	BI	-	-	-	-
21	-	-	-	-	-	-
24	BI	-	ANG/OBT	RND	COR/ SKWPRX	COR/ SKWPRX
30	ASYM/ PLTR	PLCX	ANG/OBT	ANG/OBT	COR/ SKWPRX	COR/ SWKPRX
31	-	-	-	-	-	-
32	PLTR	CX/CV	ANG/OBT	ANG/OBT	COR/ SKWPRX	COR/ SKWPRX
38	BI	PLCX	-	-	-	-
39	ASYM/ PLTR	PLCX	-	-	-	-
40	PLCX	PLCX	-	-	-	-
48	PLTR	ASYM/PLTR	RND	RND	COR/ SKWDST	SIDE/ SYM
53	PLCX	-	-	-	-	-
54	CX/CV	CX/CV	ANG/OBT	RND	COR/ SKWPRX	COR/ SKWPRX
56	BI	-	-	-	-	-
58	PLCX	CX/CV	ANG/OBT	ANG/OBT	COR/ SKWPRX	COR/ SYM
59	-	-	-	-	-	-
64	PLTR	CX/CV	RND	ANG/OBT	COR/ SKWDST	COR/ SKWDST
65	CX/CV	CX/CV	RND	ANG/OBT	-	COR/ SYM
68	BI	-	-	-	-	-
69	-	-	-	-	-	-
71	PLTR	PLCX	ANG/OBT	ANG/OBT	COR/ SKWPRX	COR/ SYM

Cat. No.	Tranverse Sec. Shape	Longitudinal Sec. Shape	Left Shoulder Shape	Right Shoulder Shape	Left Notch Orient.	Right Notch Orient.
76	BI	BI	ANG/OBT	ANG/OBT	-	-
80	BI	-	-	-	-	-
84	PLCX	PLCX	ANG/OBT	ANG/OBT	COR/ SYM	COR/ SYM
87	PLCX	CX/CV	ANG/OBT	ANG/OBT	SIDE/ SYM	SIDE/ SYM
89	BI	BI	ANG/OBT	ANG/OBT	-	-
92	BI	BI	-	-	-	-
93	PLCX	-	-	-	-	-
97	BI	BI	ANG/OBT	ANG/OBT	COR/ SYM	COR/ SKWPRX
100	CX/CV	CX/CV	ANG/OBT	ANG/OBT	COR/ SYM	COR/ SYM
103	CX/CV	CX/CV	RND	RND	-	-
110	PLCX	-	-	-	-	-
113	-	-	ANG/OBT	-	-	-
114	-	-	-	-	-	-
115	PLCX	PLCX	ANG/OBT	-	COR/ SYM	-
122	PLCX	BI	-	-	-	-
128	BI	BI	ANG/OBT	ANG/OBT	-	SIDE/ SYM
129	CX/CV	CX/CV	-	-	-	-
130	BI	BI	-	-	-	-
134	CX/CV	CX/CV	ANG/OBT	ANG/OBT	COR/ SKWPRX	COR/ SKWDST
144	BI	-	-	-	-	-
145	BI	BI	-	-	-	-
147	-	-	-	-	-	-
148	BI	CX/CV	-	-	-	-
181	PLCX	-	-	-	-	-
182	ASY/BI	BI	ANG/OBT	RND	COR/ SKWPRX	SIDE/ SYM
195	PLCX	PLCX	ANG/RT	ANG/OBT	-	-
203	PLTR	PLCX	RND	ANG/OBT	SIDE/ SKWDST	SIDE/ SKWPRX

Cat. No.	Tranverse Sec. Shape	Longitudinal Sec. Shape	Left Shoulder Shape	Right Shoulder Shape	Left Notch Orient.	Right Notch Orient.
212	BI	BI	-	-	-	-
214	BI	BI	-	-	-	-
217	BI	-	-	-	-	-
222	BI	PLCX	RND	RND	COR/ SKWDST	COR/ SKWPRX
223	PLCX	CX/CV	-	-	-	-
224	CX/CV	CX/CV	ANG/OBT	ANG/OBT	COR/SYM	COR/ SYM
225	PLCX	PLCX	ANG/OBT	ANG/OBT	COR/SYM	COR/ SYM
227	BI	BI	ANG/OBT	ANG/OBT	COR/ SKWPRX	-
233	BI	-	-	-	-	-
234	PLCX	CX/CV	-	-	-	-
239	PLCX	BI	ANG/OBT	ANG/OBT	SIDE/ SYM	SIDE/ SKWDST
240	BI	BI	ANG/OBT	ANG/OBT	-	-
247	CX/CV	CX/CV	ANG/OBT	ANG/OBT	COR/ SKWPRX	COR/ SKWPRX
251	PLTR	-	ANG/OBT	ANG/OBT	-	-
253	PLCX	BI	RND	RND	-	SIDE/ SKWDST
254	CX/CV	CX/CV	ANG/OBT	ANG/OBT	-	-
255	BI	BI	-	-	-	-
258	PLCX	-	-	-	-	-
259	PLTR	PLCX	-	-	-	-
262	BI	-	-	-	-	-
264	PLCX	PLCX	RND	ANG/OBT	SIDE/ SYM	SIDE/ SKWPRX
268	BI	-	-	-	-	-
270	CX/CV	CX/CV	ANG/OBT	ANG/OBT	-	-
271	BI	BI	ANG/OBT	ANG/OBT	COR/SYM	COR/ SKWDST
278	BI	-	-	-	-	-
280	PLCX	PLCX	ANG/OBT	ANG/OBT	COR/ SKWDST	COR/ SYM

Cat. No.	Tranverse Sec. Shape	Longitudinal Sec. Shape	Left Shoulder Shape	Right Shoulder Shape	Left Notch Orient.	Right Notch Orient.
286	BI	BI	ANG/OBT	ANG/OBT	COR/ SKWPRX	COR/ SYM
298	BI	-	-	-	-	-
301	BI	-	-	-	-	-
302	PLCX	-	-	-	-	-
306	BI	BI	ANG/OBT	ANG/OBT	COR/ SKWPRX	COR/ SYM

Table 4.17c. Muhlbach site, AB: Non-metric Data.

Cat. No.	Left Notch Shape	Right Notch Shape	Base Type	Left Basal Edge Shape	Right Basal Edge Shape	Ret.	Util.	Qual. of Raw Material	Qual. of Work.
1	-	-	-	-	-	-	-	H	H
2	ANG	ANG	STR	SQ/CON	RND	-	-	H	M
6	SQR	RND	STR	RND	RND	-	-	H	M
17	-	-	-	-	-	-	-	H	H
21	-	-	-	-	-	-	-	H	H
24	ANG	RND	STR	ANG	SQ/CON	-	-	H	H
30	RND	RND	STR	RND	SQ/CON	-	-	H	M
31	-	-	-	-	-	-	-	H	H
32	ANG	RND	STR	RND	SQ/CON	-	-	H	M
38	-	-	-	-	-	-	-	H	H
39	-	-	-	-	-	-	-	H	M
40	-	-	-	-	-	-	-	H	H
48	SQR	ANG	STR	RND	SQ/CON	Y	-	H	P
53	-	-	-	-	-	-	-	H	H
54	ANG	ANG	STR	RND	RND	-	-	H	M
56	-	-	-	-	-	-	-	H	H
58	ANG	SQR	CVX	RND	RND	-	-	H	M
59	-	-	STR	SQR	SQR	-	-	H	H
64	ANG	ANG	STR	SQ/CON	SQ/CON	-	-	H	M
65	ANG	SQR	-	-	-	-	-	H	M
68	-	-	-	-	-	-	-	H	H
69	-	-	-	-	-	-	-	H	H
71	ANG	SQR	STR	RND	ANG	Y	-	H	M
76	-	-	-	-	-	-	-	H	H
80	-	-	-	-	-	-	-	H	H
84	ANG	RND	CVX	-	SQ/CON	-	-	H	M
87	ANG	ANG	STR	SQ/CON	SQ/CON	-	-	H	M
89	-	-	-	-	-	-	-	H	H
92	-	-	-	-	-	-	-	M	H
93	ANG	ANG	CVX	SQ/CON	ANG	-	-	H	H
97	SQR	RND	STR	SQ/CON	RND	-	-	H	M
100	SQR	SQR	CVX	RND	-	-	-	H	M
103	-	-	-	-	-	-	-	H	H
110	-	-	-	-	-	-	-	H	H

Cat. No.	Left Notch Shape	Right Notch Shape	Base Type	Left Basal Edge Shape	Right Basal Edge Shape	Ret.	Util.	Qual. of Raw Material	Qual. of Work.
113	-	-	STR	-	SQ/CON	-	-	H	M
114	-	-	-	-	-	-	-	H	H
115	ANG	-	STR	SQ/CON	SQ/CON	-	-	H	M
122	-	-	-	-	-	-	-	H	H
128	RND	RND	CCV	-	SQ/CON	Y	-	M	M
129	-	-	-	-	-	-	-	H	H
130	-	-	-	-	-	Y	-	M	P
134	ANG	ANG	STR	SQ/CON	SQ/CON	-	-	H	H
144	-	-	STR	SQ/CON	-	-	-	H	H
145	-	-	-	-	-	-	-	H	H
147	-	-	STR	-	-	-	-	H	H
148	-	-	-	-	-	-	-	H	H
181	-	-	-	-	-	-	-	H	M
182	RND	ANG	STR	RND	SQ/CON	Y	-	H	M
195	-	-	-	-	-	-	-	M	M
203	RND	ANG	CVX	SQR	RND	-	-	H	P
212	-	-	-	-	-	-	-	H	H
214	-	-	-	-	-	-	-	H	H
217	-	-	-	-	-	-	-	H	H
222	ANG	SQR	STR	SQR	RND	-	-	H	M
223	-	-	-	-	-	-	-	H	H
224	ANG	ANG	STR	SQ/CON	ANG	-	-	H	H
225	SQR	SQR	CVX	ANG	RND	-	-	M	M
227	ANG	-	STR	ANG	-	-	-	P	M
233	-	-	CVX	ANG	SQ/CON	-	-	H	H
234	-	-	-	-	-	-	-	H	M
239	RND	RND	STR	SQ/CON	ANG	Y	-	H	H
240	-	-	-	-	-	-	-	H	H
247	SQR	SQR	STR	ANG	RND	Y	-	H	M
251	-	-	-	-	-	-	-	H	H
253	-	ANG	-	-	-	Y	-	H	M
254	ANG	RND	CCV	SQ/CON	SQ/CON	Y	-	H	M
255	-	-	-	-	-	-	-	H	H
258	-	-	-	-	-	-	-	H	M
259	-	-	-	-	-	-	-	H	H
262	-	-	-	-	-	-	-	H	H

Cat. No.	Left Notch Shape	Right Notch Shape	Base Type	Left Basal Edge Shape	Right Basal Edge Shape	Ret.	Util.	Qual. of Raw Material	Qual. of Work.
264	RND	RND	STR	SQ/CON	SQ/CON	Y	-	H	M
268	-	-	-	-	-	-	-	H	H
270	-	-	-	-	-	-	-	H	H
271	SQR	ANG	STR	SQ/CON	ANG	-	-	H	M
278	-	-	-	-	-	-	-	H	H
280	ANG	ANG	CVX	ANG	SQ/CON	-	-	H	M
286	ANG	RND	STR	ANG	SQ/CON	-	-	H	H
298	-	-	-	-	-	-	-	P	M
301	-	-	-	-	-	-	-	H	H
302	-	-	-	ANG	ANG	-	-	H	M
306	ANG	ANG	STR	SQ/CON	SQ/CON	-	-	H	H

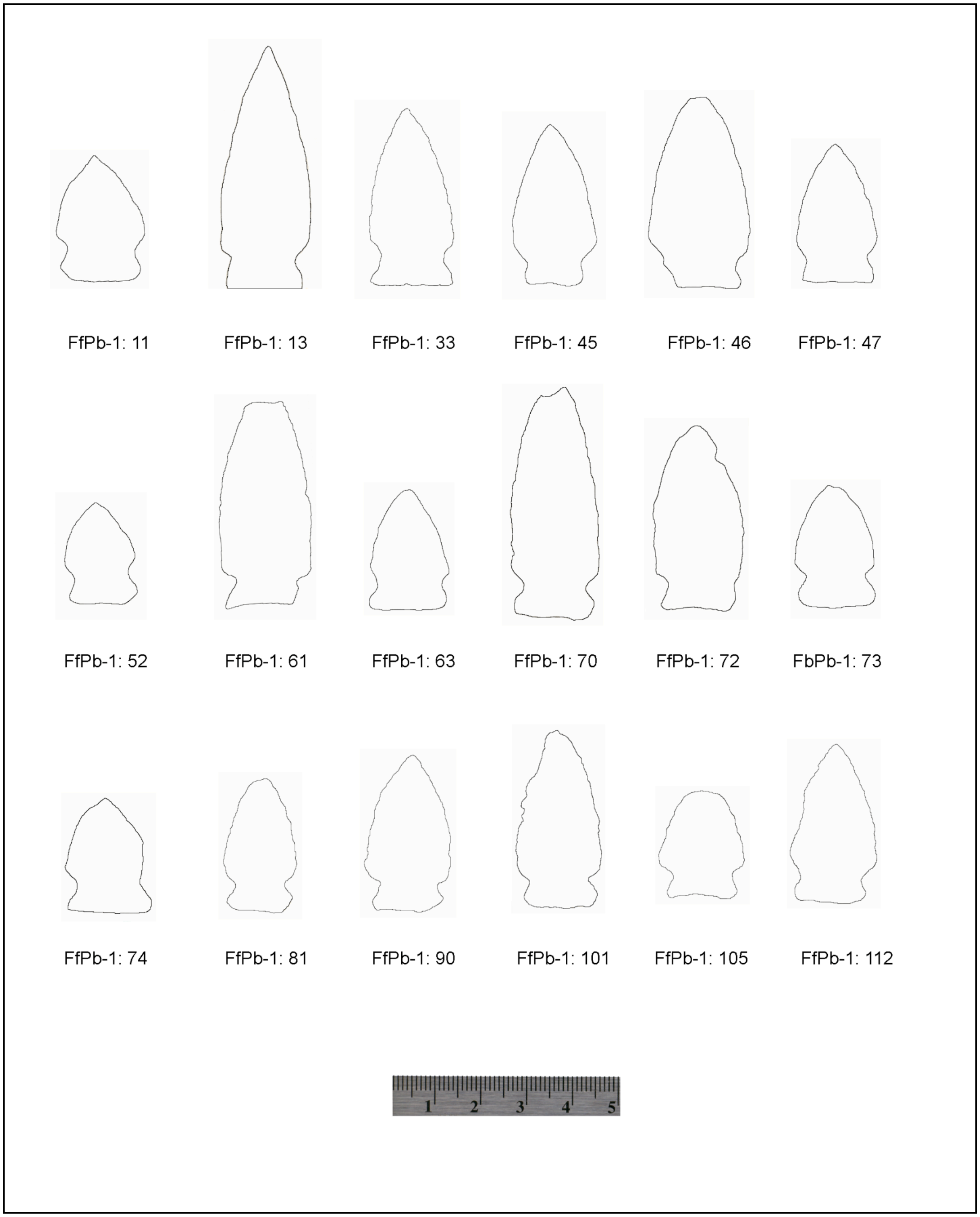

Figure 4.12a. Missing projectile points, Muhlbach site (FfPb-1), AB.

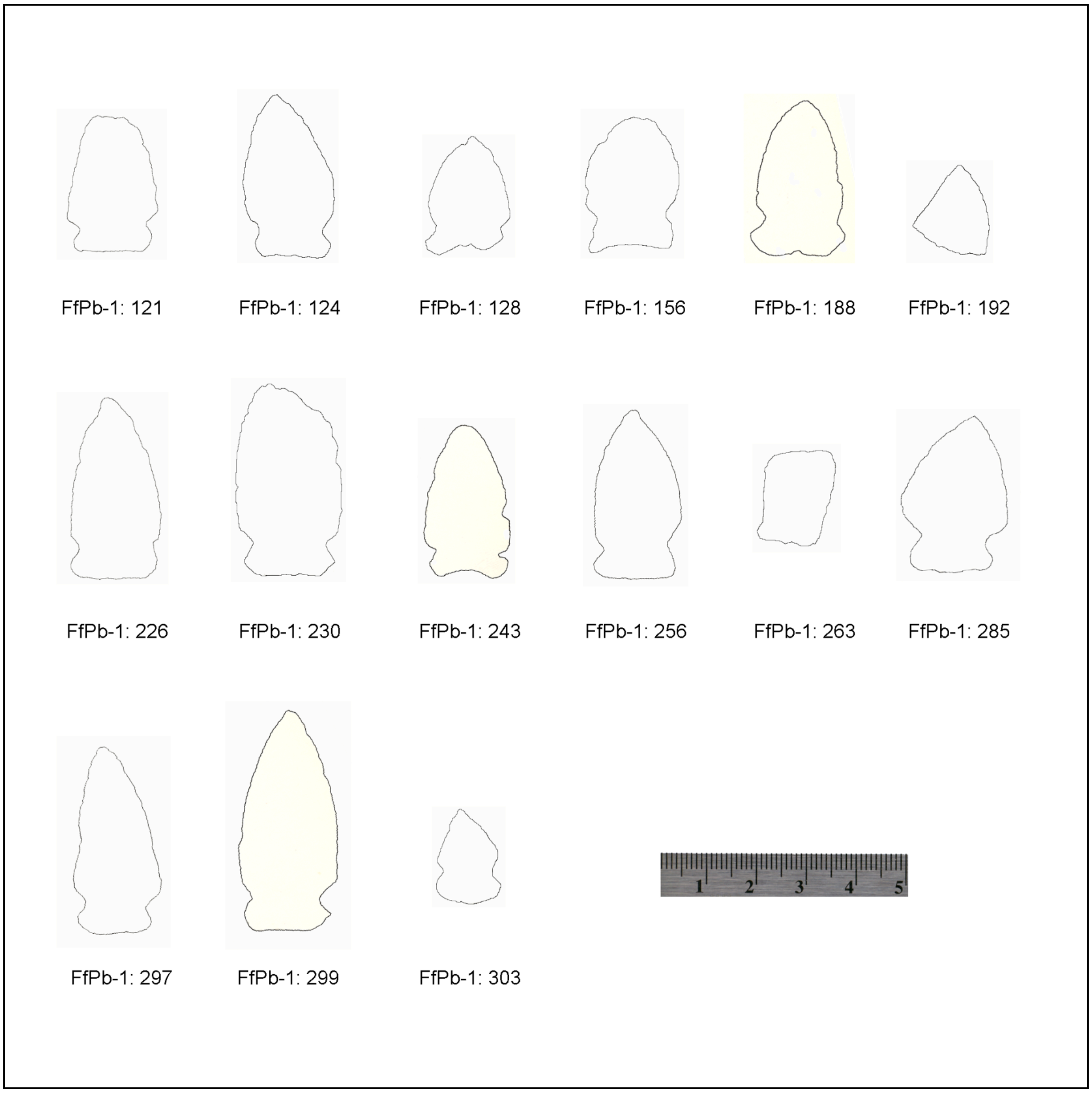

Figure 4.12b. Missing projectile points, Muhlbach site (FfPb-1), AB.

Table 4.18a. Muhlbach site Missing Points, AB: Metric Data.

Cat. No.	Max. Length	Max. Width	Max. Thick	Body Length Left	Body Length Right	Notch Height Left	Notch Height Right	Notch Depth Left
11	33.0	23.0	7.0	24.2	26.0	12.2	12.2	7.3
13	66.0	24.0	7.0	55.3	52.3	10.8	12.6	1.9
33	47.0	22.0	5.0	36.7	38.7	12.1	10.9	2.7
35	54.0	25.0	5.0	48.4	49.3	10.5	8.9	2.9
36	24.0	17.9	4.0	20.3	18.5	8.3	9.7	1.3
45	42.0	21.0	6.0	34.8	33.4	10.0	11.7	1.7
46	51.0	26.0	6.0	38.8	42.9	13.0	10.0	-
47	36.0	21.0	6.0	28.5	27.4	10.9	12.2	1.6
52	26.0	18.7	7.0	19.4	18.0	10.0	13.2	1.9
61	-	17.4	-	-	-	10.7	8.6	1.0
63	31.0	21.3	6.0	23.9	25.3	10.9	9.7	1.7
70	-	22.0	7.0	-	-	12.8	12.4	2.7
72	47.0	22.0	6.0	41.0	42.5	9.4	8.9	2.4
73	31.0	21.0	6.0	23.6	24.5	12.2	10.7	2.3
74	29.0	21.0	6.0	22.1	-	11.0	-	2.7
81	35.0	19.0	5.0	24.3	24.3	12.5	12.8	2.4
90	40.0	20.0	7.0	34.4	34.4	11.7	9.3	2.5
101	45.0	21.0	5.0	38.9	38.4	9.9	10.4	2.2
105	26.0	21.0	6.0	23.3	21.8	8.4	9.2	2.5
112	41.0	22.0	5.0	33.7	33.6	12.5	10.8	1.7
121	-	21.0	5.0	-	-	8.2	9.4	1.7
124	40.0	20.0	6.0	31.6	33.0	9.3	10.8	1.2
128	29.0	19.0	5.0	20.0	22.3	11.9	6.9	1.9
156	32.0	21.0	5.0	25.0	20.8	11.6	13.2	2.0
188	36.0	22.0	5.0	28.4	27.3	12.8	11.7	2.2
192	-	-	2.5	-	-	-	-	-
226	43.5	21.0	5.5	34.5	35.9	11.7	10.5	1.4
230	-	25.0	6.0	-	-	12.0	10.0	2.7
243	36.0	20.0	7.0	30.4	31.5	8.3	7.3	1.5
256	40.4	21.0	4.0	32.3	31.5	1.02	13.0	2.0
263	-	-	6.0	-	-	-	-	-
285	37.0	25.0	5.0	29.2	29.0	14.3	12.5	3.5
297	45.0	19.0	6.0	35.2	37.9	12.1	10.1	2.4
299	51.0	22.0	9.0	44.1	42.7	13.4	10.6	1.8

Cat. No.	Max. Length	Max. Width	Max. Thick	Body Length Left	Body Length Right	Notch Height Left	Notch Height Right	Notch Depth Left
303	21.5	15.5	4.0	13.8	15.4	10.9	10.6	1.1

Table 4.18b. Muhlbach site Missing Points, AB: Metric Data.

Cat. No.	Notch Depth Right	Shoulder Width	Max. Base Width	Neck Width	Basal Height Left	Basal Height Right	Wgt (g)
11	1.8	23.0	21.0	17.0	3.7	2.3	-
13	2.4	24.0	18.0	16.0	1.0	4.2	-
33	2.3	22.0	21.0	16.0	1.6	0.8	-
35	-	25.0	17.0	16.0	0.5	-	-
36	1.7	19.5	17.9	16.0	2.2	4.2	-
45	1.8	21.0	14.0	13.0	3.2	3.4	-
46	1.9	26.0	16.0	17.0	-	0.6	-
47	1.7	21.0	19.0	16.0	0.6	4.2	-
52	2.0	18.7	18.0	14.0	1.4	3.4	-
61	0.7	17.4	15.0	12.0	4.0	3.4	-
63	1.2	21.3	20.1	17.5	4.4	3.6	-
70	2.3	22.0	20.0	14.0	5.9	5.3	-
72	0.6	22.0	19.0	16.0	1.1	3.8	-
73	2.2	21.0	19.0	16.0	1.9	1.9	-
74	-	-	21.0	16.0	1.1	3.6	-
81	1.9	19.0	18.0	13.0	3.1	5.7	-
90	1.7	20.0	16.0	15.0	2.7	4.0	-
101	2.2	21.0	16.0	14.0	3.2	3.5	-
105	1.8	21.0	17.0	15.0	1.5	1.9	-
112	2.2	22.0	17.0	16.0	4.6	3.8	-
121	1.7	21.0	17.0	15.0	3.4	3.8	-
124	2.1	20.0	14.0	15.0	5.2	3.9	-
128	-	19.0	-	15.0	2.4	-	-
156	2.2	21.0	19.0	16.0	2.0	3.8	-
188	1.4	20.7	22.0	17.0	4.3	4.4	-
192	-	-	-	-	-	-	-
226	1.3	21.0	18.5	16.0	2.7	2.6	-
230	2.3	25.0	21.0	17.0	4.0	3.5	-
243	1.2	20.0	15.0	15.0	3.6	4.1	-
256	2.0	21.0	20.0	15.0	2.4	2.9	-
263	-	-	-	-	-	-	-
285	3.0	25.0	17.0	14.0	3.6	2.8	-
297	1.5	19.0	16.0	13.0	3.5	2.6	-
299	3.0	22.0	17.0	15.0	4.5	3.1	-

Cat. No.	Notch Depth Right	Shoulder Width	Max. Base Width	Neck Width	Basal Height Left	Basal Height Right	Wgt (g)
303	1.6	14.0	15.5	11.0	4.5	3.8	-

Table 4.19a. Muhlbach site Missing Points, AB: Non-metric Data.

Cat. No.	Unit	Level	Inferred Type	Material Type	Part	Body Shape	Symmetry
11	A11	21 cm	?	KRF	complete	OVT	SYM
13	A10	62 cm	?	KRF	complete	OVT	SYM
33	A12	74 cm	?	KRF	complete	OVT	SYM
35	C10	63 cm	?	KRF	1/3 base missing	OVT	SYM
36	C10	59 cm	?	KRF	complete	OVT	SYM
45	B12	68 cm	?	KRF	complete	OVT	SYM
46	C10	69 cm	?	KRF	1/3 base missing	OVT	SYM
47	A14	31 cm	?	yellow chalcedony	complete	OVT	SYM
52	B12	54 cm	?	KRF	complete	OVT	SYM
61	A10	87 cm	?	KRF	base	-	-
63	B10	74 cm	?	KRF	complete	OVT	SLASY
70	B13	48 cm	?	KRF	tip missing	OVT	SYM
72	B10	67 cm	?	KRF	complete	OVT	SLASY
73	B14	52 cm	?	KRF	complete	OVT	SYM
74	B13	52 cm	?	KRF	complete	OVT	SLASY
81	A13	57 cm	?	KRF	complete	OVT	SLASY
90	A11	72 cm	?	KRF	complete	OVT	SLASY
101	B12	62 cm	?	KRF	complete	OVT	SYM
105	A11	83 cm	?	KRF	complete	OVT	SYM
112	B11	74 cm	?	KRF	complete	OVT	SYM
121	B14	46 cm	?	KRF	tip missing	OVT	SYM
124	B14	39 cm	?	KRF	complete	OVT	SYM
128	A22	87 cm	?	black chert	1/3 base missing	OVT	SLASY
156	A20	83 cm	?	KRF	complete	OVT	SLASY
188	B10	69 cm	?	KRF	complete	OVT	SYM
192	B12	46 cm	?	KRF	tip	-	ASY
226	A19	61 cm	?	KRF	complete	OVT	SYM
230	A13	60 cm	?	KRF	tip missing	OVT	SYM
243	D20	111 cm	?	petrified wood	complete	OVT	SYM
256	D20	92 cm	?	chert	complete	OVT	SYM
263	C19	79 cm	?	KRF	body	-	-

Cat. No.	**Unit**	**Level**	**Inferred Type**	**Material Type**	**Part**	**Body Shape**	**Symmetry**
285	A14	47 cm	?	KRF	complete	OVT	SLASY
297	A14	56 cm	?	KRF	complete	OVT	SYM
299	A12	75 cm	?	KRF	complete	OVT	SYM
303	B12	51 cm	?	KRF	complete	OVT	SYM

Table 4.19b. Muhlbach site Missing Points, AB: Non-metric Data.

Cat. No.	Tranverse Sec. Shape	Longitudinal Sec. Shape	Left Shoulder Shape	Right Shoulder Shape	Left Notch Orient.	Right Notch Orient.
11	-	-	ANG/OBT	ANG/OBT	SIDE/ SYM	SIDE/ SYM
13	-	-	ANG/OBT	ANG/OBT	COR/ SKWPRX	SIDE/ SYM
33	-	-	ANG/OBT	ANG/RT	SIDE/ SYM	SIDE/ SYM
35	-	-	ANG/OBT	ANG/OBT	SIDE/ SKWPRX	-
36	-	-	ANG/RT	ANG/OBT	SIDE/ SYM	SIDE/ SYM
45	-	-	ANG/OBT	ANG/OBT	COR/ SYM	COR/ SYM
46	-	-	ANG/OBT	ANG/OBT	-	SIDE/ SYM
47	-	-	ANG/OBT	ANG/OBT	SIDE/ SYM	SIDE/ SYM
52	-	-	ANG/OBT	ANG/OBT	SIDE/ SYM	SIDE/ SYM
61	-	-	ANG/OBT	ANG/OBT	SIDE/ SYM	SIDE/ SYM
63	-	-	ANG/OBT	ANG/OBT	SIDE/ SYM	SIDE/ SYM
70	-	-	ANG/OBT	ANG/OBT	SIDE/ SYM	SIDE/ SYM
72	-	-	ANG/OBT	RND	SIDE/ SKWPRX	SIDE/ SKWPRX
73	-	-	ANG/OBT	ANG/OBT	SIDE/ SKWPRX	SIDE/ SKWPRX
74	-	-	ANG/OBT	ANG/OBT	SIDE/ SYM	SIDE/ SKWDST
81	-	-	RND	RND	SIDE/SK WPRX	SIDE/ SYM
90	-	-	ANG/OBT	RND	SIDE/ SYM	SIDE/ SKWPRX
101	-	-	ANG/OBT	ANG/OBT	SIDE/ SYM	SIDE/ SYM

Cat. No.	Tranverse Sec. Shape	Longitudinal Sec. Shape	Left Shoulder Shape	Right Shoulder Shape	Left Notch Orient.	Right Notch Orient.
105	-	-	ANG/OBT	ANG/OBT	COR/ SYM	SIDE/ SYM
112	-	-	ANG/OBT	ANG/OBT	SIDE/ SKWDST	COR/ SYM
121	-	-	ANG/OBT	ANG/OBT	COR/ SYM	SIDE/ SYM
124	-	-	RND	RND	SIDE/ SYM	SIDE/ SKWDST
128	-	-	RND	ANG/OBT	SIDE/ SYM	-
156	-	-	ANG/OBT	RND	SIDE/ SKWPRX	SIDE/ SKWDST
188	-	-	ANG/OBT	RND	SIDE/ SYM	SIDE/ SKWDST
192	-	-	-	-	-	-
226	-	-	ANG/OBT	ANG/OBT	SIDE/ SYM	SIDE/ SKWPRX
230	-	-	ANG/OBT	ANG/OBT	SIDE/ SYM	SIDE/ SYM
243	-	-	ANG/OBT	ANG/OBT	SIDE/ SYM	SIDE/ SYM
256	-	-	RND	ANG/OBT	SIDE/ SKWPRX	SIDE/ SYM
263	-	-	-	-	-	-
285	-	-	ANG/OBT	ANG/OBT	SIDE/ SYM	COR/ SYM
297	-	-	ANG/OBT	ANG/OBT	SIDE/ SYM	COR/ SYM
299	-	-	RND	ANG/OBT	SIDE/ SYM	SIDE/ SYM
303	-	-	ANG/OBT	ANG/OBT	SIDE/ SYM	SIDE/ SYM

Table 4.19c. Muhlbach site Missing Points, AB: Non-metric Data.

Cat. No.	Left Notch Shape	Right Notch Shape	Base Type	Left Basal Edge Shape	Right Basal Edge Shape	Ret.	Util.	Qual. of Raw Material	Qual. of Work.
11	SQR	RND	STR	RND	RND	-	-	H	?
13	ANG	RND	STR	ANG	SQR	-	-	H	?
33	RND	RND	STR	ANG	SQR	-	-	H	?
35	ANG	-	STR	ANG	-	-	-	H	?
36	RND	ANG	STR	RND	SQ/CON	-	-	H	?
45	SQR	RND	CCV	SQR	RND	-	-	H	?
46	-	SQR	STR	-	ANG	-	-	H	?
47	ANG	ANG	STR	ANG	SQR	-	-	H	?
52	RND	RND	STR	ANG	SQ/CON	-	-	H	?
61	ANG	RND	CVX	RND	RND	-	-	H	?
63	SQR	SQR	STR	SQR	RND	-	-	H	?
70	SQR	ANG	STR	SQR	SQ/CON	-	-	H	?
72	ANG	ANG	CCV	ANG	SQ/CON	-	-	H	?
73	ANG	ANG	STR	RND	RND	-	-	H	?
74	SQR	ANG	STR	ANG	SQR	-	-	H	?
81	ANG	SQR	STR	SQ/CON	SQ/CON	-	-	H	?
90	ANG	ANG	CVX	SQ/CON	ANG	-	-	H	?
101	ANG	ANG	STR	SQ/CON	SQ/CON	-	-	H	?
105	SQR	SQR	CCV	ANG	RND	-	-	H	?
112	ANG	RND	STR	SQR	ANG	-	-	H	?
121	RND	SQR	STR	RND	SQ/CON	-	-	H	?
124	RND	ANG	STR	RND	SQ/CON	-	-	H	?
128	SQR	-	CCV	SQR	-	-	-	M	?
156	ANG	ANG	CCV	ANG	SQR	-	-	H	?
188	SQR	ANG	CCV	RND	SQ/CON	-	-	H	?
192	-	-	-	-	-	-	-	H	?
226	SQR	ANG	STR	RND	RND	-	-	H	?
230	ANG	ANG	STR	SQ/CON	SQ/CON	-	-	H	?
243	ANG	ANG	CCV	SQ/CON	SQ/CON	-	-	H	?
256	ANG	ANG	STR	RND	RND	-	-	H	?
263	-	-	-	-	-	-	-	H	?
285	ANG	RND	STR	RND	RND	-	-	H	?
297	SQR	ANG	STR	RND	RND	-	-	H	?
299	ANG	RND	STR	RND	ANG	-	-	H	?

Cat. No.	Left Notch Shape	Right Notch Shape	Base Type	Left Basal Edge Shape	Right Basal Edge Shape	Ret.	Util.	Qual. of Raw Material	Qual. of Work.
303	ANG	RND	CVX	RND	RND	-	-	H	?

Smith-Swainson site (FeOw-1)

The Smith-Swainson site (FeOw-1) was gathered as a surface collection slightly northeast of the Muhlbach site. There are a total of 152 projectile points in the Smith-Swainson collection, with 81 complete points (Figures 4.13a, 4.13b, 4.13c, 4.13d, 4.13e, 4.13f, 4.13g, 4.13h; Tables 4.20a, 4.20b, 4.21a, 4.21b, 4.21c). The mean for the shoulder widths is 18.6 mm (n=141), ranging from 9.9 mm to 29.5 mm. The mean for the neck widths is 12.7 mm (n=137), ranging from 6.6 mm to 19.8 mm.

Raw materials represented in the Smith-Swainson collection include chalcedony (n=2), chert (n=24), Knife River Flint (n=111), mudstone (n=1), obsidian (n=2), quartzite (n=7), siltstone (n=5). Body shapes were ovate (n=95), excurvate (n=36), and triangular (n=9). Basal edge forms were straight (n=76), convex (n=32), and concave (n=20). Left shoulder shapes were angular-obtuse (n=106), angular-right (n=5), angular-acute (n=4), and round (n=27). Right shoulder shapes were angular-obtuse (n=109), angular-right (n=11), angular-acute (n=1), and round (n=23). Left notch shapes were rounded (n=39), angled (n=57), and squared (n=27). Right notch shapes were rounded (n=40), angled (n=63), and squared (n=20). Left notch orientations were side-symmetrical (n=65), side-skewed proximally (n=23), side-skewed distally (n=9), corner-symmetrical (n=15), corner-skewed proximally (n=8), and corner-skewed distally (n=2). Right notch orientations were side-symmetrical (n=56), side-skewed proximally (n=29), side-skewed distally (n=12), corner-symmetrical (n=16), corner-skewed proximally (n=6), and corner-skewed distally (n=3).

Knife River Flint dominates the raw materials in the Smith-Swainson projectile points, representing 73% of the total point assemblage. The next most commonly used raw material was chert, representing 16%. Body shapes tended be ovate (63%) or excurvate (24%). Bases tend to be either straight, with next most common shape convex. Shoulders tended to be obtuse, with the second most frequent shape was rounded. Notch shapes were variable, with angled notches the most frequent shape. Notches were usually oriented symmetrically, or skewed proximally; occasionally there were corner-symmetrical variants. The quality of workmanship of the projectile points within the Smith-Swainson collection is variable, ranging from well-made bifacially worked projectile points to expedient flake points. Both atlatl darts and arrow points are represented within the assemblage. Some of the points exhibit reworking, and the collection is reminscient of the Melhagen and Fitzgerald sites in Saskatchewan, as well as with Fincastle. The presence of one Pelican Lake projectile point in this collection is questionable; unfortunately as a surface collection, it cannot be ascertained what its association is with the rest of the collection, whether it is an intrusive specimen or associated. However, as there is only one such point within the sample of 152, it is very possible that it is not associated with the rest of the Smith-Swainson points.

Figure 4.13a. Projectile points, Smith-Swainson Collection (FeOw-1), AB.

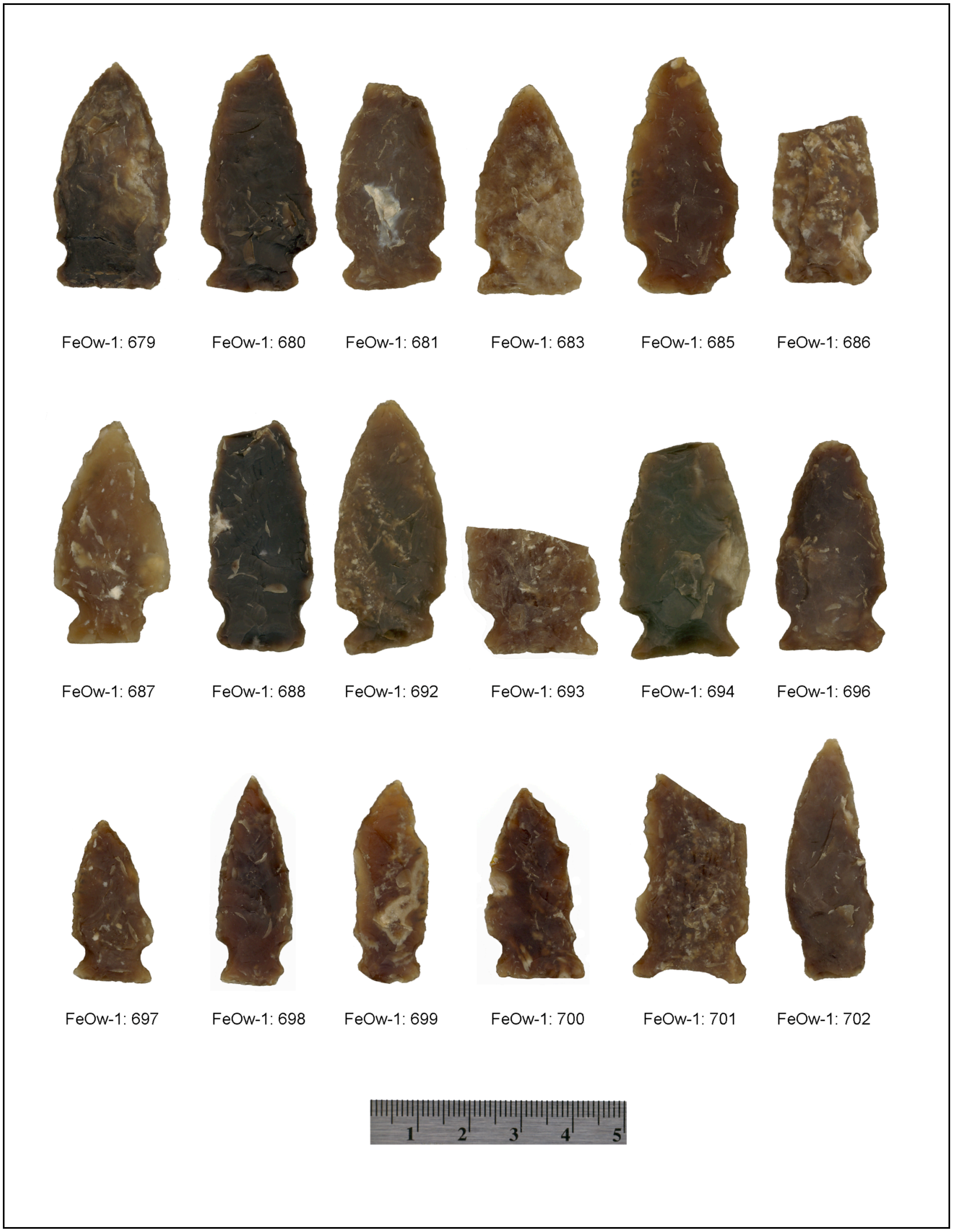

Figure 4.13b. Projectile points, Smith-Swainson Collection (FeOw-1), AB.

Figure 4.13c. Projectile points, Smith-Swainson Collection (FeOw-1), AB.

Figure 4.13d. Projectile points, Smith-Swainson Collection (FeOw-1), AB.

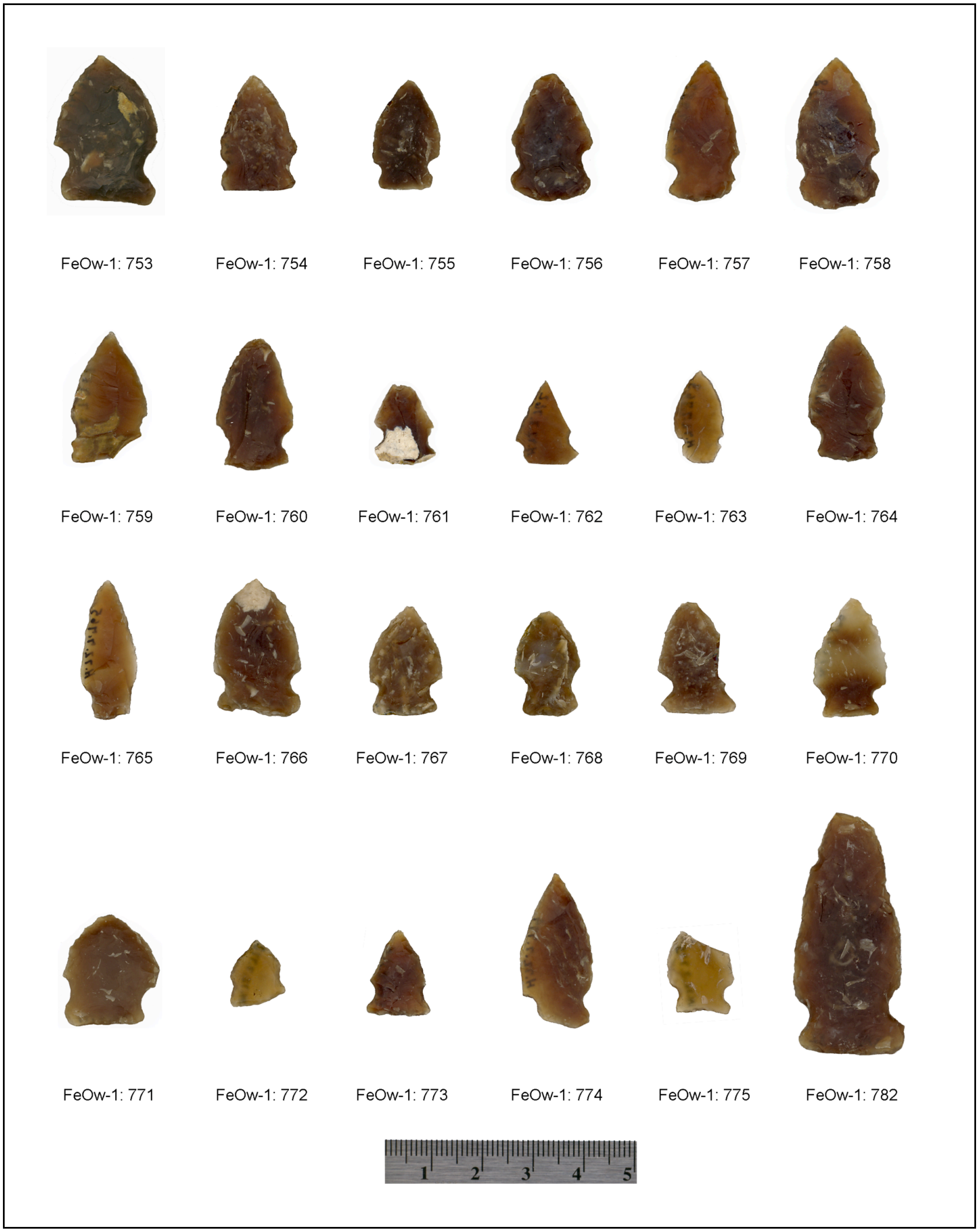

Figure 4.13e. Projectile points, Smith-Swainson Collection (FeOw-1), AB.

Figure 4.13f. Projectile points, Smith-Swainson Collection (FeOw-1), AB.

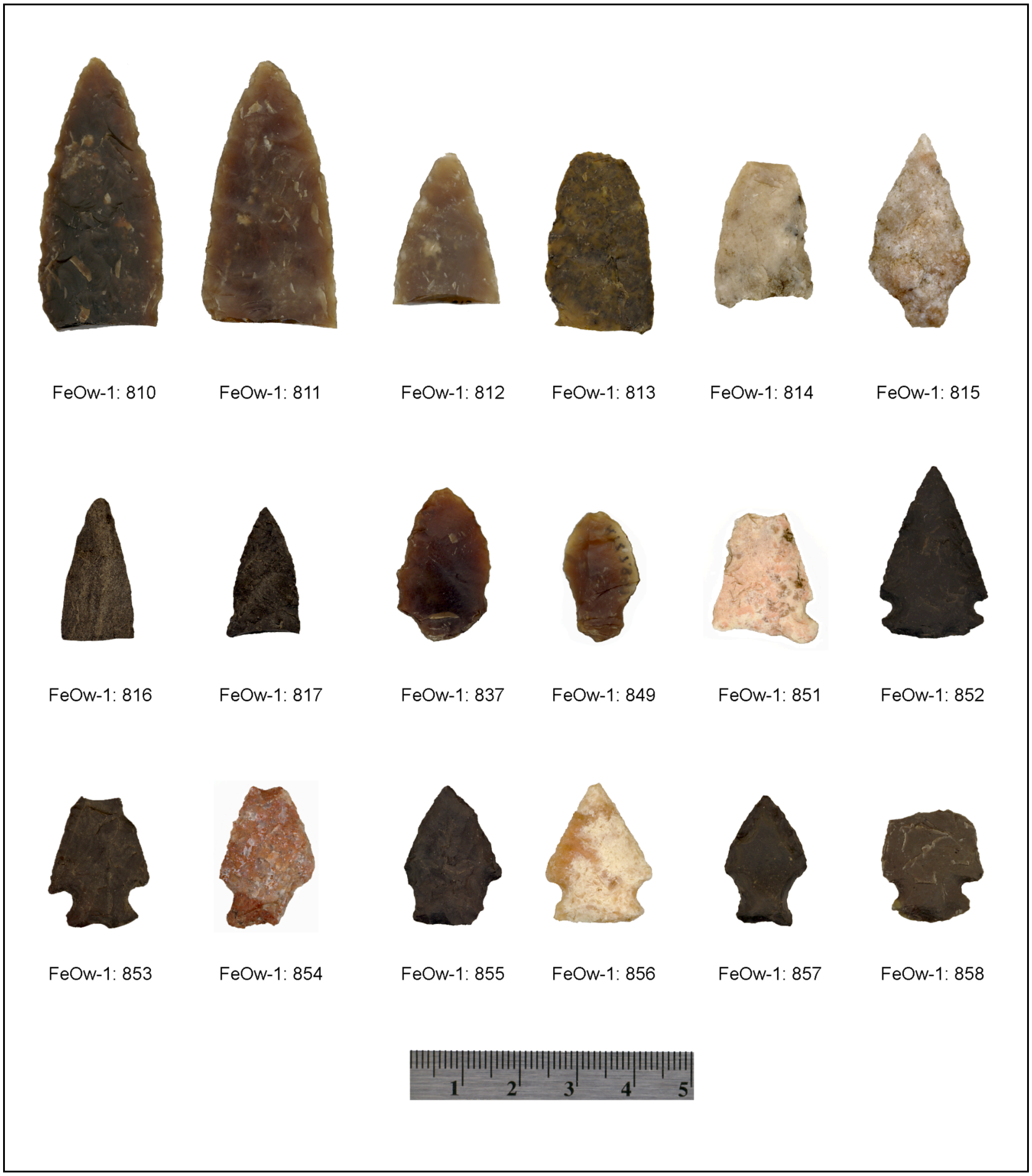

Figure 4.13g. Projectile points, Smith-Swainson Collection (FeOw-1), AB.

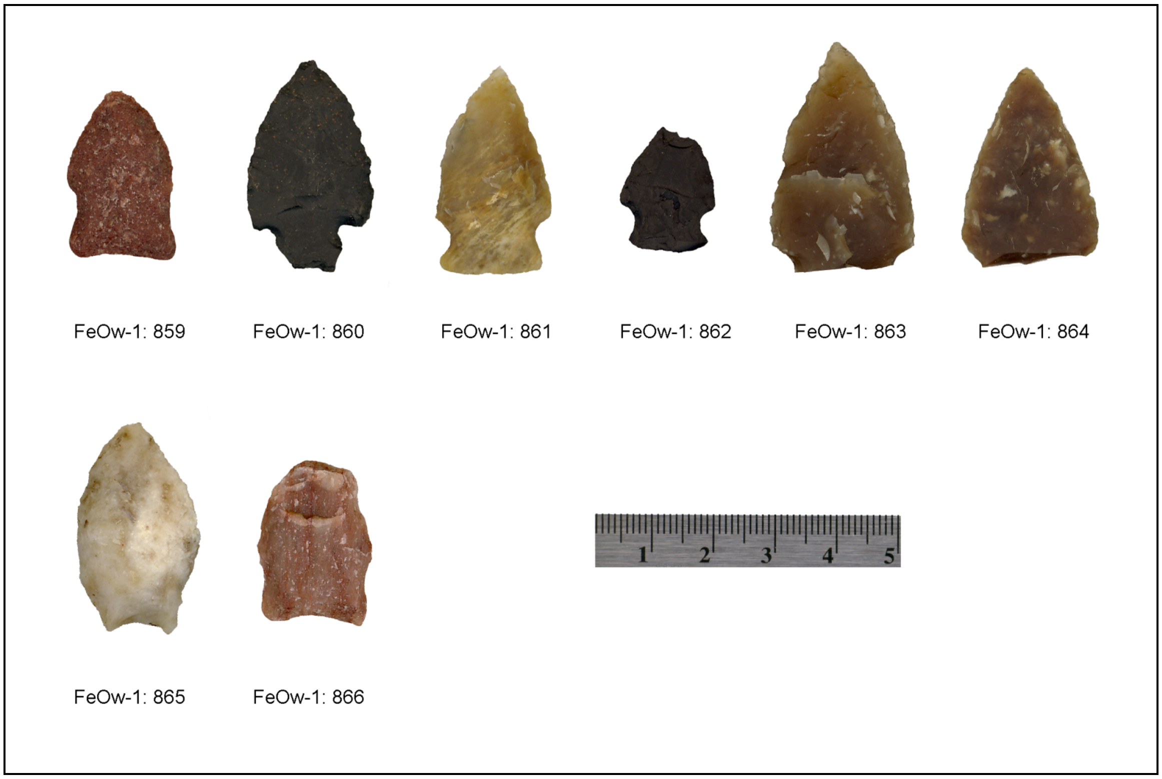

Figure 4.13h. Projectile points, Smith-Swainson Collection (FeOw-1), AB.

Table 4.20a. Smith-Swainson Collection, AB: Metric Data.

Cat. No.	Max. Length	Max. Width	Max. Thick	Body Length Left	Body Length Right	Notch Height Left	Notch Height Right
659	41.6	20.4	4.7	38.9	35.9	4.9	6.7
660	30.0	19.3	5.8	24.9	25.8	9.2	8.7
662	42.6	15.5	7.7	38.5	38.8	5.8	4.9
663	-	22.9	4.8	44.2	45.7	-	-
664	-	26.0	5.6	34.6	34.4	-	-
665	-	-	5.6	-	-	-	-
666	-	21.6	5.8	59.8	60.4	-	-
667	-	-	5.2	-	-	-	-
668	-	24.1	5.9	48.2	45.9	-	-
669	-	26.7	7.3	57.7	59.7	-	-
670	-	23.0	5.5	47.7	46.4	-	-
671	-	21.7	5.6	-	-	-	-
672	-	19.5	5.4	34.0	34.1	-	-
673	-	22.7	5.2	-	-	-	-
674	-	17.3	4.0	31.8	30.6	-	-
675	-	26.4	8.0	-	-	10.6	10.4
676	-	27.0	6.2	-	-	10.2	9.5
677	51.1	23.4	5.6	41.7	42.9	11.0	9.8
679	44.0	21.9	7.2	36.2	36.8	9.1	9.5
680	-	22.6	5.5	-	-	9.3	9.7
681	-	21.0	6.4	-	-	10.4	10.4
683	41.0	20.5	5.4	32.9	31.3	9.7	10.5
685	45.5	21.1	4.7	36.7	35.9	10.3	11.4
686	-	20.3	6.9	-	-	10.6	10.6
687	42.9	22.5	6.5	34.8	33.9	11.2	10.9
688	-	19.9	6.7	-	-	13.0	10.6
692	47.8	21.4	7.3	41.1	38.4	10.5	9.1
693	-	25.0	5.5	-	-	10.7	0.5
694	-	23.7	8.6	-	-	11.3	10.1
696	40.6	21.7	6.4	33.7	29.6	8.7	12.5
697	31.1	15.6	4.8	22.7	25.7	8.5	8.4
698	40.8	14.8	4.5	32.3	32.8	8.9	9.6
699	39.5	13.8	3.6	30.9	31.9	9.3	7.6
700	37.0	17.3	4.3	29.1	31.2	8.9	8.2

Cat. No.	Max. Length	Max. Width	Max. Thick	Body Length Left	Body Length Right	Notch Height Left	Notch Height Right
701	-	22.0	5.4	-	-	11.5	10.2
702	46.6	16.0	6.5	37.5	37.1	10.5	9.2
703	41.0	20.8	5.2	30.8	32.0	11.5	10.2
704	31.9	16.4	4.7	26.2	26.2	6.1	7.2
705	-	17.1	3.6	-	-	7.0	6.4
706	31.3	19.7	4.7	22.1	26.2	10.0	8.7
707	36.1	17.1	4.3	28.5	26.5	10.3	9.3
708	-	15.5	4.3	-	-	7.3	8.6
709	26.9	18.3	6.1	22.4	19.3	7.7	9.1
710	-	17.4	4.2	-	-	7.6	6.4
711	32.6	14.3	4.4	25.8	23.7	7.5	9.7
712	33.4	18.5	4.6	21.1	23.7	16.1	11.4
713	-	17.8	3.9	-	-	8.0	10.3
716	37.3	16.6	4.9	29.8	30.7	7.9	8.0
717	42.8	22.7	6.0	33.3	35.4	12.2	10.0
719	-	23.2	4.9	-	-	10.7	10.9
720	37.5	19.2	5.6	30.5	31.6	8.8	8.7
721	42.4	29.5	5.6	34.9	35.7	11.0	10.4
722	35.6	20.6	5.9	27.9	29.6	9.1	9.2
723	58.6	25.2	7.4	47.0	47.2	12.8	11.9
724	-	17.8	6.9	-	-	8.6	8.5
726	35.8	19.6	4.9	27.7	28.6	9.8	9.9
727	-	19.1	4.6	-	-	9.9	10.2
728	32.9	21.2	4.9	23.6	24.4	10.1	12.2
729	28.6	16.4	4.8	21.2	19.4	10.0	10.7
730	35.7	20.5	5.7	27.3	28.7	9.9	10.9
731	-	19.0	5.2	-	-	9.7	9.3
732	32.6	19.1	5.3	19.3	23.6	-	11.6
735	33.1	21.3	5.6	22.7	22.6	12.4	12.0
736	27.4	17.6	5.5	18.7	19.2	10.1	7.1
737	31.4	22.9	5.5	23.4	22.8	10.2	12.4
738	30.5	20.8	5.6	24.0	21.6	10.7	10.2
739	36.8	22.5	5.7	28.2	28.2	12.4	10.0
740	32.8	18.4	5.9	25.4	24.0	8.9	12.0
741	22.2	18.6	5.6	18.4	15.5	8.3	9.2
742	28.1	20.0	5.5	19.9	19.5	10.9	10.7
743	34.2	20.0	5.4	26.3	24.0	10.3	10.9

Cat. No.	Max. Length	Max. Width	Max. Thick	Body Length Left	Body Length Right	Notch Height Left	Notch Height Right
744	-	21.6	6.2	-	-	12.7	11.6
745	23.1	16.3	5.9	13.7	18.6	11.2	8.1
747	38.2	19.6	5.7	30.5	30.3	9.9	10.2
748	30.3	20.1	5.4	24.2	22.7	10.0	10.3
750	30.9	18.4	4.9	22.4	23.1	11.9	9.9
751	31.4	16.8	4.7	23.8	21.9	9.2	11.3
752	-	21.3	5.2	-	-	8.8	7.0
753	29.2	20.8	7.2	20.4	21.0	11.2	12.6
754	22.4	15.3	5.1	17.1	17.9	7.4	8.2
755	21.4	13.2	2.6	17.8	16.0	5.4	6.8
756	25.0	15.8	3.5	15.1	16.3	12.0	11.8
757	28.0	14.8	3.2	31.1	20.0	8.4	9.4
758	30.2	16.7	3.6	22.0	21.2	9.8	11.7
759	26.0	15.3	3.9	18.6	18.1	9.4	9.2
760	26.0	15.3	3.9	19.1	18.1	8.8	8.4
761	-	11.9	3.3	-	-	8.5	7.5
762	16.5	10.9	1.4	13.1	11.3	4.4	6.4
763	18.1	9.9	1.6	13.7	13.5	5.2	5.5
764	26.8	14.5	3.7	20.8	19.3	7.7	8.9
765	27.5	11.0	2.7	21.8	20.2	6.6	8.5
766	27.2	17.2	4.3	20.6	20.9	8.7	9.5
767	20.8	14.5	4.5	16.8	14.8	6.8	7.7
768	20.8	12.6	4.4	13.7	13.1	8.6	9.9
769	21.7	14.7	3.7	14.5	-	8.6	-
770	23.3	14.3	3.8	18.6	18.4	7.3	5.8
771	21.7	18.2	4.9	15.3	17.0	9.8	7.1
772	13.0	10.9	2.2	8.9	7.4	6.3	8.3
773	16.9	12.2	3.7	12.1	12.4	6.8	6.0
774	30.7	13.3	2.9	25.0	23.8	3.8	8.6
775	-	12.6	2.0	-	-	5.7	7.1
782	-	20.4	6.3	-	-	11.5	13.5
783	-	20.9	4.6	-	-	10.4	10.2
784	32.1	20.1	7.2	22.6	22.7	10.8	10.2
785	32.2	20.1	5.2	24.7	23.5	11.4	10.5
786	38.0	22.1	6.1	31.8	29.6	9.2	10.5
788	40.5	17.6	7.6	30.1	30.4	11.6	13.1
789	-	18.8	5.2	-	-	8.0	8.7

Cat. No.	Max. Length	Max. Width	Max. Thick	Body Length Left	Body Length Right	Notch Height Left	Notch Height Right
790	-	19.5	6.1	-	-	9.8	12.2
791	-	20.7	4.9	-	-	10.4	12.6
792	-	12.7	5.1	-	-	7.9	8.1
793	-	18.0	4.9	-	-	9.2	-
794	-	14.5	4.7	-	-	8.9	9.2
795	28.4	17.8	5.3	19.9	22.5	11.0	9.1
796	23.8	13.0	5.2	17.7	17.5	7.4	8.9
797	23.2	17.8	6.4	16.3	18.3	9.8	8.1
799	-	19.9	5.1	-	-	10.9	8.1
800	-	16.3	4.7	-	-	8.9	6.9
801	24.2	15.4	4.8	18.9	19.1	7.4	6.7
802	-	19.2	5.2	-	-	8.8	9.8
803	-	15.9	5.6	-	-	7.8	7.1
804	-	20.3	6.8	-	-	10.3	8.5
805	-	16.0	4.1	-	-	7.2	7.6
806	-	15.5	5.0	-	-	6.8	6.2
807	17.6	13.9	3.4	14.9	12.2	5.4	5.3
809	16.1	11.4	4.5	10.3	11.6	8.6	6.1
810	-	-	5.8	-	-	-	-
811	-	-	5.0	-	-	-	-
812	-	-	4.5	-	-	-	-
813	-	19.0	6.4	-	-	-	-
814	-	17.0	4.4	-	-	-	-
815	34.1	17.8	5.7	25.4	26.9	10.4	9.1
816	-	-	4.2	-	-	-	-
817	-	-	2.8	-	-	-	-
837	27.2	17.1	4.2	23.2	18.2	5.2	10.0
849	22.2	13.2	3.4	12.3	14.6	12.6	10.8
851	-	-	4.0	-	-	-	7.3
852	30.1	18.9	5.7	25.3	25.2	7.1	6.9
853	-	17.6	4.4	-	-	5.3	7.6
854	-	16.6	5.2	-	-	8.6	8.7
855	24.6	17.2	5.2	16.6	18.5	10.4	7.9
856	23.9	18.6	4.8	18.5	19.7	8.0	7.2
857	22.5	14.4	3.7	15.4	15.0	8.7	10.5
858	-	18.0	5.0	-	-	8.3	7.5
859	26.9	17.3	6.5	17.2	18.8	12.9	11.9

Cat. No.	Max. Length	Max. Width	Max. Thick	Body Length Left	Body Length Right	Notch Height Left	Notch Height Right
860	34.4	20.7	6.0	28.7	28.2	6.4	7.2
861	33.6	18.9	6.1	27.2	25.7	9.4	9.4
862	-	15.6	4.2	-	-	7.3	7.2
863	-	23.4	5.4	35.1	35.4	-	-
864	-	22.4	4.6	29.9	31.8	-	-
865	34.2	19.8	7.3	27.6	21.9	8.4	15.9
866	-	18.7	5.3	-	-	12.4	11.1

Table 4.20b. Smith-Swainson Collection, AB: Metric Data.

Cat. No.	Notch Depth Left	Notch Depth Right	Shoulder Width	Max. Base Width	Neck Width	Basal Height Left	Basal Height Right	Wgt (g)
659	4.6	2.9	20.4	10.3	7.5	6.2	6.6	2.9
660	2.0	-	19.3	-	14.8	3.3	-	3.5
662	-	0.6	15.5	9.0	10.5	-	2.3	3.8
663	-	-	22.9	-	-	-	-	5.9
664	-	-	26.0	-	17.4	-	-	5.1
665	-	-	-	-	-	-	-	7.6
666	-	-	21.6	-	14.1	-	-	9.7
667	-	-	-	-	-	-	-	4.1
668	-	-	41.1	-	-	-	-	7.2
669	-	-	26.7	-	-	-	-	14.3
670	-	-	23.0	-	16.8	-	-	8.4
671	-	-	21.7	-	16.2	-	-	8.9
672	-	-	19.5	-	15.4	-	-	5.2
673	-	-	22.7	-	10.7	-	-	5.9
674	-	-	17.3	-	-	-	-	3.1
675	2.9	2.6	26.4	22.5	18.6	2.7	2.2	6.1
676	3.3	3.2	27.0	23.5	18.7	0.7	0.8	10.6
677	3.2	2.3	23.4	21.6	18.3	2.6	3.1	8.9
679	1.8	1.8	21.9	20.1	16.8	4.1	3.5	7.1
680	3.2	2.3	22.6	18.2	13.6	2.2	2.1	5.9
681	2.2	2.4	21.0	19.0	14.7	3.8	5.2	6.0
683	2.6	2.9	20.5	20.1	14.7	3.4	3.3	4.9
685	3.0	1.9	21.1	18.1	14.5	3.2	-	5.5
686	2.0	2.5	20.3	16.9	14.0	2.9	3.4	5.1
687	3.5	-	22.5	-	12.4	3.9	-	5.8
688	2.1	1.3	19.9	17.3	14.8	3.0	4.3	7.2
692	3.2	1.9	21.4	17.4	14.1	4.3	5.4	7.5
693	2.8	3.5	25.0	22.2	16.6	2.9	2.6	4.6
694	3.5	2.6	23.7	20.9	16.3	0.9	2.0	8.7
696	2.4	2.5	21.7	20.6	15.8	2.1	4.2	6.2
697	2.5	2.1	15.6	15.5	11.1	0.8	2.6	2.5
698	2.1	1.2	14.8	12.2	10.1	0.6	3.3	3.0
699	1.3	1.2	13.8	11.8	10.3	3.6	3.9	2.4
700	2.1	0.7	17.2	17.3	14.0	1.1	3.1	3.3

Cat. No.	Notch Depth Left	Notch Depth Right	Shoulder Width	Max. Base Width	Neck Width	Basal Height Left	Basal Height Right	Wgt (g)
701	2.4	2.2	22.0	21.8	16.8	2.8	3.6	5.8
702	1.0	0.9	16.0	11.7	12.3	1.9	1.6	4.8
703	2.2	1.7	20.8	16.2	14.5	2.9	3.0	4.2
704	2.1	1.7	16.4	12.2	10.3	0.9	0.6	2.2
705	2.5	2.2	17.1	12.8	9.9	1.0	0.9	2.4
706	1.3	1.4	19.7	16.5	14.9	3.3	3.3	2.9
707	1.1	2.4	17.1	13.6	12.2	1.7	2.6	3.3
708	2.2	1.6	15.5	13.3	10.4	1.0	1.8	1.8
709	0.6	1.4	18.3	17.6	15.8	2.1	1.5	3.3
710	1.5	1.7	17.4	13.8	11.7	1.5	1.8	3.6
711	1.7	1.2	14.3	11.3	9.5	1.5	4.1	2.5
712	1.3	1.2	18.5	13.8	12.6	6.8	6.4	3.0
713	1.6	2.1	17.8	15.1	12.2	1.5	2.3	2.8
716	1.6	1.7	16.6	13.9	11.3	2.8	3.5	3.2
717	1.7	1.9	22.7	18.1	15.8	4.6	4.5	6.0
719	1.8	2.6	23.2	18.5	15.9	4.6	2.6	2.0
720	1.7	2.1	19.2	16.2	13.9	1.8	0.5	4.5
721	2.7	3.0	29.5	22.2	19.2	3.1	3.2	7.8
722	2.2	1.0	20.6	16.4	14.7	3.5	2.1	4.8
723	2.4	1.7	25.2	22.3	19.8	2.0	5.3	12.0
724	2.5	2.9	17.8	15.4	11.0	2.6	2.1	3.1
726	1.6	1.2	19.6	18.1	15.5	2.4	2.4	4.0
727	2.7	2.1	19.1	15.9	12.4	3.2	3.0	3.6
728	2.0	2.3	20.3	21.2	15.4	1.6	4.5	3.6
729	2.2	2.6	16.4	15.8	11.1	2.9	1.0	2.5
730	2.0	1.8	20.5	17.8	15.1	4.6	3.4	4.8
731	1.6	1.7	19.0	16.1	13.6	3.6	2.9	2.8
732	-	2.3	19.1	-	10.8	-	2.4	3.5
735	2.4	3.1	21.3	19.4	15.3	4.3	2.5	4.0
736	1.3	0.4	17.6	16.6	14.5	1.9	2.9	2.5
737	3.1	2.6	22.9	21.7	16.0	2.3	3.4	4.1
738	2.5	2.4	20.8	19.5	14.5	3.1	1.9	3.8
739	2.0	2.3	22.5	16.9	14.5	3.8	1.1	5.2
740	2.0	2.1	18.4	16.3	12.9	1.1	4.0	3.6
741	1.4	1.0	18.6	17.0	15.1	1.1	3.8	2.8
742	2.1	1.2	19.4	20.0	15.8	4.4	3.3	3.4
743	1.8	2.1	20.0	18.3	14.6	4.7	2.5	4.3

Cat. No.	Notch Depth Left	Notch Depth Right	Shoulder Width	Max. Base Width	Neck Width	Basal Height Left	Basal Height Right	Wgt (g)
744	2.4	2.6	21.6	18.9	15.6	3.6	3.6	4.5
745	0.8	1.2	16.3	15.8	13.7	6.3	1.5	2.2
747	2.1	1.6	19.6	19.0	15.3	3.1	3.3	4.6
748	1.7	2.3	20.1	18.0	14.3	3.3	2.5	3.9
750	2.8	2.2	18.4	18.2	13.2	2.9	2.6	2.8
751	2.1	-	16.8	-	11.6	5.0	-	2.7
752	0.9	0.8	18.5	21.3	17.3	3.2	2.4	2.5
753	2.4	2.3	20.8	18.8	14.6	4.1	3.1	4.1
754	0.9	1.1	15.3	14.4	12.4	3.5	1.3	1.9
755	1.0	1.1	13.2	10.6	9.3	2.2	2.7	0.9
756	1.5	1.8	15.8	15.7	12.3	4.4	4.0	1.8
757	1.6	0.7	14.8	13.3	10.8	2.2	4.3	1.4
758	1.1	1.6	16.7	15.7	13.3	3.8	5.8	1.9
759	0.8	-	15.3	-	12.5	4.2	-	1.3
760	1.5	1.4	15.3	12.7	10.3	1.2	1.5	1.6
761	1.5	0.9	11.9	11.8	8.5	3.2	2.4	0.4
762	0.4	0.5	10.9	10.7	8.9	2.3	2.2	0.3
763	0.5	0.4	9.9	7.4	6.6	3.2	3.1	0.3
764	1.0	1.1	14.5	11.7	10.5	2.5	2.2	1.5
765	0.6	0.2	11.0	7.5	7.7	3.0	1.5	0.7
766	1.7	1.7	17.2	16.3	12.7	4.5	4.1	2.2
767	1.2	1.6	14.5	12.6	10.3	2.2	3.3	1.3
768	1.6	1.4	12.6	10.7	8.2	1.3	2.2	1.2
769	2.5	-	-	14.7	9.9	1.5	1.7	1.2
770	0.8	1.5	14.3	11.0	9.3	1.3	2.0	1.2
771	1.2	1.2	18.2	15.5	14.0	4.4	1.7	2.3
772	0.4	0.5	10.3	10.9	9.0	1.6	1.6	0.3
773	1.0	0.5	10.8	12.2	9.1	1.6	1.2	0.7
774	0.9	1.3	13.3	9.8	9.1	1.4	2.0	1.4
775	1.3	1.4	12.6	10.5	8.5	2.9	1.6	0.5
782	2.3	2.4	20.4	20.3	15.2	2.9	5.9	6.7
783	2.3	2.2	20.9	19.1	14.8	2.6	3.4	4.3
784	2.0	2.1	20.1	18.6	14.6	1.9	1.6	4.5
785	1.1	2.1	20.0	20.1	16.5	4.5	2.9	3.8
786	1.9	1.8	22.1	19.9	16.5	2.4	2.2	5.3
788	1.3	1.2	17.6	16.9	14.5	2.8	4.0	6.1
789	3.1	2.8	18.8	17.4	12.1	3.7	2.7	2.8

Cat. No.	Notch Depth Left	Notch Depth Right	Shoulder Width	Max. Base Width	Neck Width	Basal Height Left	Basal Height Right	Wgt (g)
790	2.6	2.1	19.5	16.6	13.1	3.6	3.6	3.5
791	2.1	2.1	20.7	18.5	14.5	3.2	4.1	3.6
792	1.7	1.7	12.7	10.3	7.2	2.5	3.2	1.7
793	3.4	-	-	18.0	10.9	3.5	3.9	1.0
794	2.3	2.8	14.5	13.7	8.7	3.1	2.4	1.1
795	1.9	-	17.8	-	12.8	3.2	-	2.5
796	1.9	1.8	13.0	12.3	8.1	2.1	1.3	1.6
797	1.3	1.0	17.8	16.9	14.6	3.4	2.6	2.4
799	2.4	1.5	19.9	14.9	12.6	2.9	3.4	3.0
800	1.7	-	-	16.3	13.0	3.2	3.3	1.9
801	1.2	1.8	15.4	10.4	9.3	3.5	1.9	1.3
802	2.5	2.4	19.2	14.1	11.2	3.0	1.3	2.8
803	1.7	2.1	15.9	13.5	10.4	2.8	2.6	2.1
804	2.4	1.7	20.3	14.7	12.8	2.3	4.2	2.9
805	2.3	2.3	16.0	12.5	8.7	1.7	3.2	1.4
806	1.8	1.5	15.5	11.6	9.6	1.3	1.4	1.3
807	0.3	1.4	13.9	12.8	11.2	2.8	1.1	0.7
809	0.5	0.5	11.4	9.6	9.3	3.1	0.7	0.7
810	-	-	-	-	-	-	-	6.6
811	-	-	-	-	-	-	-	6.2
812	-	-	-	-	-	-	-	2.1
813	-	-	19.0	-	-	-	-	4.2
814	-	-	17.0	-	-	-	-	2.4
815	0.6	1.1	17.8	7.7	8.0	2.1	2.9	3.1
816	-	-	-	-	-	-	-	1.3
817	-	-	-	-	-	-	-	0.8
837	0.7	0.7	17.1	11.8	12.6	2.0	7.4	1.7
849	0.5	0.7	13.2	8.3	7.7	2.6	2.5	0.9
851	-	1.3	-	-	-	-	3.1	1.7
852	1.7	1.6	18.9	17.6	14.3	3.1	3.1	2.9
853	2.5	2.4	17.6	12.4	9.2	1.9	1.8	1.8
854	1.4	-	16.6	-	10.2	2.3	-	2.1
855	0.8	1.1	17.2	10.2	11.7	1.4	2.8	2.0
856	2.1	1.7	18.6	15.7	13.0	3.5	1.9	1.9
857	1.7	1.9	14.4	9.8	7.7	1.6	2.6	1.3
858	1.8	2.1	18.0	13.5	11.2	2.5	3.4	1.8
859	1.4	0.7	17.2	17.3	15.0	2.4	1.8	3.5

Cat. No.	Notch Depth Left	Notch Depth Right	Shoulder Width	Max. Base Width	Neck Width	Basal Height Left	Basal Height Right	Wgt (g)
860	1.6	2.9	20.7	10.6	10.0	3.8	4.0	3.9
861	1.8	1.7	18.9	16.6	13.4	2.2	1.3	4.0
862	1.5	1.7	15.6	12.9	10.1	1.6	1.5	1.2
863	-	-	23.4	-	15.9	-	-	5.2
864	-	-	22.4	-	-	-	-	3.4
865	-	-	19.8	11.6	-	-	-	5.1
866	1.0	0.9	18.7	17.3	15.9	2.0	2.9	3.3

Table 4.21a. Smith-Swainson Collection, AB: Non-metric Data.

Cat. No.	Unit	Level	Inferred Type	Material Type	Part	Body Shape	Symmetry
659	-	-	Pelican Lake	brown chert	complete	TRI	SYM
660	-	-	Sonota	KRF	1/3 base missing	EXC	SLASY
662	-	-	Sonota	brown chert	1/3 base missing	OVT	SYM
663	-	-	Sonota	KRF	body	OVT	SYM
664	-	-	Sonota	KRF	body	EXC	SYM
665	-	-	Sonota	KRF	body	-	-
666	-	-	Sonota	KRF	body	OVT	SYM
667	-	-	Sonota	KRF	body	-	-
668	-	-	Sonota	KRF	body	OVT	SYM
669	-	-	Sonota	KRF	body	EXC	SYM
670	-	-	Sonota	KRF	body	EXC	SYM
671	-	-	Sonota	KRF	body	EXC	SYM
672	-	-	Sonota	KRF	body	EXC	SYM
673	-	-	Sonota	KRF	body	OVT	SYM
674	-	-	Sonota	KRF	body	EXC	SYM
675	-	-	Sonota	mudstone	body/ base	OVT	SYM
676	-	-	Sonota	KRF	body/ base	EXC	SYM
677	-	-	Sonota	KRF	complete	OVT	SYM
679	-	-	Sonota	KRF	complete	EXC	SYM
680	-	-	Sonota	KRF	complete	OVT	SLASY
681	-	-	Sonota	KRF	body/ base	OVT	SYM
683	-	-	Sonota	KRF	complete	EXC	SYM
685	-	-	Sonota	KRF	1/3 base missing	EXC	SLASY
686	-	-	Sonota	KRF	body/ base	OVT	SLASY
687	-	-	Sonota	KRF	complete	OVT	SLASY
688	-	-	Sonota	KRF	body/ base	OVT	SYM
692	-	-	Sonota	KRF	complete	EXC	SLASY
693	-	-	Sonota	KRF	body/ base	-	SLASY
694	-	-	Sonota	KRF	body/ base	EXC	SLASY
696	-	-	Sonota	KRF	complete	OVT	SLASY
697	-	-	Sonota	KRF	complete	OVT	ASY
698	-	-	Sonota	KRF	complete	OVT	SLASY

Cat. No.	Unit	Level	Inferred Type	Material Type	Part	Body Shape	Symmetry
699	-	-	Sonota	KRF	complete	EXC	SYM
700	-	-	Sonota	KRF	complete	OVT	ASY
701	-	-	Sonota	KRF	body/ base	OVT	ASY
702	-	-	Sonota	KRF	complete	EXC	ASY
703	-	-	Sonota	KRF	complete	OVT	ASY
704	-	-	Sonota	KRF	complete	OVT	SYM
705	-	-	Sonota	KRF	tip missing	OVT	SLASY
706	-	-	Sonota	KRF	complete	OVT	ASY
707	-	-	Sonota	KRF	complete	EXC	SLASY
708	-	-	Sonota	KRF	body/ base	OVT	SLASY
709	-	-	Sonota	KRF	complete	OVT	ASY
710	-	-	Sonota	KRF	body/ base	OVT	SYM
711	-	-	Sonota	KRF	complete	EXC	SLASY
712	-	-	Sonota	KRF	complete	OVT	SLASY
713	-	-	Sonota	KRF	body/ base	EXC	SLASY
716	-	-	Sonota	KRF	complete	OVT	SYM
717	-	-	Sonota	KRF	complete	OVT	SYM
719	-	-	Sonota	KRF	body/ base	-	SYM
720	-	-	Sonota	KRF	complete	EXC	SLASY
721	-	-	Sonota	KRF	complete	OVT	SLASY
722	-	-	Sonota	KRF	complete	OVT	SLASY
723	-	-	Sonota	quartzite	complete	OVT	SYM
724	-	-	Sonota	chert	complete	OVT	SYM
726	-	-	Sonota	KRF	complete	OVT	SYM
727	-	-	Sonota	KRF	body/ base	OVT	SYM
728	-	-	Sonota	KRF	complete	OVT	SLASY
729	-	-	Sonota	KRF	complete	OVT	SLASY
730	-	-	Sonota	KRF	complete	OVT	SLASY
731	-	-	Sonota	KRF	body/ base	OVT	SLASY
732	-	-	Sonota	KRF	1/3 base missing	OVT	ASY
735	-	-	Sonota	KRF	complete	OVT	SLASY
736	-	-	Sonota	KRF	complete	OVT	ASY
737	-	-	Sonota	KRF	complete	EXC	SYM
738	-	-	Sonota	KRF	complete	OVT	SLASY
739	-	-	Sonota	KRF	complete	EXC	SYM
740	-	-	Sonota	KRF	complete	EXC	SLASY
741	-	-	Sonota	KRF	complete	OVT	ASY

Cat. No.	Unit	Level	Inferred Type	Material Type	Part	Body Shape	Symmetry
742	-	-	Sonota	KRF	complete	OVT	SYM
743	-	-	Sonota	KRF	tip missing	EXC	SLASY
744	-	-	Sonota	KRF	body/ base	OVT	ASY
745	-	-	Sonota	KRF	complete	OVT	ASY
747	-	-	Sonota	KRF	complete	OVT	SYM
748	-	-	Sonota	KRF	body/ base	OVT	SLASY
750	-	-	Sonota	KRF	complete	OVT	SYM
751	-	-	Sonota	chalcedony	1/3 base missing	EXC	-
752	-	-	Sonota	KRF	body/ base	OVT	SLASY
753	-	-	Sonota	KRF	complete	EXC	SYM
754	-	-	Sonota	KRF	complete	OVT	SLASY
755	-	-	Sonota	KRF	complete	EXC	SYM
756	-	-	Sonota	KRF	complete	TRI	SLASY
757	-	-	Sonota	KRF	complete	OVT	SLASY
758	-	-	Sonota	KRF	complete	OVT	SYM
759	-	-	Sonota	KRF	1/3 base missing	OVT	SLASY
760	-	-	Sonota	KRF	complete	OVT	SYM
761	-	-	Sonota	KRF	complete	TRI	SYM
762	-	-	Sonota	KRF	complete	TRI	SLASY
763	-	-	Sonota	KRF	complete	EXC	SYM
764	-	-	Sonota	KRF	complete	EXC	SYM
765	-	-	Sonota	KRF	complete	OVT	ASY
766	-	-	Sonota	KRF	complete	OVT	SYM
767	-	-	Sonota	KRF	complete	EXC	SYM
768	-	-	Sonota	KRF	complete	OVT	SYM
769	-	-	Sonota	KRF	shoulder missing	-	ASY
770	-	-	Sonota	KRF	complete	EXC	SYM
771	-	-	Sonota	KRF	complete	OVT	ASY
772	-	-	Sonota	KRF	complete	OVT	ASY
773	-	-	Sonota	KRF	complete	OVT	SLASY
774	-	-	Sonota	KRF	complete	EXC	ASY
775	-	-	Sonota	KRF	body/ base	-	SYM
782	-	-	Sonota	KRF	tip missing	OVT	SLASY
783	-	-	Sonota	KRF	body/ base	OVT	SYM
784	-	-	Sonota	KRF	complete	OVT	SYM

Cat. No.	Unit	Level	Inferred Type	Material Type	Part	Body Shape	Symmetry
785	-	-	Sonota	KRF	complete	EXC	SLASY
786	-	-	Sonota	KRF	complete	OVT	SYM
788	-	-	Sonota	KRF	complete	OVT	SLASY
789	-	-	Sonota	chert	body/ base	-	SYM
790	-	-	Sonota	chert	body/ base	OVT	SYM
791	-	-	Sonota	chert	body/ base	OVT	SYM
792	-	-	Sonota	quartzite	body/ base	OVT	SLASY
793	-	-	Sonota	siltstone	body/ base	-	SYM
794	-	-	Sonota	chert	body/ base	-	SLASY
795	-	-	Sonota	chert	1/3 base missing	TRI	SYM
796	-	-	Sonota	quartzite	complete	OVT	SLASY
797	-	-	Sonota	KRF	complete	OVT	SLASY
799	-	-	Sonota	KRF	body/ base	OVT	SLASY
800	-	-	Sonota	KRF	body/ base	-	SLASY
801	-	-	Sonota	siltstone	complete	TRI	SLASY
802	-	-	Sonota	siltstone	body/ base	OVT	SLASY
803	-	-	Sonota	brown chert	body/ base	OVT	SLASY
804	-	-	Sonota	chert	body/ base	-	SLASY
805	-	-	Sonota	chert	body/ base	OVT	SLASY
806	-	-	Sonota	chert	body/ base	OVT	SLASY
807	-	-	Sonota	obsidian	complete	OVT	ASY
809	-	-	Sonota	obsidian	complete	OVT	SLASY
810	-	-	Sonota	KRF	body	EXC	SYM
811	-	-	Sonota	KRF	body	OVT	SLASY
812	-	-	Sonota	KRF	body	OVT	SYM
813	-	-	Sonota	chert	body	OVT	ASY
814	-	-	Sonota	chert	body	OVT	SLASY
815	-	-	Sonota	chert	complete	OVT	SYM
816	-	-	Sonota	siltstone	body	OVT	SYM
817	-	-	Sonota	chert	body	OVT	SLASY
837	-	-	Sonota	KRF	complete	EXC	ASY
849	-	-	Sonota	KRF	complete	OVT	SLASY
851	-	-	Sonota	chert	body/ base	TRI	ASY
852	-	-	Sonota	chert	complete	TRI	SYM
853	-	-	Sonota	siltstone	body/ base	OVT	SYM

Cat. No.	Unit	Level	Inferred Type	Material Type	Part	Body Shape	Symmetry
854	-	-	Sonota	quartzite	body/ base	OVT	-
855	-	-	Sonota	chert	complete	OVT	SLASY
856	-	-	Pelican Lake?	quartzite	complete	TRI	SYM
857	-	-	?	chert	complete	OVT	SYM
858	-	-	Pelican Lake?	chert	body/ base	-	SLASY
859	-	-	Besant	quartzite	complete	OVT	SLASY
860	-	-	Pelican Lake?	chert	1/3 base missing	EXC	SLASY
861	-	-	Besant	chalce-dony	complete	OVT	SLASY
862	-	-	Besant?	chert	body/ base	OVT	SYM
863	-	-	-	KRF	body	OVT	SLASY
864	-	-	-	KRF	body	OVT	SYM
865	-	-	Middle Prehistoric ?	chert	complete	EXC	SYM
866	-	-	Middle Prehistoric ?	quartzite	body/ base	OVT	SYM

Table 4.21b. Smith-Swainson Collection, AB: Non-metric Data.

Cat. No.	Tranverse Sec. Shape	Longitudinal Sec. Shape	Left Shoulder Shape	Right Shoulder Shape	Left Notch Orient.	Right Notch Orient.
659	BI	BI	ANG/ ACT	ANG/ ACT	COR/ SYM	COR/ SYM
660	BI	BI	ANG/ OBT	RND	SIDE/ SYM	-
662	BI	BI	ANG/ OBT	ANG/ OBT	-	COR/ SYM
663	BI	BI	ANG/ OBT	ANG/ OBT	-	-
664	BI	BI	ANG/ OBT	ANG/ OBT	-	-
665	BI	BI	-	ANG/ OBT	-	-
666	BI	PLCX	ANG/ OBT	ANG/ OBT	-	-
667	PLCX	BI	-	-	-	-
668	BI	BI	ANG/ OBT	ANG/ OBT	-	-
669	BI	BI	ANG/ OBT	ANG/ OBT	-	-
670	BI	BI	ANG/ OBT	RND	-	-
671	BI	BI	ANG/ OBT	ANG/ OBT	-	-
672	BI	BI	ANG/ OBT	ANG/ OBT	-	-
673	BI	BI	ANG/ RT	ANG/RT	-	-
674	PLCX	PLCX	RND	ANG/ OBT	-	-
675	BI	BI	ANG/ OBT	ANG/ OBT	COR/ SYM	COR/ SYM
676	BI	BI	ANG/ OBT	ANG/ OBT	COR/ SKWPRX	COR/ SKWPRX
677	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SYM	COR/ SKWDST
679	BI	BI	ANG/ RT	ANG/RT	SIDE/ SYM	SIDE/ SKWPRX

Cat. No.	Tranverse Sec. Shape	Longitudinal Sec. Shape	Left Shoulder Shape	Right Shoulder Shape	Left Notch Orient.	Right Notch Orient.
680	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SKWPRX	COR/ SYM
681	PLCX	PLCX	RND	ANG/ OBT	SIDE/ SYM	SIDE/ SYM
683	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SYM
685	CX/CV	CX/CV	ANG/ OBT	ANG/ OBT	COR/ SYM	SIDE/ SYM
686	BI	BI	RND	ANG/ OBT	COR/ SKWDST	COR/ SKWPRX
687	BI	PLCX	ANG/ OBT	ANG/ OBT	SIDE/ SYM	COR/ SYM
688	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SYM
692	BI	CX/CV	ANG/ OBT	ANG/ OBT	SIDE/ SYM	COR/ SKWDST
693	BI	BI	ANG/ OBT	ANG/RT	SIDE/ SYM	SIDE/ SKWPRX
694	BI	BI	ANG/ OBT	ANG/ OBT	COR/ SYM	COR/ SKWPRX
696	BI	PLCX	ANG/ OBT	ANG/ OBT	COR/ SKWPRX	SIDE/ SKWDST
697	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SYM
698	PLCX	PLCX	ANG/ OBT	ANG/ OBT	SIDE/ SKWPRX	SIDE/ SYM
699	CX/CV	CX/CV	ANG/ OBT	ANG/ OBT	SIDE/ SKWDST	SIDE/ SYM
700	CX/CV	CX/CV	ANG/ OBT	ANG/RT	SIDE/ SYM	SIDE/ SYM
701	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SKWPRX
702	CX/CV	CX/CV	ANG/ OBT	ANG/ OBT	-	-
703	BI	CX/CV	ANG/ OBT	ANG/ OBT	COR/ SKWPRX	COR/ SYM
704	BI	BI	ANG/ RT	ANG/ OBT	COR/ SYM	COR/ SYM

Cat. No.	Tranverse Sec. Shape	Longitudinal Sec. Shape	Left Shoulder Shape	Right Shoulder Shape	Left Notch Orient.	Right Notch Orient.
705	BI	PLCX	ANG/ OBT	ANG/ OBT	COR/ SKWPRX	COR/ SYM
706	CX/CV	CX/CV	ANG/ OBT	ANG/ OBT	SIDE/ SKWPRX	SIDE/ SYM
707	PLCX	CX/CV	RND	RND	COR/ SKWPRX	COR/ SYM
708	BI	BI	ANG/ OBT	ANG/ OBT	COR/ SYM	SIDE/ SYM
709	BI	PLCX	-	ANG/ OBT	-	SIDE/ SKWPRX
710	BI	PLCX	ANG/ OBT	RND	SIDE/ SYM	COR/ SKWPRX
711	BI	PLCX	ANG/ OBT	ANG/RT	SIDE/ SYM	SIDE/ SKWDST
712	PLTR	CX/CV	RND	ANG/ OBT	SIDE/ SKWDST	SIDE/ SKWPRX
713	CX/CV	CX/CV	ANG/ RT	ANG/ OBT	SIDE/ SKWPRX	SIDE/ SKWDST
716	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SKWDST
717	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SYM
719	BI	-	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SYM
720	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SKWPRX
721	PLCX	PLCX	ANG/ OBT	ANG/ OBT	SIDE/ SKWDST	COR/ SYM
722	BI	BI	ANG/ OBT	RND	SIDE/ SKWDST	SIDE/ SYM
723	BI	BI	RND	ANG/ OBT	SIDE/ SKWPRX	SIDE/ SKWPRX
724	BI	BI	ANG/ OBT	ANG/RT	SIDE/ SYM	SIDE/ SYM
726	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SKWPRX
727	PLCX	CX/CV	ANG/ OBT	ANG/ OBT	SIDE/ SKWPRX	SIDE/ SKWDST
728	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SKWPRX	SIDE/ SKWPRX

Cat. No.	Tranverse Sec. Shape	Longitudinal Sec. Shape	Left Shoulder Shape	Right Shoulder Shape	Left Notch Orient.	Right Notch Orient.
729	BI	CX/CV	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SYM
730	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SYM
731	BI	PLCX	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SYM
732	BI	PLCX	ANG/ OBT	ANG/ OBT	-	SIDE/ SKWDST
735	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SYM
736	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SKWPRX	SIDE/ SYM
737	BI	BI	RND	ANG/ OBT	SIDE/ SKWPRX	SIDE/ SYM
738	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SKWPRX	SIDE/ SKWPRX
739	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SYM
740	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SKWPRX	SIDE/ SKWDST
741	BI	BI	ANG/ ACT	RND	SIDE/ SKWPRX	SIDE/ SKWPRX
742	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SKWPRX
743	BI	BI	ANG/ OBT	RND	SIDE/ SKWDST	SIDE/ SYM
744	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SKWPRX	SIDE/ SKWDST
745	BI	BI	ANG/ OBT	RND	SIDE/ SKWDST	SIDE/ SYM
747	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SKWPRX
748	BI	BI	RND	RND	SIDE/ SYM	SIDE/ SKWPRX
750	BI	BI	ANG/ OBT	RND	SIDE/ SKWDST	SIDE/ SYM
751	PLCX	PLCX	RND	ANG/ OBT	SIDE/ SYM	-

Cat. No.	Tranverse Sec. Shape	Longitudinal Sec. Shape	Left Shoulder Shape	Right Shoulder Shape	Left Notch Orient.	Right Notch Orient.
752	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SKWPRX	SIDE/ SKWPRX
753	BI	BI	ANG/ OBT	RND	SIDE/ SKWPRX	SIDE/ SYM
754	BI	BI	RND	ANG/ OBT	SIDE/ SYM	SIDE/ SYM
755	BI	PLCX	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SYM
756	PLCX	CX/CV	ANG/ OBT	ANG/ OBT	SIDE/ SKWDST	SIDE/ SKWPRX
757	CX/CV	CX/CV	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SYM
758	CX/CV	CX/CV	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SYM
759	CX/CV	CX/CV	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SYM
760	PLTR	CX/CV	ANG/ OBT	ANG/ OBT	COR/ SYM	SIDE/ SYM
761	PLTR	CX/CV	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SYM
762	BI	CX/CV	ANG/ OBT	ANG/ OBT	COR/ SYM	SIDE/ SKWPRX
763	CX/CV	CX/CV	RND	ANG/RT	SIDE/ SYM	SIDE/ SYM
764	PLCX	PLCX	RND	RND	SIDE/ SYM	SIDE/ SYM
765	CX/CV	CX/CV	RND	RND	SIDE/ SYM	SIDE/ SKWPRX
766	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SYM
767	PLTR	BI	ANG/ OBT	ANG/ OBT	SIDE/ SKWPRX	SIDE/ SYM
768	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SKWPRX	SIDE/ SYM
769	BI	BI	ANG/ OBT	-	SIDE/ SYM	-
770	BI	BI	RND	ANG/ OBT	SIDE/ SYM	SIDE/ SYM

Cat. No.	Tranverse Sec. Shape	Longitudinal Sec. Shape	Left Shoulder Shape	Right Shoulder Shape	Left Notch Orient.	Right Notch Orient.
771	CX/CV	CX/CV	ANG/ OBT	ANG/ OBT	SIDE/ SYM	COR/ SYM
772	CX/CV	CX/CV	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SYM
773	PLCX	PLCX	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SKWPRX
774	PLTR	CX/CV	ANG/ OBT	RND	COR/ SYM	SIDE/ SYM
775	BI	CX/CV	RND	ANG/ OBT	COR/ SYM	SIDE/ SYM
782	BI	PLCX	ANG/ OBT	ANG/ OBT	SIDE/ SKWPRX	SIDE/ SKWDST
783	PLTR	PLCX	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SYM
784	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SKWPRX	SIDE/ SKWPRX
785	BI	BI	RND	RND	SIDE/ SYM	SIDE/ SYM
786	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SYM
788	BI	BI	RND	RND	SIDE/ SKWDST	SIDE/ SKWPRX
789	BI	BI	ANG/ RT	ANG/RT	SIDE/ SKWPRX	SIDE/ SKWPRX
790	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SKWDST
791	BI	BI	ANG/ OBT	RND	SIDE/ SYM	SIDE/ SYM
792	PLCX	PLCX	ANG/ OBT	ANG/RT	SIDE/ SYM	SIDE/ SKWPRX
793	BI	-	ANG/ OBT	-	SIDE/ SYM	SIDE/ SYM
794	BI	-	RND	ANG/ OBT	SIDE/ SKWPRX	SIDE/ SKWPRX
795	PLCX	PLCX	ANG/ OBT	ANG/ OBT	SIDE/ SYM	-
796	BI	BI	RND	ANG/ OBT	SIDE/ SYM	SIDE/ SYM

Cat. No.	**Tranverse Sec. Shape**	**Longitudinal Sec. Shape**	**Left Shoulder Shape**	**Right Shoulder Shape**	**Left Notch Orient.**	**Right Notch Orient.**
797	BI	PLCX	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SKWPRX
799	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SKWDST
800	BI	-	ANG/ OBT	ANG/ OBT	SIDE/ SKWPRX	SIDE/ SKWPRX
801	BI	PLCX	ANG/ OBT	ANG/ OBT	SIDE/ SYM	COR/ SYM
802	BI	PLCX	ANG/ OBT	ANG/ OBT	COR/ SKWPRX	COR/ SKWPRX
803	PLCX	BI	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SKWPRX
804	BI	BI	ANG/ OBT	ANG/ OBT	COR/ SYM	COR/ SYM
805	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SYM
806	BI	BI	ANG/ OBT	ANG/ OBT	COR/ SKWPRX	COR/ SKWPRX
807	PLCX	-	-	ANG/ OBT	-	SIDE/ SYM
809	PLCX	PLCX	RND	ANG/ OBT	SIDE/ SYM	SIDE/ SKWPRX
810	BI	BI	-	-	-	-
811	BI	BI	-	-	-	-
812	BI	BI	-	-	-	-
813	BI	PLCX	RND	ANG/ OBT	-	-
814	BI	-	ANG/ OBT	ANG/ OBT	-	-
815	BI	BI	RND	RND	-	-
816	CX/CV	CX/CV	-	-	-	-
817	PLCX	PLCX	-	-	-	-
837	CX/CV	CX/CV	ANG/ OBT	ANG/ OBT	COR/ SYM	SIDE/ SYM
849	CX/CV	CX/CV	RND	ANG/ OBT	COR/ SKWDST	COR/ SKWDST
851	BI	BI	-	ANG/ OBT	-	SIDE/ SYM

Cat. No.	Tranverse Sec. Shape	Longitudinal Sec. Shape	Left Shoulder Shape	Right Shoulder Shape	Left Notch Orient.	Right Notch Orient.
852	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SYM
853	BI	BI	ANG/ ACT	ANG/ OBT	COR/ SYM	COR/ SYM
854	BI	PLCX	ANG/ OBT	RND	SIDE/ SYM	-
855	BI	BI	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SYM
856	BI	PLCX	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SYM
857	PLCX	CX/CV	ANG/ OBT	ANG/ OBT	COR/ SYM	COR/ SYM
858	PLTR	BI	RND	ANG/RT	SIDE/ SYM	SIDE/ SYM
859	BI	PLCX	RND	RND	SIDE/ SKWPRX	SIDE/ SKWDST
860	BI	BI	ANG/ ACT	ANG/RT	COR/ SYM	COR/ SYM
861	PLCX	BI	ANG/ OBT	ANG/ OBT	SIDE/ SYM	SIDE/ SKWPRX
862	PLCX	PLCX	ANG/ OBT	ANG/ OBT	COR/ SKWPRX	SIDE/ SYM
863	CX/CV	CX/CV	ANG/ OBT	ANG/ OBT	-	-
864	BI	BI	ANG/ OBT	RND	-	-
865	BI	BI	RND	RND	-	-
866	PLCX	PLCX	RND	RND	-	-

Table 4.21c. Smith-Swainson Collection, AB: Non-metric Data.

Cat. No.	Left Notch Shape	Right Notch Shape	Base Type	Left Basal Edge Shape	Right Basal Edge Shape	Ret.	Util.	Qual. of Raw Material	Qual. of Work.
659	RND	RND	STR	ANG	SQR	-	-	M	H
660	RND	-	CCV	RND	-	-	-	H	M
662	-	ANG	STR	-	RND	-	-	M	M
663	-	-	-	-	-	-	-	H	H
664	-	-	-	-	-	-	-	H	H
665	-	-	-	-	-	-	-	H	H
666	-	-	-	-	-	-	-	H	H
667	-	-	-	-	-	-	-	H	H
668	-	-	-	-	-	-	-	H	H
669	-	-	-	-	-	-	-	H	H
670	-	-	-	-	-	-	-	H	H
671	-	-	-	-	-	-	-	H	H
672	-	-	-	-	-	-	-	H	H
673	-	-	-	-	-	-	-	H	H
674	-	-	-	-	-	-	-	H	M
675	RND	SQR	STR	ANG	SQ/CON	-	-	P	M
676	ANG	ANG	STR	ANG	ANG	-	-	H	H
677	ANG	ANG	CCV	RND	ANG	-	-	H	H
679	RND	ANG	STR	SQR	SQR	Y	-	H	M
680	ANG	SQR	STR	ANG	ANG	-	-	H	H
681	ANG	ANG	STR	RND	SQR	-	-	H	H
683	RND	RND	STR	SQ/EXP	SQ/CON	-	-	H	H
685	RND	RND	STR	ANG	-	Y	-	H	M
686	RND	RND	STR	SQR	SQ/CON	-	-	H	M
687	ANG	RND	STR	SQ/EXP	SQ/CON	-	-	H	M
688	SQR	RND	STR	RND	SQ/CON	-	-	H	H
692	SQR	ANG	STR	SQR	SQR	-	-	H	H
693	ANG	RND	STR	SQ/CON	SQ/CON	-	-	H	H
694	SQR	ANG	CCV	ANG	SQ/CON	-	-	H	H
696	RND	RND	STR	ANG	SQ/CON	-	-	H	H
697	SQR	RND	STR	ANG	RND	Y	-	H	M
698	ANG	RND	STR	ANG	SQ/CON	-	-	H	M
699	RND	RND	CVX	ANG	SQR	-	-	H	P
700	RND	RND	STR	RND	ANG	Y	-	H	P

Cat. No.	Left Notch Shape	Right Notch Shape	Base Type	Left Basal Edge Shape	Right Basal Edge Shape	Ret.	Util.	Qual. of Raw Material	Qual. of Work.
701	RND	ANG	CCV	RND	RND	Y	-	H	M
702	SQR	SQR	STR	RND	RND	Y	-	H	M
703	ANG	RND	CVX	RND	RND	Y	-	H	M
704	SQR	RND	STR	ANG	ANG	-	-	H	M
705	SQR	RND	STR	ANG	SQ/CON	-	-	H	H
706	RND	RND	CVX	RND	SQR	-	-	H	M
707	ANG	SQR	CVX	ANG	RND	-	-	H	M
708	ANG	RND	STR	ANG	RND	-	-	H	M
709	-	ANG	STR	RND	RND	Y	-	H	M
710	ANG	ANG	STR	RND	SQR	-	-	H	H
711	RND	SQR	CVX	RND	SQR	-	-	H	H
712	SQR	ANG	STR	RND	RND	-	-	H	M
713	RND	RND	STR	ANG	RND	-	-	H	M
716	ANG	ANG	CCV	SQ/CON	SQR	-	-	H	H
717	SQR	RND	STR	SQ/CON	SQ/CON	-	-	H	H
719	RND	SQR	STR	SQR	ANG	-	-	H	M
720	ANG	ANG	STR	ANG	ANG	-	-	H	H
721	ANG	SQR	STR	SQR	RND	-	-	H	H
722	ANG	ANG	STR	ANG	SQ/CON	-	-	H	H
723	ANG	ANG	CVX	RND	RND	-	-	P	M
724	RND	RND	CVX	ANG	ANG	-	-	M	M
726	ANG	RND	STR	SQ/CON	ANG	-	-	H	M
727	ANG	ANG	STR	SQ/CON	SQR	-	-	H	M
728	ANG	ANG	STR	ANG	RND	-	-	H	M
729	RND	ANG	STR	SQR	ANG	-	-	H	H
730	SQR	ANG	STR	RND	SQ/CON	Y	-	H	M
731	RND	RND	STR	SQ/CON	SQ/CON	-	-	H	M
732	-	ANG	STR	-	RND	-	-	H	M
735	RND	SQR	CVX	RND	ANG	-	-	H	M
736	ANG	RND	STR	ANG	RND	-	-	H	M
737	ANG	RND	STR	RND	ANG	-	-	H	M
738	ANG	ANG	CCV	SQR	SQ/CON	Y	-	H	M
739	RND	SQR	STR	SQ/CON	ANG	-	-	H	H
740	ANG	ANG	STR	ANG	RND	-	-	H	H
741	ANG	ANG	STR	ANG	SQ/CON	Y	-	H	M
742	RND	ANG	STR	SQ/CON	SQ/CON	-	-	H	H

Cat. No.	Left Notch Shape	Right Notch Shape	Base Type	Left Basal Edge Shape	Right Basal Edge Shape	Ret.	Util.	Qual. of Raw Material	Qual. of Work.
743	ANG	ANG	STR	RND	RND	-	-	H	H
744	ANG	ANG	STR	SQR	RND	-	-	H	M
745	ANG	RND	CVX	RND	ANG	Y	-	H	M
747	SQR	ANG	CVX	SQR	SQ/CON	-	-	H	H
748	RND	ANG	CVX	SQR	RND	-	-	H	M
750	ANG	ANG	STR	RND	SQR	-	-	H	H
751	ANG	-	CCV	SQ/CON	-	-	-	H	M
752	ANG	ANG	CCV	RND	RND	Y	-	H	M
753	ANG	ANG	STR	SQR	SQ/CON	Y	-	H	M
754	RND	ANG	STR	SQR	ANG	Y	-	H	M
755	RND	RND	STR	SQ/CON	SQ/CON	-	-	H	M
756	ANG	ANG	CVX	RND	RND	-	-	H	M
757	ANG	ANG	CVX	ANG	RND	-	-	H	M
758	SQR	SQR	CVX	RND	RND	-	-	H	M
759	SQR	SQR	-	SQR	-	-	-	H	M
760	RND	SQR	CVX	ANG	ANG	-	-	H	P
761	SQR	RND	CVX	SQ/CON	ANG	-	-	H	M
762	RND	RND	STR	RND	ANG	-	-	H	P
763	RND	RND	CVX	SQR	SQ/CON	-	-	H	P
764	RND	ANG	CVX	SQ/CON	SQ/CON	-	-	H	M
765	SQR	ANG	CVX	SQR	ANG	-	-	H	P
766	SQR	RND	STR	ANG	RND	-	-	H	M
767	ANG	SQR	STR	ANG	ANG	-	-	H	M
768	ANG	ANG	STR	ANG	ANG	-	-	H	M
769	ANG	-	STR	SQ/CON	ANG	-	-	H	M
770	ANG	ANG	STR	ANG	ANG	-	-	H	M
771	RND	RND	STR	RND	ANG	Y	-	H	M
772	ANG	RND	CVX	ANG	ANG	-	-	H	P
773	RND	ANG	STR	ANG	ANG	-	-	H	M
774	RND	RND	CVX	RND	RND	-	-	H	M
775	SQR	SQR	CVX	ANG	SQ/CON	-	-	H	M
782	ANG	ANG	STR	ANG	SQR	-	-	H	M
783	ANG	ANG	STR	RND	SQ/CON	-	-	H	M
784	ANG	ANG	STR	ANG	ANG	-	-	H	M
785	ANG	ANG	STR	SQ/CON	SQ/CON	-	-	H	M
786	ANG	ANG	STR	RND	RND	-	-	H	H

Cat. No.	Left Notch Shape	Right Notch Shape	Base Type	Left Basal Edge Shape	Right Basal Edge Shape	Ret.	Util.	Qual. of Raw Material	Qual. of Work.
788	ANG	ANG	CCV	RND	RND	-	-	H	M
789	ANG	ANG	CCV	SQ/CON	SQ/CON	-	-	M	M
790	ANG	ANG	CCV	RND	RND	-	-	M	M
791	RND	RND	STR	SQ/CON	RND	-	-	M	P
792	ANG	ANG	CVX	ANG	RND	-	-	M	M
793	SQR	SQR	STR	SQ/CON	SQ/CON	-	-	M	M
794	ANG	ANG	STR	SQ/CON	SQR	-	-	M	M
795	RND	-	-	ANG	-	-	-	M	M
796	ANG	ANG	STR	ANG	ANG	-	-	P	M
797	RND	ANG	CVX	SQR	ANG	-	-	H	M
799	SQR	ANG	CCV	RND	SQR	-	-	H	M
800	ANG	ANG	CVX	ANG	ANG	Y	-	H	M
801	SQR	ANG	STR	SQ/CON	SQ/CON	-	-	M	M
802	ANG	ANG	STR	SQR	ANG	-	-	M	M
803	SQR	ANG	STR	SQ/CON	SQR	-	-	M	M
804	SQR	ANG	STR	RND	SQR	-	-	P	M
805	ANG	ANG	CVX	ANG	SQ/CON	-	-	M	M
806	ANG	ANG	CCV	RND	RND	Y	-	M	M
807	-	ANG	STR	RND	ANG	Y	-	H	M
809	RND	ANG	CCV	RND	ANG	-	-	H	M
810	-	-	-	-	-	-	-	H	H
811	-	-	-	-	-	-	-	H	H
812	-	-	-	-	-	-	-	H	H
813	-	-	-	-	-	-	-	H	H
814	-	-	-	-	-	-	-	M	M
815	-	-	STR	SQR	SQR	-	-	M	M
816	-	-	-	-	-	-	-	M	M
817	-	-	-	-	-	-	-	M	M
837	ANG	RND	CVX	RND	RND	Y	-	H	P
849	ANG	ANG	CVX	ANG	RND	-	-	H	D
851	-	RND	CCV	ANG	RND	-	-	M	M
852	RND	RND	CVX	ANG	ANG	-	-	H	H
853	RND	RND	CVX	SQR	ANG	-	-	M	H
854	ANG	-	-	ANG	-	-	-	P	M
855	SQR	SQR	STR	ANG	SQ/CON	Y	-	H	M
856	RND	RND	STR	SQR	ANG	-	-	M	M

Cat. No.	Left Notch Shape	Right Notch Shape	Base Type	Left Basal Edge Shape	Right Basal Edge Shape	Ret.	Util.	Qual. of Raw Material	Qual. of Work.
857	RND	RND	CVX	ANG	ANG	-	-	M	M
858	SQR	SQR	CCV	ANG	SQR	-	-	M	M
859	SQR	SQR	CCV	RND	RND	-	-	P	M
860	SQR	SQR	CCV	SQ/CON	SQ/CON	-	-	M	M
861	SQR	ANG	STR	ANG	ANG	-	-	M	M
862	ANG	SQR	CVX	ANG	ANG	-	-	M	P
863	-	-	-	-	-	-	-	H	M
864	-	-	-	-	-	-	-	H	M
865	-	-	CCV	ANG	ANG	-	-	P	M
866	-	-	CCV	RND	ANG	-	-	P	M

Discussion

A detailed analysis was conducted on projectile point assemblages from the Fincastle, EbPi-63, EgPn-111, Kenney, Leavitt, Muhlbach, and Smith-Swainson sites. With the exception of the Leavitt site, from Montana, the study sites were all from Alberta. The focus on the Alberta archaeological sites was made in order to place the Fincastle site in context on the Northwestern Plains at *c*. 2500 B.P.

There were several objectives guiding the projectile point research. The first objective was to determine the cultural affiliation at the Fincastle site, based on its projectile point typology, in comparison with other contemporaneous assemblages during the late Middle Prehistoric Period. The second objective pertaining to the Fincastle assemblage was to determine the technology represented by the projectile point assemblage—did the sample of points from the Fincastle site represent darts, arrows, or both? Additionally, was such technological variability evident among the other site assemblages under study? Additional objectives included trying to identify Sonota versus Besant projectile points on Alberta's Northwestern Plains, and trying to see whether these two hypothesized cultural affiliations could be distinguished within the study sites, as discussed further in Chapter 5.

It was difficult at the outset of the metric and non-metric analysis to determine which attributes would be significant in distinguishing cultural affiliation. Metric attributes have been noted to reflect the technology used at an archaeological site, rather than its cultural affiliation (Ramsey 1991). Nevertheless, following Ramsey (1991) and Hjermstad (1996) metric and non-metric attributes were selected that would best describe each projectile point to see if any trends became apparent. As discussed earlier, metric

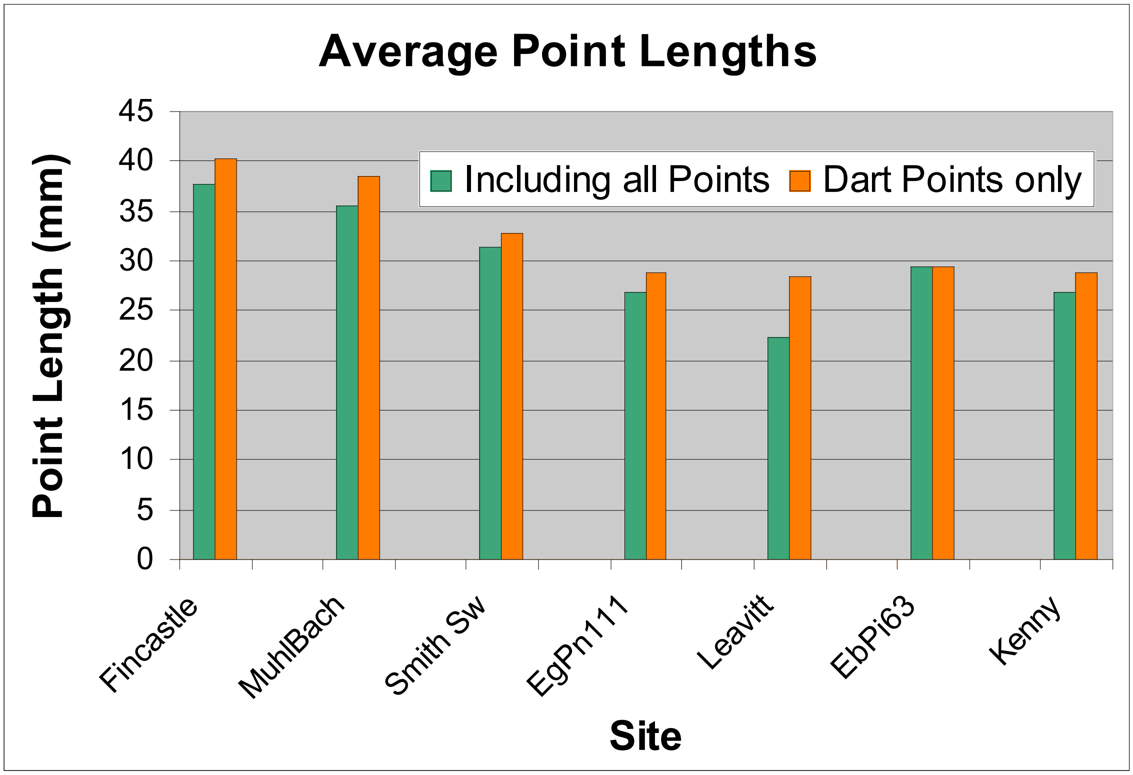

Figure 4.14. Projectile point length per site.

attributes were used to distinguish dart and arrow technology (Bradbury 1997; Christenson 1986; Shott 1997; Thomas 1978), for example.

The one metric attribute, however, that did appear to hold some significance in contributing to distinguishing assemblages with higher frequencies of Knife River Flint from more heterogeneous raw materials was projectile point length (Figure 4.14). Average projectile points lengths were the greatest at the Fincastle site, with the dart points averaging 40.2 mm in length, while the longest points were over 70 mm and the smallest 23.8 mm in length. The Muhlbach site average was 38.4 mm, the next highest average dart point length in the study. The lengths ranged from 66 to 24 mm. Smith-Swainson follows with an average dart point length of 32.7 mm, and a range of 51.1 to 16.1 mm. EgPn-111, Leavitt, EbPi-63, and Kenney average dart point lengths were below 30 mm: 28.8 mm (36.4 mm to 15.0 mm), 28.5 mm (38.3 mm to 21.7 mm), 29.5 mm (47.3 mm to 18.6 mm), and 28.8 mm (40.3 mm to 16.7 mm) respectively. It should be noted that there were several long dart bodies in the Leavitt collection that could not be quantified, as they were missing their bases; had these points been complete, it is likely that the average dart point length for this site would have been higher.

As previously noted, the projectile point length metric attribute must be viewed in relation to basal width, as reworking can markedly reduce the length in later stages of the point's use cycle. Therefore, the greater number of points available within an assemblage from a single context, the greater the odds are of showing projectile points in a variety of stages in their use cycle. Larger samples help minimize the possible skewing of the lengths by resharpening.

In the case of the present analysis with the seven study sites, the combination of length viewed against raw material selection yielded significant results. There was a correlation between length and raw material evident in the analysis, as shown in Figure 4.15. In this figure, the range and means of projectile point lengths are illustrated, versus raw material. The raw materials in this figure are categorized as Knife River Flint, chert, and other. 'Chert' includes all named varieties of chert, as well as chalcedonies. 'Other' includes obsidian, quartzite, siltstone, mudstone, and other raw materials. EgPn-111 had nearly equal quantities of Knife River Flint and cherts, approximately 40% each. EbPi-63 and the Kenney site included raw materials such as quartzites, siltstones, mudstone, and petrified wood. The Fincastle, Muhlbach, and Smith-Swainson sites were dominated by Knife River Flint. The Leavitt site point assemblage was also dominated by chert. What is particularly interesting is viewing those frequencies of raw materials from the site

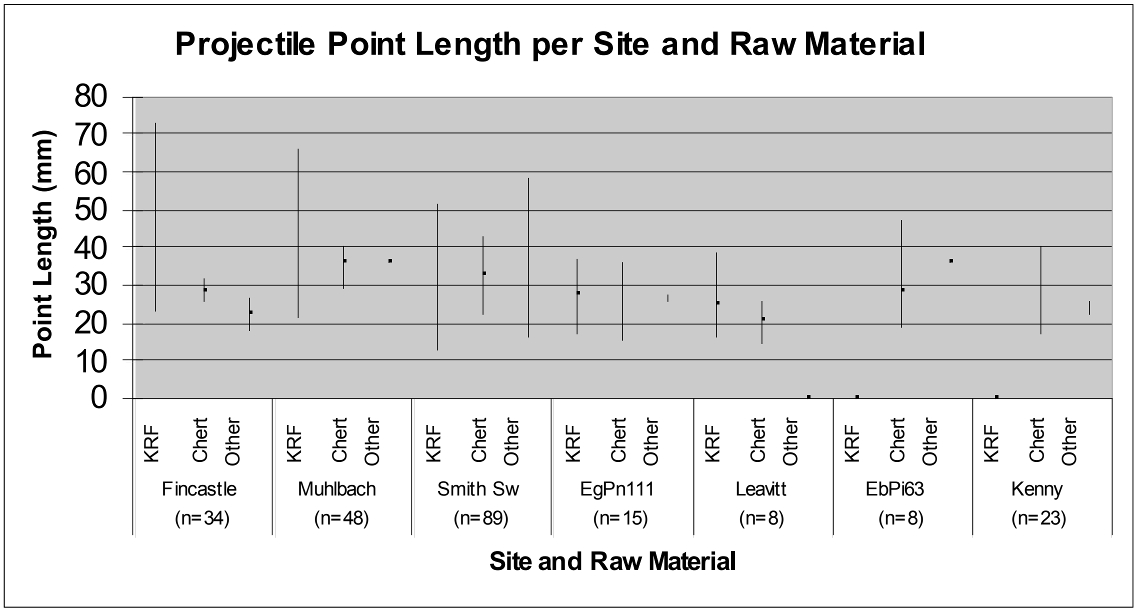

Figure 4.15. Projectile point length by study site, showing raw material. The range (from maximum to minimum) is indicated by a line, and the average is depicted by a dot.

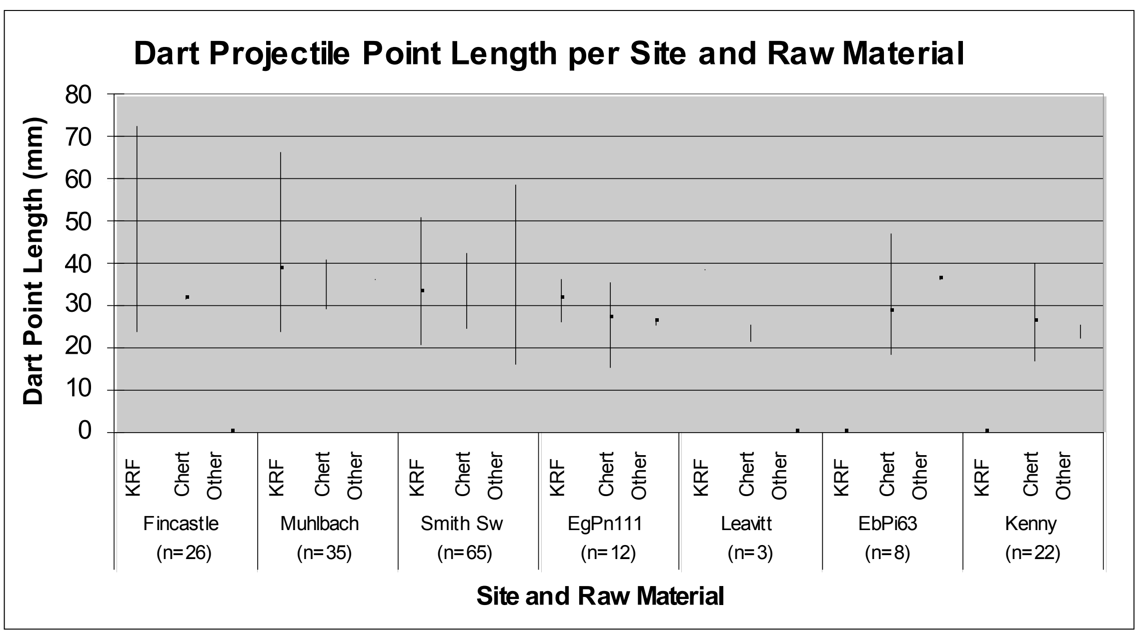

Figure 4.16. Dart projectile point length by study site, showing raw material. The range (from maximum to minimum) is indicated by a line, and the average is depicted by a dot.

analysis versus the projectile point lengths in Figure 4.15. It is apparent that at Fincastle, Muhlbach, and Smith-Swainson that the longest points are made from Knife River Flint. At Fincastle, the small points, interpreted as arrows as discussed later in this section, are primarily cherts and other raw materials. At Muhlbach, the arrows are made from both Knife River Flint and other raw materials. At Smith-Swainson, long points are indicated by both Knife River Flint and chert, although long Knife River Flint points occur more frequently. The longest points at EbPi-63 and the Kenney site were made from cherts; Knife River Flint appeared in trace quantities at these two sites. At the Leavitt site, Knife River Flint was preferred slightly more frequently than the cherts.

In Figure 4.16, raw material is examined against dart length, rather than the overall projectile assemblage, as shown in Figure 4.15. Generally, the same trends hold. At Fincastle, the dart points are nearly all made from Knife River Flint, and these are significantly longer on average than the chert dart points. The Muhlbach site's darts are also made primarily from Knife River Flint, with a few chert specimens; however, in this case, they are more similar in length on average, although the longest points are made from Knife River Flint. Dart points from Smith-Swainson made from Knife River Flint and quartzite show similar average lengths, although it should be noted that one very long pink quartzite specimen (cat. 723) skews this result, at 58.6 mm in length. At EgPn-111, the long darts are predominantly made from chert. The single quartzite dart point is longer than the chert point average for EbPi-63; however, the longest point was made from chert. Darts are also dominated by cherts at EbPi-63 and Kenney. Chert darts are longer than the 'other' type at the Kenney site. There is too little data to comment on raw material and projectile point length for the Leavitt site.

The technology represented by these assemblages was a significant question. Previous statistical research by Ramsey (1991) in trying to determine the cultural affiliation of the Melhagen site in Saskatchewan instead revealed the types of technology utilized at the site; cultural affiliation could not be determined using statistical methods. Furthermore, the issue of recognizing technology rather than cultural affiliation through statistical analysis is not a problem specific to the Fincastle site, but to any typological study relying upon this kind of approach in trying to place a site in prehistory. One of the findings from this analysis is that there is no single formula that will calculate cultural affiliation. This is due to the fact that projectile points as taxonomically defined within these assemblages represent different kinds of technology, atlatl darts and arrows. Additionally, Sonota and Besant are closely related archaeological cultures; using a statistical analysis may not distinguish between them. Multiple lines of evidence, where the projectile point metric measurements are only one avenue of inquiry, are needed to do distinguish between Besant and Sonota, as discussed further in Chapter 5.

Through the course of this analysis, it was apparent that there were arrows within several of the Besant Phase projectile point assemblages. Smaller projectile points co-occurring with Besant darts have been termed 'Samantha' arrow points (Kooyman 2000; Reeves 1983a). 'Samantha' arrow points share the same attributes as defined for the Besant dart point; the difference between the arrow and dart during the Besant Phase is size. As indicated in the dart and arrow comparative analyses conducted by Thomas (1978), Christensen (1986), and Shott (1997), distinguishing between darts and arrows needs to be site specific, as the relationship between these two kinds of projectile points

Table 4.22. Samantha arrow points identified in the study.

Site	**Borden No.**	**Arrows**	**No.**
Fincastle	DlOx-5	2, 3, 852, 855, 858, 865, 884, 4506, 4976, 5921, 6524	11
-	EbPi-63	-	-
-	EgPn-111	251, 330, 957, 982	4
Kenney	DkPj-1	116	1
Leavitt	-	2?, 23, 30, 34, 51, 52, 53	7
Muhlbach	FbPf-1	2, 48, 54, 58, 64, 65, 71, 84, 87, 100, 115, 129, 134, 203, 225, 234, 247, 253, 254, 280, 303	21
Smith-Swainson	FeOw-1	674, 698, 699, 700, 702, 706, 707, 712, 713, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 771, 772, 773, 774, 775, 837, 849, 857	28

varies by site and through time as demonstrated in the shoulder means in their research. In this study, smaller projectile point forms, as compared within each site's projectile point assemblage's shoulder means, were arbitrarily identified as 'Samantha' arrows. Additionally, flake points were also identified as 'Samantha' arrows; flake points tended to have smaller shoulder widths, but there were some exceptions to this, particularly at Fincastle.

Gregg (1989:43) hypothesized that the arrows or small darts at the Naze site in North Dakota during the Early Woodland, coeval with the late Middle Prehistoric Period in Alberta, represented small atlatl darts, used when "… high speed projectiles, rather than slower, heavy impact projectiles, were needed." Arrow points were identified in several of the study sites, including Fincastle, EgPn-111, Kenney, Leavitt, Muhlbach, and Smith-Swainson. They, too, may also represent this specialized function (Table 4.22; Table 4.23). In Table 4.23, means are shown between darts and arrows for the study sites.

Table 4.23. Dart and arrow shoulder widths.

Site	Darts				Arrows				Total
	Min.	**Max.**	**Mean**	**(n=)**	**Min.**	**Max.**	**Mean**	**(n=)**	
Fincastle	16.9	24.7	20.6	26	14.9	22.3	18.0	8	**34**
EbPi-63	17.2	22.2	19.8	8	-	-	-	-	**8**
EgPn-111	11.6	19.7	16.6	12	10.9	14.8	12.9	3	**15**
Kenney	13.6	22.2	18.4	22	10.1	10.1	10.1	1	**23**
Leavitt	12.9	22.1	16.7	3	11.8	13.8	13.0	5	**8**
Muhlbach	17.8	26.0	21.1	35	9.0	21.0	15.5	13	**48**
Smith-Swainson	11.4	29.5	18.9	65	9.9	19.7	14.7	24	**89**

Dart means range from 16.6 mm at EgPn-111 to 29.5 mm at Smith-Swainson. Arrow means range from 10.1 mm at Kenney to 18.0 mm at Fincastle.

It is hypothesized that the variation in shoulder widths at the Fincastle site may represent experimentation with an emergent technology. Samantha points become more frequent through time, as evidenced at the Muhlbach and Smith-Swainson sites. It is noteworthy that no Samantha points were identified at EbPi-63, and only a single arrow was identified at the Kenney site. Fincastle and EbPi-63 are contemporaneous at *c*. 2500 B.P. but they each feature very different assemblages. The Fincastle site includes what seem to be several arrows in its assemblage. At approximately one thousand years later, arrows are seen at other Alberta archaeological sites, in small quantities, although they are an earlier and more common occurrence at Fincastle, Muhlbach, and Smith-Swainson. The Leavitt site, the most recent Besant Phase site in this analysis includes arrows in combination with darts; it is of interest that the arrows from Leavitt are smaller than those of the earlier Besant sites in the study. The arrow and dart forms tend to feature the same notching and form, with the arrows often fashioned on flakes like the other sites. Also of interest is the similarity of form and workmanship of arrow points from the Leavitt site to those at later Avonlea sites such as at the Miniota site in Manitoba, and may represent a link between Sonota and the later Avonlea type in the Late Prehistoric Period (Landals, Kulle, and Cockle 2004).

Quality of workmanship and quality of raw material are two attributes from the non-metric study that yielded interesting findings. Both of these attributes represent an arbitrary classification as either ‘high,’ medium,’ or ‘low’ quality. As introduced earlier, high quality of workmanship was designated when the projectile point under analysis had been bifacially and skillfully worked, and symmetrical in longitudinal and transverse cross-sections; flaking tended to be parallel and regular on both sides of the projectile point. ‘Low’ quality of workmanship was designated when the point under analysis was asymmetrical, unifacially worked, or with minimal flaking around its lateral edges; ‘low’ quality of workmanship points tended to be expedient tools, and included most of the Samantha arrows identified in this study. ‘Medium’ quality workmanship was selected when the point exhibited a mixture of features from the ‘high’ and ‘low’ quality definitions. The quality of the raw material used to produce a projectile point was also analyzed as either ‘high,’ ‘medium,’ or ‘poor’ quality. ‘High’ quality raw materials were identified when the projectile point lithic material exhibited a fine, homogeneous microcrystalline structure, and could be readily flaked into a well-formed tool; ‘high’ quality raw materials also tended to have been heat-treated to improve the quality of the stone for knapping. Knife River Flint has often been heat treated in the prehistoric past to improve the stone for flintknapping (Johnson 1980). Knife River Flint was identified as high quality raw material, whereas quartzite, with its coarse structure, was considered a poor quality raw material for flintknapping projectile points. Siltstones and argillite would be considered medium quality.

In the analysis of the seven study sites, high quality workmanship and high quality raw material tended to co-occur; there was also a correlation between low quality workmanship and low quality raw materials. The majority of the Knife River Flint projectile points were considered to represent high quality workmanship, although more expedient Samantha arrow forms were also identified, and often considered low quality points. It is of interest that the majority of the dart points were high quality in their workmanship, and Knife River Flint was preferred at Fincastle, Muhlbach, and Smith-Swainson for dart points; EbPi-63, EgPn-111, Kenney, and Leavitt point assemblages also showed a preference for high quality raw materials that included Knife River Flint, along with other fine-grained chalcedonies and cherts. Interestingly, the Samantha arrow points, although sometimes made from Knife River Flint at the Fincastle site, did not indicate as strong a preference for this raw material as for the dart points. Fincastle Samantha points were also produced from porcellainite and siltstone, thus not as fine-grained as Knife River Flint; expedient arrow points did not require high quality raw materials, although they were also used when available. In contrast, the Leavitt site, the most recent site included in the study, featured high quality raw materials in its dart and arrow assemblage.

Most significantly, as discussed further in Chapter 5, the recognition of mixed Besant-Pelican Lake assemblages was an important observation in this study. This is an observation that is not represented metrically. Besant projectile points are identified on the basis of their side notches, feature a variety of base types (straight, convex, concave), and workmanship. Pelican Lake points are characterized by their corner notches, acute shoulder angles and angled notches. Several Besant Phase assemblages, EbPi-63, EgPn-111, and Kenney in the study typically feature both types of projectile points within an assemblage. Fincastle, Smith-Swainson, Muhlbach, and Leavitt do not have these mixed Besant-Pelican Lake assemblages. The single Pelican Lake specimen at Smith-Swainson is problematic, as the site is a surface collection; it cannot be ascertained whether this specimen is from the same occupation due to its uncertain provenience. Another observation regarding the sites with the mixed assemblages (EbPi-63, EgPn-111, Kenney, Leavitt), is that they also tend to feature lower frequencies of Knife River Flint, and a greater diversity of raw materials and raw material quality in the projectile points, as well as both Besant and Pelican Lake point types.

The pattern of mixed Besant and Pelican Lake assemblages is evident at several of the study sites, and throughout the Northwestern Plains; this concurrent representation occurs more frequently than can be explained by possible stratigraphic mixing. Significantly, it is the lack of this mixing at the 'Sonota' sites, Fincastle, Muhlbach, Leavitt, and Smith-Swainson in the study that is noteworthy here: combined with the heavy reliance upon Knife River Flint, and skilled workmanship of the points, the argument can be made that these sites may represent a different group of people within the Besant Phase, and represents the Sonota subphase.

The results from the projectile points study suggest that there were two groups of projectile points. These two groups were named Kenney and Sonota subphases within the

Besant Phase (see Chapter 5 for discussion). There was no particular metric attribute, or set of metric attributes, that distinguish between Kenney subphase and Sonota subphase projectile points within the Besant Phase. The differences between these two archaeological cultures are best demonstrated through non-metric attributes, such as raw material and shoulder shape, as well as comparing metric and non-metric attributes. These preliminary findings from the projectile point study are elaborated upon in the following chapter.

CHAPTER 5: INTERPRETATION

Introduction

During the course of the projectile point analysis, it became apparent that an overview was needed of the theoretical approaches and conceptual frameworks used in identifying archaeological cultures and assigning cultural affiliations in the late Middle Prehistoric Period on the Northwestern Plains. Ultimately, interpretation is a series of choices emphasized by researchers, whether explicit or implicit; researchers decide which characteristics are significant in their data, in order to address particular research questions. Projectile points are frequently used by Plains archaeologists as time-sensitive artifacts in order to organize prehistory, based on projectile point attributes. This culture-historical approach, based upon the classification of projectile points and their characteristics, has been commonly used on the Plains over the past 50 years. In doing so, archaeologists make a number of often implicit assumptions in using projectile point studies to determine cultural affiliation. These assumptions include: 1) that projectile points reflect ethnicity; 2) that projectile points indicate archaeological cultures, rather than the technologies used by their producers; 3) that projectile points remain static and do not change within a temporal or cultural unit; and 4) that projectile points were actually used as projectiles. More broadly, the nature of this kind of study assumes that a quantitative analysis of projectile points will ultimately reveal culture. This approach has its roots in the early days of the classifactory-historical period and the following processual, or scientific approach, in archaeology in the 1960s, that arose from cultural ecology in the 1950s (Steward 1955; White 1949).

The concept of an archaeological culture is different from that of a modern, living group; it is based on similarities of material evidence from a specific time and place. The intellectual history of archaeological investigations on the Northwestern Plains is steeped within a culture historical and processual approach (Duke 1991; Forner 2005). Often, investigations on the Northwestern Plains fall within low-level theoretical concerns, remain site-specific, or are focused toward reconstructing past environments in prehistory. Integrative (mid-level) studies of cultural patterns are unusual, such as the study of the Blackfoot seasonal round during the Old Women's Phase of the Late Prehistoric Period (Peck 2004). In the present study, it was through the examination of the projectile points, the specific, that attention to culture dynamics in the broader late Middle Prehistoric Period, the general, was drawn. The modeling here is inductive, a low-level approach with the examination of artifacts from Fincastle and other archaeological sites, in conjunction with archaeological evidence such as radiocarbon dates and stratigraphy, to address high-level questions regarding cultural affiliation. This middle-level approach is pursued to gather data, examine patterns in the archaeological evidence, and apply it to understand: 1) the material culture from the Fincastle site, and 2) the Besant Phase during the late Middle Prehistoric Period on the Northwestern Plains. Interpretations are culturally specific to the Besant Phase during this time.

As described by Clarke (1973:15), "at least part of the confusion about explanation in archaeology arises from the mistaken belief that there is one universal form of archaeological explanation structure appropriate at all levels, in all contexts." Different kinds of explanation are needed to address different types of problems. For example, the scientific method works well in addressing low-level theoretical problems.

However, explanations of social organization and technology are complex high-level theoretical problems that may have multiple causes, and may never be testable, due to their nature and the incomplete archaeological record. Ultimately, it is the high-level concerns that drive archaeology; it is for this reason that models of behaviour and cultures cannot work with only a single interpretive paradigm; it is the dichotomy between contrasting stances of different paradigms, across varying contexts, that fosters innovation in archaeological interpretation.

Archaeological Units Used in Organizing Plains Prehistory

Plains archaeology has been organized into a number of archaeological units of varying scale by researchers over the past 50 years (Foor 1985; Mulloy 1958; Reeves 1983a; Syms 1977; Vickers 1986; Willey and Phillips 1965). On the Northwestern Plains, archaeological units have been used to organize Plains history since Mulloy's (1958) original scheme organizing prehistory by using lithic technology, although his terminology is no longer used as it was deemed too confusing. Following Mulloy's (1958) organizational scheme, archaeologists have continued to use projectile point technology (spear, dart, arrow) as the primary basis with which to organize prehistory temporally (Reeves 1983a; Vickers 1986). Key concepts used since Mulloy (1958), particularly influential not only on the Plains but throughout North American archaeology since the 1950s, are outlined in Willey and Phillips' (1965) *Method and Theory in American Archaeology*, originally published in 1958. Willey and Phillips' theoretical orientation remains highly influential on Plains archaeology nearly 50 years later. Key concepts introduced by Willey and Phillips (1965) have been reworked by Reeves (1983a), including components, phases, traditions, and horizons. Syms' (1977) work on the Northeastern Plains also describes the complex, generally considered a synonym for the subphase, first introduced by Willey and Phillips (1965). Reeves (1983a) and Vickers (1986) publications represent the two influential works that organize Northern Plains (particularly Alberta) prehistory both temporally and conceptually. These archaeological units are reviewed in the following section.

Willey and Phillips' Archaeological Units

Willey and Phillips (1965) introduced several archaeological units to organize prehistory; their scheme, with some revision, still provides much of the framework used in interpreting archaeological remains on the Northwestern Plains. These units are organized as 'basic archaeological units' (components, phases, and subphases), and integrative units (horizons and traditions), outlined below.

The most basic archaeological unit is that of the 'component.' Willey and Phillips (1965:22) note that a component is "a site or a level within a site." However, the most useful archaeological unit for study is the 'phase,' which can integrate archaeological components. Willey and Phillips (1965:22) define a phase as:

> …an archaeological unit possessing traits sufficiently characteristic to distinguish it from all other units similarly conceived, whether of the same or other cultures or civilizations, spatially limited to the order of magnitude of a locality or region and chronologically limited to a relatively brief interval of time.

They also offer a 'subphase,' within a larger phase. It is possible for a single component to evidence a 'phase.' Willey and Phillips (1965:24) note that:

> As typological and stratigraphic analyses become more refined, it often becomes desirable to subdivide phases into smaller (primarily temporal) units, and it seems best to regard these as *subphases* and to give them numbers instead of names. It also sometimes happens that two or more phases in the same locality or region, originally set up as independent units, subsequently appear to be more intelligible as subphases of a single unit, though they continue to be operationally useful in sequences and area correlations. It is clearly impossible to lay down any precise rules governing the formation of subphases. In general, their use seems appropriate in cases where differences apply only to a few specific items of content or where such differences are expressible only in variations in frequency.

Components, phases, and subphases are the basic units of archaeological investigation in Willey and Phillips' (1965) scheme of interpreting archaeological remains from a site-specific level to a broader regional and temporal scale.

Willey and Phillips also outline 'integrative units,' introducing the concepts of a 'horizon' and a 'tradition.' These 'integrative units' are intended to provide a practical method to integrate culture history larger than a regional scale (Willey and Phillips 1965:30). A horizon is defined as "primarily spatial continuity represented by cultural traits and assemblages whose nature and mode of occurrence permit the assumption of a broad and rapid spread. The archaeological units linked by a horizon are thus assumed to be *approximately* contemporaneous" (Willey and Phillips 1965:). A tradition is defined as "…a (primarily) temporal continuity represented by persistent configurations in single technologies or other systems of related forms," and can also be delimited regionally (Willey and Phillips 1965:37). Willey and Phillips (1965:40) note that the relationship between components and phases within the basic archaeological units, as defined previously "…are predominantly formal and static." Horizons and traditions do not practically correspond to phases and components; Willey and Phillips (1965) note that a single phase can appear in several horizons.

Reeves' Archaeological Units

Reeves (1983a) revises the concepts introduced by Willey and Phillips (1965), as described above. Most notably, he eliminates the geographic boundaries as stated by Willey and Phillips in their archaeological units. He justifies this as being due to the open environment of the Great Plains region, that the open topography would allow prehistoric hunter-gatherers to move more easily and without restriction over a vast area. Presumably, this is the framework that justifies the broad geographic distribution of the Besant Phase in Reeves' (1983a) study. He remarks that:

> …my use of phases and subphases differs from Willey and Phillips primarily in order of magnitude, in at least some cases. This is, I believe, justified by the nature of the material and by the lack of terms for archaeological units of the sort I am working with here. The nature of the environment of the Northern Plains, the lack of geographical barriers to the movement of people and the diffusion of ideas and actual items, the similarity of exploitation of the environment may well mean that the units at the phase level will be larger in the Plains than in other culture areas. This, coupled with paucity of archaeological work, and the preliminary nature of this study, seem adequate justifications for my use of phase and subphase. In my scheme, a phase does not necessarily correlate with a locality, region, or even an area. The area occupied by a phase may change through time and it may in fact be found in two environmentally distinct areas (1983:39).

Reeves (1983a:40) modifies the definition of tradition in his study as:

> …persistent configurations in a number of cultural systems (to use my terminology) which interact to produce an archaeological unit distinct from all other archaeological units conceived on the same criteria. The cultural traditions serve to articulate phases that I judge related into an ongoing space-time cultural continuum.

Reeves (1983a:44) names two traditions on the Northern Plains, and his dissertation focuses upon organizing archaeological components and phases into these two traditions. These traditions are a temporal progression of a series of archaeological cultures. The first tradition is 'Tunaxa', extending from the Middle Prehistoric Period through the Late Prehistoric Period; the word refers to the Kootenai name for themselves, and encompasses McKean, Hanna, Pelican Lake, Avonlea, Keyhole and Patten Creek (Reeves 1983a:44-45). He notes that his definition of Pelican Lake varies from Wettlaufer's original definition that was named from points recovered at the Mortlach site (Reeves 1983a:45). The second tradition is 'Napikwan'; this word refers to the Blackfoot word for 'Old Man Person', and includes the Besant and the Old Women's Phases (Reeves 1983a:45). In Vicker's (1986) Alberta Plains Prehistory, he includes the revised sequences for 'Tunaxa' and 'Napikwan' since Reeves' (1983a) original dissertation, previously unpublished. 'Tunaxa' includes the McKean, Hanna, Pelican Lake, Avonlea, Tobacco Plains, and Kootenai Phases (Vickers 1986:75-76). 'Napikwan' includes: Mummy Cave (tentative association to 'Napikwan'), Oxbow, Sandy Creek, Besant, and Old Women's Phases (Vickers 1986:75).

Reeves uses, in his terms, a 'systems approach' in his analysis of the Middle Prehistoric Period and Late Prehistoric Period transition, focusing upon Pelican Lake, Besant, and Avonlea in his dissertation. His research findings from his lithic tool study, along with stratigraphic sequences and their supporting radiocarbon dates, demonstrate an impressive amount of data; however, he did not apply his conceptual framework to his study. Although Reeves (1983a:27) outlines his systems approach, he notes that it was impossible to apply his systems approach to his research findings. However, in describing his systems orientation, Reeves (1983a:28) states that the ‘universal oversystem’ consists of two analytic-empirical supersystems, the sociocultural and the environmental; the sociocultural is composed of the social system and the culture system as two separate systems, while the environmental involves static versus dynamic equilibrium systems, impacted by the ecological system. Reeves (1983a:29) outlines the frame of reference to be used in a systems approach in prehistory, including the ‘interactional patterns’ between: 1) the non-cultural systems of the effective environment; 2) the systems of the effective environment and the cultural systems under consideration; 3) the cultural subsystems; and 4) the cultural system and the social system. He explains that his systems analysis cannot be applied to his study due to “the variable nature of the data, no detailed study can be undertaken of their interactional patterns in space-time as it relates to the effective environment exclusive of the other cultural systems existing in it” (Reeves 1983a:29).

It is argued here that Reeves’ (1983a) organization the archaeological data to follow into these two linear cultural traditions, ‘Tunaxa’ and ‘Napikwan,’ forces the data from archaeological sites to be interpreted to support this particular conceptual framework—whether these relationships existed in prehistory or not. It is exciting to see a theoretical framework utilized to try and reveal cultural relationship in prehistory. However, these traditions span thousands of years and a great deal of geography, and the relationships that are presented may or may not have actually existed. Reeves provides Pelican Lake (‘Tunaxa’) and Besant (‘Napikwan’) as two distinct and parallel traditions, as part of a continuum of thousands of years of prehistory. This framework is geared toward understanding these cultures as part of a linear, parallel progression, and does not allow them to occur simply as distinct entities—if that is even the case. It is the findings of the present study that Besant and Pelican Lake projectile points often occur *together* within the same assemblage—this is a pattern that cannot be ignored, and discussed further in this chapter.

Syms' Archaeological Units

Syms' definition of a 'complex' should be presented here, as an example of an archaeological unit that is often used in the Northeastern Plains, and often synonymous with Willey and Phillips' 'subphase.' Syms (1977:70) explains that:

> A complex is the total expression of a number of assemblages left by the same group over a sufficiently narrow time period that the cultural expressions undergo only minor changes. A complex has both cultural and historical validity. It represents the remains of a group with a shared lifestyle, the same overall toolkit, the same technological skills and preferences, and the same typological and technological attributes.

Syms (1977) and Neuman (1975) apply the 'complex' as the conceptual archaeological unit when referring to Sonota. As has been noted by Vickers (1986:15), Syms' use of the term complex differs from Reeves' use, with Reeves' use of 'complex' meaning that a particular archaeological manifestation cannot be integrated within an archaeological tradition.

Archaeological Units Discussion

Through the course of this study, reviewing research articles, theses, and other publications, it is evident that there is a lack of consistency on the Plains in the use and definitions of archaeological units. This is an observation that has also been made by other researchers (Cloutier 2004; Ramsey 1991; Vickers 1986): terms such as 'complex' can have different meanings depending on the researcher using them, as shown by Reeves (1983a) and Syms (1977). 'Complex' and 'subphase' are sometimes used interchangeably, while on other occasions they have very different meanings. This varying use of terminology and concepts of archaeological units serves to further obscure the prehistoric past. Ideally, the same terms should be used by researchers within an area in making reference to specific archaeological groups or cultures. This said, it is much more practical for researchers to clearly define their meanings when using these archaeological units, such as 'phase' or 'complex.'

As introduced in Chapter 1, the units used to organize prehistory in the present analysis include 'phase,' 'subphase,' and 'complex.' The use of phase here is intended in Willey and Phillips' (1965) original defintion, referring to a geographically limited archaeological unit that occurs only at a specific time and place. Used to further refine the archaeological unit represented by a 'phase,' a 'subphase' is a flexible definition used to delimit temporal, stratigraphic, or artifact trait frequency occurrences that share commonalities within a phase. A 'complex' shares the same base definition as the 'subphase'; a 'complex' is defined when the relationship to the preceding or anteceding archaeological culture (phase, subphase) is not well understood.

Furthermore, aside from the taxonomical confusion, the situation is further muddied by archaeologists interchangeably making references to the 'Besant Phase,' and to 'Besant projectile points.' In actuality, these two entities may not be the same thing—one refers to archaeological culture or manifestation, while the other refers to a particular type of projectile point. Some researchers have gone further, designating a variety of projectile point types within Besant, including 'Outlook,' and 'Bratton' (Dyck and

Morlan 1995). This before even getting into the repurposing of terms, such as the Sandy Creek Complex, referring to a particular archaeological culture, time and technology (although tenuous), instead applied to mean specifically a type of projectile point *within* Besant (Dyck and Morlan 1995). It is enough to give a Plains archaeologist night terrors, or at least an inspired episode of teeth-gnashing. It certainly makes the analysis of archaeological cultures and their relationships all the more difficult when there is frequent disagreement on the terms used by researchers within the same study area. There is definite need for discussion regarding terminology and archaeological units on the Northwestern Plains. As a working solution in the interim, archaeologists need to define their usage of these terms when applying them.

At this point, with the archaeological units outlined, it is time to turn to the existing models of the Besant Phase and the Sonota Complex on the Northern Plains, as described by other researchers, and introduced in Chapter 2 (with particular reference to projectile point typology).

The Besant Phase/Sonota Complex Debate

As previously introduced, the relationship between the Besant Phase and the Sonota Complex remains a contentious issue among Plains archaeologists (Cloutier 2004; Duke 1991; Dyck 1983; Hjermstad 1996; Joyes 1984; Ramsey 1991; Reeves 1983a; Shortt 1993; Syms 1977). This debate is outlined here, as necessitated with the recovery of distinctive projectile points from the Fincastle site in southern Alberta. Is this an issue of taxonomic confusion, as stated by Reeves (1983)? Is Sonota a viable archaeological entity, coeval with Besant, making it a phase? Or is Sonota simply a regional variant of the broader Besant Phase, making it a subphase? At this point, it is appropriate to outline the models regarding the relationship between Besant and Sonota, in order to place the Fincastle and the broader study results in context.

Neuman Model

Neuman defined the Sonota Complex in his 1975 monograph, *The Sonota Complex and Associated Sites on the Northern Great Plains*. This was done on the basis of excavations conducted at the Boundary Mound site in North Dakota, and Arpan Mound, Grover Hand, Swift Bird, and Stelzer sites in South Dakota (Neuman 1975). All of these sites, with the exception of Stelzer, a campsite, were burial mounds. The findings from these excavations were described in detail in Chapter 2. Neuman (1975:96) describes the Sonota Complex as:

> The Sonota Complex is an archaeological expression *representing a regional segment of a cultural tradition* which effectively exploited the plains-riverine environment of north-central North America. If the data have been properly interpreted, some time around the beginning of the Christian Era and lasting until at least A.D. 600, there existed a culture charactereized by small groups of hunters and gatherers whose primary subsistence was oriented toward communal hunting of the buffalo. For the western range of this culture, in the southern portions of Alberta and Saskatchewan, in Montana, and in the western parts of the Dakotas, the archaeological data are drawn from investigations describing the remains of campsites and buffalo impounding or jump butchering stations. Such sites are characterized by layers of buffalo bone, stone tools, a lesser number of bone implements, and only rarely small quantities of pottery fragments. On the other hand, along the main trench of the Missouri River and smaller drainages in the eastern Dakotas, comparable artifacts are found in low, domed mound groups and in campsites herein assigned to the Sonota Complex. In this eastern range the basic artifact inventories are amended by an increase in ceramics, along with a variety of specialized regionally elaborate, and at times exotic stone, bone, shell, copper, vegetal and pigmentary specimens, most of which are associated with the burial mound interments [emphasis added].

Neuman (1975) includes the Sonota Complex conceptually within the broader Plains Woodland designation, at the level of 'tradition' in the archaeological unit scheme. Neuman (1975) describes the people of this complex with an economy geared to bison-hunting; the ideological significance of bison was also evidenced by the interring of bison remains with human remains within the burial mounds of this complex. Other features noted by Neuman (1975) included the vertical bone uprights, occasional production of pottery, and a well-developed stone tool assemblage featuring predominantly Knife River Flint, along with other chalcedonies.

Reeves Model

Reeves (1983a:7-9; 140) interprets the Besant Phase as a vast archaeological expression, encompassing much of the Great Plains culture area, including Wyoming, Montana, and the Middle Missouri region. The Besant Phase is described by Reeves (1983a:140-141) as featuring:

1) Low frequency of unnotched points (usually one type).
2) Besant Side Notched (atlatl) and Samantha Side Notched (arrow) projectile points. No stemmed forms and *few of Pelican Lake Corner Notched points* [emphasis added]. Flake points are common.
3) Few discrete types of bifaces with modified hafting elements.
4) High frequency of asymmetric ovate bifaces.
5) High frequency of small dorsally-finished end scrapers.
6) Distinctive drill types—pentagonal and triangular.
7) Absence of pointed unifacial flakes, domed side scrapers, pointed unifaces; few bifacial choppers.
8) Rare and localized cord-marked bossed and/or punctuated conchoidal pottery vessels.
9) Presence of excavated basin-shaped earth-filled hearths but absence of excavated basin- or bucket-shaped rock-filled hearths. Surface hearths are common. Presence of cache pits, house structures (two sites), and bone uprights.

10) *Secondary burials, usually accompanied by many grave goods, in a central subfloor log-covered tomb, under an earth mound* [emphasis added].

As for Besant's origins, two general propositions may be presented:

1) The Besant Phase is a sequent phase in the TUNAXA cultural tradition and it either (A) develops from the Pelican Lake Phase or (B) develops from one of the regional subphases.
2) The Besant Phase is part of a cultural tradition unrelated to TUNAXA which is either (A) a Plains adapted tradition or (B) an intrusive cultural tradition from some other area.

As noted by Ramsey (1991), there were several additions to the list of characteristics for the Besant Phase from Reeves' original dissertation in 1970 to his 1983 publication. Ramsey (1991:87) observes:

> It should be noted that this list of characteristic traits differs from his original one (Reeves 1970a:149-150) in the following ways. First, in the more recent edition he recognized the presence of the Samantha arrow projectile points under point number two. This was not stated clearly in the original disseration. Second, he added the presence of house structures in point nine. Third, and quite significantly, he appended point ten, which would therefore include the Sonota complex burials as described by Neuman in the Besant phase.

In the foreword to *Culture Change in the Northern Plains: 1000 B.C. – A.D. 1000*, Reeves (1983a) outlines his stance on the Besant-Sonota debate. He states that Syms (1977) complicated the matter by including the Muhlbach and Richards sites with the Sonota Complex. As well, he notes that Neuman (1975) later revised his definition of the Sonota Complex, using the same archaeological sites (Stelzer, Swift Bird, Grover Hand, Arpan, Boundary Mound) to define two separate archaeological units. Neuman (1975) considers these sites as part of the Sonota Complex. Reeves (1983a:10) uses these sites to define what he terms the "Besant Phase Middle Missouri variant and mound burial pattern." Reeves also states that his analysis was "based on first hand examination of the collections," something presumably that Neuman also did in his excavation and subsequent study.

Reeves believes that the debate is due to improper terminology. Reeves (1983a:11) remarks that Besant has precedence over Sonota in the published literature, citing Wettlaufer (1955), Wettlaufer and Mayer-Oakes (1960), Forbis (1962), Davis and Stallcop (1966), and Gruhn (1971). He states that the term Sonota should refer only to the burial mound pattern.

Reeves believes that Syms (1977) creates an 'artificial separation' between Besant and Sonota, based on projectile points. He states that Syms:

> …extends Neuman's concept to include certain Besant sites on the basis of point styles (long points) and the quantities of Knife River Flint (Muhlbach and Richards Kill), ceramics (Walter Felt) or both (Richards Village). Syms excludes other sites with varying quantities of Knife River Flint and short and long points—the Kenney Site (Reeves 1966), Old Women's (Forbis 1962) and 24HL101 (Davis and Stallcop 1966) for example.

Furthermore, there is conflict over the archaeological unit used to describe the Besant Phase between Syms and Reeves. Syms (1977) believes that Reeves has defined a horizon, rather a phase.

> Syms…prefers to define a 'Besant Horizon' on the basis of projectiles with shallow corner notches, in which he sees tremendous variability which has not been systematically quantified. Syms is correct in that a statistical analysis has not been performed to examine intra-phase variation. It would be most useful to do so. Non-metric technological attributes of Besant projectile point construction and modification in the hafting area are the primary criteria utilized by myself and most workers for identifying Besant Side Notched projectile points and separating them from other styles; not, as Syms would have it, whether they are long or squat with well defined or shallow notches. Identical constructions occur on the points from Muhlbach, Walter Felt and Richards and Stelzer which

> Syms assigns to Sonota because they are made out of Knife River Flint, as are the points from Old Women's and Morkan which he assigns to Besant because they are not Knife River Flint and are squat. Syms' assignment is presumably based, in part, on illustrated specimens and not on "hands-on" examination. He also selects his evidence. He does not discuss Mortlach, Long Creek, Kenney or 24HL101; four of the major Besant sites for which reports were available at the time of his analysis. For example, 24HL101 is characterized by long points and a low frequency of Knife River Flint. Logically Syms would require a third construct to account for this variation (Reeves 1983a:12-13).

Finally, Reeves states that he does not believe that definition of Besant needs to be revisited, and that Besant "…is not a separate complex from Sonota which can be combined with the latter at the level of a 'composite configuration'," as proposed by Syms (1977:92). Reeves views the diversity in site types and projectile point forms and raw materials as variants within the Besant Phase, and believes that the issue with Sonota is over taxonomical precedence in the academic literature.

Syms Model

Syms' (1977) model of the Sonota Complex follows Neuman's (1975) original definition. He provides a summary of Neuman's description of the Sonota Complex that he expands upon.

> The Sonota Complex was originally defined on the basis of excavations at the Stelzer Village Site, and at the Swift Bird, Arpan, Grover Hand and Boundary Mounds… Neuman subsequently incorporated several other sites from North and South Dakota in the complex. On the basis of his excavations in the early 1960's, Neuman (1975) defined a complex with: a) an important emphasis on bison; b) a dominance of tools made from Knife River flint; c) a distinctive variation of corner-notched projectile points that subsume Besant and Samantha side-notched types; d) upright bones in village and kill sites; e) small burial mounds containing multiple bundle burials as well as numerous bison remains (Syms 1977:88).

Furthermore, Syms makes particular reference to the lithic technology utilized in the Sonota Complex, particularly relevant for the present study.

> The majority of tools and waste flakes are of Knife River flint, from western North Dakota. The knappers had an apparent disregard for wastage of this material and made awls on long blade-like flakes, spoke shaves on small portions of large lamellar flakes, and reworked the edges of small portions of larger flakes. Projectile points had a distinctive side- or corner-notched base, widths between about 18-26 mm, and lengths from 16 mm to more than 67 mm. Large numbers of bifaces were also present (Neuman 1975). No other complex on the Northeastern Plains has the same high frequency of Knife River flint (Syms 1977:89).

Syms does raise key points with the frequency of Knife River Flint at Sonota Complex sites, as well as the projectile point characteristics.

> The importance of Knife River flint is universal among Sonota kill and village sites. The percentage of Knife River flint used for tools is more than 80% at all sites, regardless of the direction and distance from the quarries. These frequencies and the large quantities of Knife River flint and debris reflect ready access to the quarries. Since the frequency of the materials did not diminish with distance from the quarries, the process of trade can be discounted (Syms 1977:90).

In terms of the distribution of the Sonota Complex, Syms (1977:89) notes that it is centred primarily to the Northeastern Plains area, including southern Manitoba, North Dakota, and South Dakota, and also seen in Alberta and Saskatchewan. On the Northwestern Plains, Syms (1977:90) names the Walter Felt and Muhlbach sites as examples. Syms (1977:90) notes that it was unlikely that Sonota Complex peoples traveled to the Northwestern Plains expressly for bison hunting, but possibly also for trade to the Northwestern Plains.

Joyes and Duke Model

In following the debate between Reeves (1983a) and Syms (1977) regarding Besant and Sonota, Joyes (1984) and Duke (1991) note that Syms' observations regarding these cultural entities need to be heeded. Duke (1991:92) explains that Syms divides the Besant Phase into two, with the sites representing tools with high frequencies of Knife River Flint falling within the Sonota Complex, while the shorter point forms and less reliance on Knife River Flint as representative of a Besant horizon. Duke (1991:92) remarks:

> Reeves's phases tend to have spatial ranges beyond those normally associated with the phase (Joyes 1984; Duke 1988), and in encompassing such massive cultural variation—from 'hierarchical' burial mounds in the east to more 'egalitarian' bison jumps in the west—the normative concept of the Besant Phase potentially masks a great deal of internal cultural and social variability that must ultimately be explained. It is likely that what we call the Besant Phase encompasses a number of different social units, linked together in various ways but nevertheless operating as independent units. We should, therefore, not treat the Besant Phase, per Reeves, as the manifestation of a single, widespread group.

Reeves' particularly inclusive model for Besant, spanning a vast amount of geography and incorporating a great deal of variation within the phase, therefore obscures the trends within the material culture that Syms points out in his model.

Based upon the Reeves (1983a) and Syms (1977) debate, Duke (1991) integrates aspects of both models into a third hypothesis.

> Alberta Besant, although based upon a Plains cultural tradition, was created by contact with complexes to the east (what Syms would call Sonota). Syms saw those sites with heavy frequencies of Knife River Flint as evidence of trading expeditions to the quarries, although the possibility still exists that there was an actual migration of people from the east. These people, whether they were seasonal traders or permanent residents, acted as traders or contacts within an existing indigenous society (represented in Syms's Besant horizon sites) that had, following Reeves's initial hypothesis, entered the Hopewellian interaction sphere. Sites like

> 24HL101, therefore, need not be seen as constituting an anomaly to the division Syms proposed. In making this type of contact, indigenous western Besant groups may have been acculturated to some degree, especially in their internal social structure. This is *tenuously* suggested by an increase in tipi size and the types of campsite patterning at the Ross Glen site (Duke 1991:93).

Duke (1991:93) notes that Joyes (1984) shared a similar perspective with his own. In Joyes' (1984:168) review of Reeves' 1983 publication, he comments:

> The phases defined by Reeves are of substantially greater magnitude than the limited geographical entities originally conceived by Willey and Phillips (1958 [1965]). These are sometimes allowed to encompass cultural units of multi-regional distribution on the assumption that ecological uniformity and a lack of geographical barriers on the Plains provided few constraints to migration and diffusion.

Joyes (1984:169) states that if Sonota is considered a regional subphase (or complex), the Besant Phase remains the primary unit encompassing this archaeological expression. Joyes (1984:169) proposes possible subphases within the Besant Phase, including the 'Sonota subphase' on the Northeastern Plains periphery, representing a group involved with Hopewellian trade with the Eastern Woodlands culture area, as well as a hypothetical 'Kenney subphase' on the Northwestern Plains, while a possible third subphase is posited for the Besant sites in Wyoming. As Duke notes, this model offers an integration of most of the arguments by Reeves and Syms, and takes into account the variation demonstrated within the Besant Phase by the archaeological evidence.

The Present Study

Researchers have long-since noted the need for a projectile point study, incorporating both metric and non-metric analyses, in order to advance the Besant-Sonota debate on the Northern Plains (Cloutier 2004; Ramsey 1991; Reeves 1983a). Although the need for this kind of study has been recognized for decades, researchers have baulked at conducting a projectile point analysis, deeming it to be too much work (Ramsey 1991; Reeves 1983a).

> Ideally, it would be desirable to conduct a quantitative analysis on material cultural remains (projectile points as well as other artifacts and features) from as many excavated Sonota and Besant sites as possible, and compare the Melhagen site data with the other data. This is a task too monumental to be done here (Ramsey 1991:93).
>
> The fact that no researcher to date (to this author's knowledge) has conducted an intersite statistical comparison of Besant and Sonota point assemblages should come as no surprise. The sheer volume of work would be overwhelming (Ramsey 1991:96).
>
> Many authors have lamented the lack of metric data in the literature dealing with either the points recovered from the Sonota sites or Besant points in general (Ramsey 1991; Scribe 1997; Syms 1977). As such it is impossible to statistically compare the metric attributes of each point to determine if significant morphological differences exist between the two (Cloutier 2004:24).

The present study is not intended as an exhaustive analysis of all of the Besant and Sonota projectile points on the Plains, but some data has been gathered to contribute to this debate. The projectile point study is augmented by an examination of other lines of evidence from the sites included in the literature review. Due to constraints of both time and research funds, a reality with which any researcher must contend, the projectile point study has been focused primarily on the evidence from Alberta. Archaeological collections from Alberta that could not be located at the time of the analysis include the Happy Valley and Old Women's sites, two notable omissions in the projectile point study. Ideally, projectile point data from Saskatchewan and Montana would have been included, along with an actual analysis of Neuman's (1975) projectile points that were part of the original naming of Sonota Complex. Despite these limits, site and projectile point data was gathered from the available monographs, permit reports, and other publications, and included in the regional survey of archaeological sites throughout the late Middle Prehistoric Period on the Plains during the Besant Phase. Multiple lines of evidence support the model described in this chapter.

As noted by archaeologists working on the Plains, there is disagreement not only how to conceptualize Besant, but also dissent over the appropriate taxonomic designations to apply to the archaeological units associated with this phase. There is confusion about how the subphases/complex relate to one another, and to Besant. This has been compounded previously by the lack of data regarding projectile points to further this debate. With the present analysis of the seven study sites (Fincastle, EbPi-63, EgPn-111, Kenney, Muhlbach, Smith-Swainson, and Leavitt), along with data presented in the literature review in Chapter 2, there is now data to contribute from these findings toward this topic. There is no final resolution that can be offered, but an additional model hypothesizing the relationship between Besant and Sonota, and trends that have become apparent through the study data.

Revisiting the theoretical approaches and the building of theoretical models discussed earlier in this chapter, it is necessary here to outline the conceptual orientation of this research. As described by Trigger (1997), a middle-level theory level approach is sought after here in presenting the research findings. Data, including low-level theoretical concerns, such as radiocarbon dates, stratigraphic sequences, site distribution, site environmental settings, and projectile point data are used to address high-level theoretical questions. These questions include revisiting the definition of the Besant Phase, and its relationship with its various manifestations on the Northwestern Plains. This goes back to the question: ‘Who were these people that made and these points?’ Where did they come from, and why? Why would late Middle Prehistoric Period hunter-gatherers on the Northwestern Plains have any relationship with people living in the Middle Missouri area? In this next section, radiocarbon dates, stratigraphic sequences, site distribution, site environmental settings, and projectile point data are presented to address these specific questions, and present a model based on the archaeological evidence for the Besant Phase. Scientific methods are used to systematically gather data, using inductive inference to direct inquiry regarding these questions pertaining to the Besant Phase.

Results

Despite the limited availability of archaeological collections, some intriguing findings have arisen out of the present study in both the projectile point analysis, as well as the site data analysis. What is immediately clear is that the Besant Phase, utilizing Willey and Phillips’ (1965) meaning of ‘phase’, with its geographic limits, is not a homogenous archaeological culture spanning Alberta to Manitoba, and southward to Wyoming and through the Dakotas. It is apparent that there are some strong shared traits, such as an orientation toward communal bison hunting spanning over a thousand years, as well in projectile point morphology; what this hints at is a sophisticated social organization that had extensive trade and sophisticated social relations spanning this vast area, and served as a ‘Besant interaction sphere’ that interacted with the Hopewellian interaction sphere.

The results are outlined below, with discussion of the temporal distribution, geographic distribution, cultural affiliation, site types, site environments, and site stratigraphic sequences as summarized in Tables 5.1 and 5.2. The projectile point study findings are combined with the site data summarized in the following tables to interpret the cultural dynamics within the Besant phase on the Plains. Table 5.1 includes the cultural affiliation of each site and component as designated by the original excavators, as well as the proposed subphase affiliation of sites reviewed in this study, where data was available. The findings summarized in these tables are described in the following section.

Table 5.1. Summary of study sites data, including location, provenience, radiocarbon dates, and cultural affiliation.

Site Name	Borden No.	Prov./ State	Layer	Excav. Area	Radio-carbon Date B.P. (uncorr.)	Lab No.	Original Affiliation	Proposed Subphase Affiliation
Fincastle	**DlOx-5**	AB	7	East Block	2540±50	Beta-201909	Sonota	Sonota
Fincastle	**DlOx-5**	AB	7 - 10	East Block	2490±60	Beta-201910	Sonota	Sonota
-	**EbPi-63**	AB	CU 6	Block 1	2360±40	Beta-156443	Besant; Pelican Lake	Kenney
-	**EbPi-63**	AB	CU 10	Block 2	2530±50	Beta-156445	Besant; Pelican Lake	Kenney
-	**EgPn-111**	AB	-	-	1310±60	Beta-127233	Besant; Pelican Lake	Kenney
-	**EgPn-111**	AB	-	-	1340±60	Beta-127232	Besant; Pelican Lake	Kenney
-	**EgPn-111**	AB	-	-	1390±70	Beta-127231	Besant; Pelican Lake	Kenney
Happy Valley	**EgPn-290**	AB	-	-	2350±80	Beta-51285	Besant; Pelican Lake	Kenney
Happy Valley	**EgPn-290**	AB	-	-	2440±120	RL-1657	Besant; Pelican Lake	Kenney
Happy Valley	**EgPn-290**	AB	-	-	2450±120	RL-1658	Besant; Pelican Lake	Kenney
Head-Smashed-In	**DkPj-1**	AB	3	North	1330±100	RL-331	Besant (upper); Pelican Lake (lower)	Sonota (upper); Pelican Lake (lower)

Site Name	**Borden No.**	**Prov./ State**	**Layer**	**Excav. Area**	**Radio-carbon Date B.P. (uncorr.)**	**Lab No.**	**Original Affiliation**	**Proposed Subphase Affiliation**
Head-Smashed-In	**DkPj-1**	AB	3	North	1510±90	GX-1220	Besant (upper); Pelican Lake (lower)	Sonota (upper); Pelican Lake (lower)
Head-Smashed-In	**DkPj-1**	AB	11	South	1950±80	GX-1253	Besant (upper); Pelican Lake (lower)	Sonota (upper); Pelican Lake (lower)
Kenney	**DjPk-1**	AB	6	-	700±60	S-271	Besant; Pelican Lake	Kenney
Kenney	**DjPk-1**	AB	6	-	1460±110	GAK-1354	Besant; Pelican Lake	Kenney
Kenney	**DjPk-1**	AB	8	-	1600±115	S-272	Besant; Pelican Lake	Kenney
Muhl-bach	**FbPf-1**	AB	-	-	1270±150	GSC-696	Besant	Sonota
Old Women's	**EcPl-1**	AB	13	-	1020±80	S-89	Besant	?
Old Women's	**EcPl-1**	AB	13	-	1100±180	S-87	Besant	?
Old Women's	**EcPl-**1	AB	17	-	1650±60	S-90	Besant	?
Old Women's	**EcPl-1**	AB	25	-	1840±70	S-91	Besant	?
Ross Glen	**DlOp-2**	AB	-	-	1471±50	GX-5892-A; GX-5892-B	Besant	Kenney
Smith-Swainson	**FeOw-1**	AB	surface	-	-	-	Besant	Sonota
-	**EdOh-23**	SK	-	-	1675±115	S-2348	Besant	?
Elma Thompson	**EiOj-1**	SK	-	-	1675±145	S-2202	Besant	?
Fitzgerald	**ElNp-8**	SK	-	-	1160±170	S-3547	Besant	Sonota

Site Name	Borden No.	Prov./ State	Layer	Excav. Area	Radio-carbon Date B.P. (uncorr.)	Lab No.	Original Affiliation	Proposed Subphase Affiliation
Fitz-gerald	**ElNp-8**	SK	-	-	1270±140	S-3546	Besant	Sonota
Fitz-gerald	**ElNp-8**	SK	-	-	1340±60	Beta-69004	Besant	Sonota
Fitz-gerald	**ElNp-8**	SK	-	-	1490±90	Beta-69005	Besant	Sonota
Long Creek	**DjMr-1**	SK	-	-	-	-	Besant	?
Melhagen	**EgNn-1**	SK	-	-	810±205	S-2857	Besant	Sonota
Melhagen	**EgNn-1**	SK	-	-	1575±115	S-2856	Besant	Sonota
Melhagen	**EgNn-1**	SK	-	-	1710±45	S-1641	Besant	Sonota
Melhagen	**EgNn-1**	SK	-	-	1905±110	S-2855	Besant	Sonota
Melhagen	**EgNn-1**	SK	-	-	1910±70	S-1640	Besant	Sonota
Melhagen	**EgNn-1**	SK	-	-	1960±90	S-491	Besant	Sonota
Mortlach	**EcNl-1**	SK	4B	-	1580±159	S-22	Besant	?
Sjovold	**EiNs-4**	SK	X	-	2090±165	S-1767	Pelican Lake; Besant	Kenney
Sjovold	**EiNs-4**	SK	X	-	2190±140	S-3366	Pelican Lake; Besant	Kenney
Sjovold	**EiNs-4**	SK	X	-	2340±120	S-3367	Pelican Lake; Besant	Kenney
Sjovold	**EiNs-4**	SK	XI	-	2505±90	S-2058	Besant (Bratton)	?
Sjovold	**EiNs-4**	SK	XII	-	2355±105	S-2059	Besant (Sandy Creek)	?
Sjovold	**EiNs-4**	SK	XIV	-	2500+85	S-2060	Besant (Outlook)	Sonota
Walter Felt	**EcNm-8**	SK	10	-	1535+80	S-201	Besant	?

Site Name	Borden No.	Prov./ State	Layer	Excav. Area	Radio- carbon Date B.P. (uncorr.)	Lab No.	Original Affiliation	Proposed Subphase Affiliation
Walter Felt	**EcNm-8**	SK	13	-	1610±70	S-200	Besant	?
Wapiti Sakihtaw	**DlLw-12**	MB	2	-	1140±70	Beta-59415	Sonota	Sonota
Richards	**DhLw-1**	MB	surface	-	-	-	Besant	Sonota
Antonsen	**24GA660**	MT	-	Area C	1605±95	I-7027	Besant	Montana
Herde-gen's Birdtail Butte	**24BL1152**	MT	13	-	1690±80	Beta-31793	Besant	Montana
Herde-gen's Birdtail Butte	**24BL1152**	MT	15	-	1960±80	Beta-31794	Besant	Montana
Leavitt	**-**	MT	44 cm BS	-	945±120	GX-146	Besant	Montana
Leavitt	**-**	MT	44 cm BS	-	1180±?	GX-1212	Besant	Montana
Mini-Moon	**24DW85**	MT	Occ. 1	-	1520±70	Beta-10044	Besant	Montana
Mini-Moon	**24DW85**	MT	Occ. 2	-	1910±80	WSU -2379	Besant	Montana
Mini-Moon	**24DW85**	MT	Occ. 2	-	1930±80	WSU -2380	Besant	Montana
Wahkpa Chu'gn	**24HL101**	MT	-	Area B; Test Pit 4	1920±70	GAK-2504	Besant	Montana
Wahkpa Chu'gn	**24HL101**	MT	-	Area B; Test Pit 12, upper	1800±90	GAK-2505	Besant	Montana
Wahkpa Chu'gn	**24HL101**	MT	-	Area B; Test Pit 12, lower	1770±90	GAK-2506	Besant	Montana

Site Name	Borden No.	Prov./ State	Layer	Excav. Area	Radio-carbon Date B.P. (uncorr.)	Lab No.	Original Affiliation	Proposed Subphase Affiliation
Boundary Mound	**32SI1**	ND	-	Mound 1	1540+160	Isotopes Inc.-499	Sonota	Sonota
Boundary Mound	**32SI1**	ND	-	Mound 2	1340+150	Isotopes Inc.-498	Sonota	Sonota
Boundary Mound	**32SI1**	ND	-	Mound 3	1700+125	Isotopes Inc.-414	Sonota	Sonota
Naze	**32SN246**	ND	-	-	2388+44	SMU-1761	Plains Woodland	
Naze	**32SN246**	ND	-	-	2440+70	Beta-14746	Plains Woodland	
Naze	**32SN246**	ND	-	-	2448+44	SMU-1760	Plains Woodland	
Naze	**32SN246**	ND	-	-	2472+45	SMU-1759	Plains Woodland	
Naze	**32SN246**	ND	-	-	2780+80	Beta-14745	Plains Woodland	
Arpan Mound	**39DW252**	SD	-	Mound 1	1850+90	Smithsonian Institution-311	Sonota	Sonota
Grover Hand	**39DW240**	SD	-	Mound 1	650+200	Smithsonian Institution-167	Sonota	Sonota
Grover Hand	**39DW240**	SD	-	Mound 2	1640+80	Smithsonian Institution-168	Sonota	Sonota
Grover Hand	**39DW240**	SD	-	Mound 3	1720+75	Smithsonian Institution-48	Sonota	Sonota
Stelzer	**39DW242**	SD	-	-	1660+60	Beta-38266	Sonota	Sonota
Stelzer	**39DW242**	SD	-	-	1800+50	Beta-38267	Sonota	Sonota

Site Name	Borden No.	Prov./ State	Layer	Excav. Area	Radio-carbon Date B.P. (uncorr.)	Lab No.	Original Affiliation	Proposed Subphase Affiliation
Swift Bird Mound	**39DW233**	SD	-	Mound 1	1825±120	Isotopes Inc.-718	Sonota	Sonota
Swift Bird Mound	**39DW233**	SD	-	Mound 2	1600±100	Isotopes Inc.-719	Sonota	Sonota
Butler-Rissler	**24DW85**	WY	-	-	-	-	Besant	Wyoming
Muddy Creek	**48CR324**	WY	-	-	1720±110	RL-294	Besant	Wyoming
Ruby	**48CA302**	WY	-	-	1670±135	GX-1157	Besant	Wyoming

Table 5.2. Summary of study sites data, including site type, site environment, and stratigraphy.

Site Name	Borden No.	Site Type	Site Environ.	Stratified ?	No. of Compo-nents	Radio-carbon Reference
Fincastle	**DlOx-5**	kill	sand hills	Y	single	Varsakis 2006
Fincastle	**DlOx-5**	kill	sand hills	Y	single	Varsakis 2006
-	**EbPi-63**	kill	terrace	Y	multi	Landals 2006
-	**EbPi-63**	kill	terrace	Y	multi	Landals 2006
-	**EgPn-111**	kill	terrace	Y	single	Head et al. 2002
-	**EgPn-111**	kill	terrace	Y	single	Head et al. 2002
-	**EgPn-111**	kill	terrace	Y	single	Head et al. 2002
Happy Valley	**EgPn-290**	kill	terrace	Y	single	Shortt 1993
Happy Valley	**EgPn-290**	kill	terrace	Y	single	Shortt 1993
Happy Valley	**EgPn-290**	kill	terrace	Y	single	Shortt 1993
Head-Smashed-In	**DkPj-1**	kill	cliffs	Y	multi	Reeves 1990
Head-Smashed-In	**DkPj-1**	kill	cliffs	Y	multi	Reeves 1990
Head-Smashed-In	**DkPj-1**	kill	cliffs	Y	multi	Reeves 1990
Kenney	**DjPk-1**	kill	terrace	Y	multi	Reeves 1983b
Kenney	**DjPk-1**	kill	terrace	Y	multi	Reeves 1983b
Kenney	**DjPk-1**	kill	terrace	Y	multi	Reeves 1983b
Muhlbach	**FbPf-1**	kill	sand hills	Y	single	Gruhn 1969
Old Women's	**EcPl-1**	kill	cliffs	Y	multi	Forbis 1962

Site Name	Borden No.	Site Type	Site Environ.	Stratified ?	No. of Compo-nents	Radio-carbon Reference
Old Women's	**EcPl-1**	kill	cliffs	Y	multi	Forbis 1962
Old Women's	**EcPl-1**	kill	cliffs	Y	multi	Forbis 1962
Old Women's	**EcPl-1**	kill	cliffs	Y	multi	Forbis 1962
Ross Glen	**DlOp-2**	camp	terrace	Y	single	Quigg 1983
Smith-Swainson	**FeOw-1**	kill	-	-	-	-
-	**EdOh-23**	processing	sand hills	Y	single	Johnson 1983
Elma Thompson	**EiOj-1**	camp	moraine	Y	single	Finnegan and Johnson 1984
Fitzgerald	**ElNp-8**	kill	sand hills	Y	single	Hjermstad 1996
Fitzgerald	**ElNp-8**	kill	sand hills	Y	single	Hjermstad 1996
Fitzgerald	**ElNp-8**	kill	sand hills	Y	single	Hjermstad 1996
Fitzgerald	**ElNp-8**	kill	sand hills	Y	single	Hjermstad 1996
Long Creek	**DjMr-1**	camp	terrace	Y	multi	Wettlaufer and Mayer-Oakes 1960
Melhagen	**EgNn-1**	kill	sand hills	Y	single	Ramsey 1991
Melhagen	**EgNn-1**	kill	sand hills	Y	single	Ramsey 1991
Melhagen	**EgNn-1**	kill	sand hills	Y	single	Ramsey 1991
Melhagen	**EgNn-1**	kill	sand hills	Y	single	Ramsey 1991
Melhagen	**EgNn-1**	kill	sand hills	Y	single	Ramsey 1991

Site Name	Borden No.	Site Type	Site Environ.	Stratified ?	No. of Compo-nents	Radio-carbon Reference
Melhagen	**EgNn-1**	kill	sand hills	Y	single	Ramsey 1991
Mortlach	**EcNl-1**	camp	terrace	Y	multi	Wettlaufer 1955
Sjovold	**EiNs-4**	camp	terrace	Y	multi	Dyck and Morlan 1995
Sjovold	**EiNs-4**	camp	terrace	Y	multi	Dyck and Morlan 1995
Sjovold	**EiNs-4**	camp	terrace	Y	multi	Dyck and Morlan 1995
Sjovold	**EiNs-4**	camp	terrace	Y	multi	Dyck and Morlan 1995
Sjovold	**EiNs-4**	camp	terrace	Y	multi	Dyck and Morlan 1995
Sjovold	**EiNs-4**	camp	terrace	Y	multi	Dyck and Morlan 1995
Walter Felt	**EcNm-8**	camp	terrace	Y	multi	Kehoe 1974
Walter Felt	**EcNm-8**	camp	terrace	Y	multi	Kehoe 1974
Wapiti Sakihtaw	**DlLw-12**	camp	moraine	Y	multi	Scribe 1996
Richards	**DhLw-1**	kill	moraine	-	-	Paulson 1980
Antonsen	**24GA660**	kill	terrace	Y	multi	Zeier 1983
Herdegen's Birdtail Butte	**24BL1152**	kill	butte	Y	multi	Brumley 1990
Herdegen's Birdtail Butte	**24BL1152**	kill	butte	Y	multi	Brumley 1990
Leavitt	**-**	kill	terrace	Y	multi	Reeves 1983a

Site Name	Borden No.	Site Type	Site Environ.	Stratified ?	No. of Compo-nents	Radio-carbon Reference
Leavitt	**-**	kill	terrace	Y	multi	Reeves 1983a
Mini-Moon	**24DW85**	camp	butte	Y	multi	Hughes 1991
Mini-Moon	**24DW85**	camp	butte	Y	multi	Hughes 1991
Mini-Moon	**24DW85**	camp	butte	Y	multi	Hughes 1991
Wahkpa Chu'gn	**24HL101**	kill	terrace	Y	multi	Davis and Stallcop 1966
Wahkpa Chu'gn	**24HL101**	kill	terrace	Y	multi	Davis and Stallcop 1966
Wahkpa Chu'gn	**24HL101**	kill	terrace	Y	multi	Davis and Stallcop 1966
Boundary Mound	**32SI1**	burial	terrace	-	-	Neuman 1975
Boundary Mound	**32SI1**	burial	terrace	-	-	Neuman 1975
Boundary Mound	**32SI1**	burial	terrace	-	-	Neuman 1975
Naze	**32SN246**	camp	terrace	Y	single	Gregg and Picha 1989
Naze	**32SN246**	camp	terrace	Y	single	Gregg and Picha 1989
Naze	**32SN246**	camp	terrace	Y	single	Gregg and Picha 1989
Naze	**32SN246**	camp	terrace	Y	single	Gregg and Picha 1989
Naze	**32SN246**	camp	terrace	Y	single	Gregg and Picha 1989
Arpan Mound	**39DW252**	burial	terrace	-	-	Neuman 1975
Grover Hand	**39DW240**	burial	terrace	-	-	Neuman 1975
Grover Hand	**39DW240**	burial	terrace	-	-	Neuman 1975
Grover Hand	**39DW240**	burial	terrace	-	-	Neuman 1975

Site Name	Borden No.	Site Type	Site Environ.	Stratified ?	No. of Compo-nents	Radio-carbon Reference
Stelzer	**39DW242**	camp	terrace	-	-	Haberman and Travis 1995
Stelzer	**39DW242**	camp	terrace	-	-	Haberman and Travis 1995
Swift Bird Mound	**39DW233**	burial	terrace	-	-	Neuman 1975
Swift Bird Mound	**39DW233**	burial	terrace	-	-	Neuman 1975
Butler-Rissler	**24DW85**	procesing	terrace	Y	single	Miller et al. 1987
Muddy Creek	**48CR324**	kill	terrace	-	-	Hughes 1981
Ruby	**48CA302**	kill	arroyo	Y	single	Frison 1971

Radiocarbon dates

All of the radiocarbon dates from the Besant/Sonota components reviewed in the present study from the projectile point analysis and the literature review are plotted in Figure 5.1, including both Northern Plains and Plains Woodland sites. All dates are shown in radiocarbon years B.P., and have not been calibrated. Radiocarbon date calibration curves are revised frequently to correlate with data from primarily dendrochronological studies and computer models (Bowman 1990). By presenting the uncorrected dates here, it is intended to show the general trends from the archaeological record, rather than applying a specific calendar date to the Besant/Sonota archaeological cultures. It is known that at approximately 2500 B.P. there is a 'flattening' of the radiocarbon calibration curve. The flattening of the curve may pose difficulties in applying calendar dates against radiocarbon dates, which emphasizes the need for caution when examining dates from this period, as they may fall within a range of error of a few hundred years on either side of the mean date. Despite this difficulty, there are trends worth outlining within the overall radiocarbon sequence. As stated previously, this is not an exhaustive study of all possible dates for Besant/Sonota, but with a particular focus upon the Alberta sites with data from other regions for comparison.

In Figure 5.1, containing the sequence of radiocarbon dates from all of the study sites, the dates span approximately 2500 – 1000 B.P., with a few outliers at either end of the sequence. These dates fit with the overall manifestation of the Besant Phase. There are two groups of dates, the earlier group at approximately 2500 – 2300 B.P., and the later group at approximately 2000 – 1400 B.P. The latter group of dates fits the dates

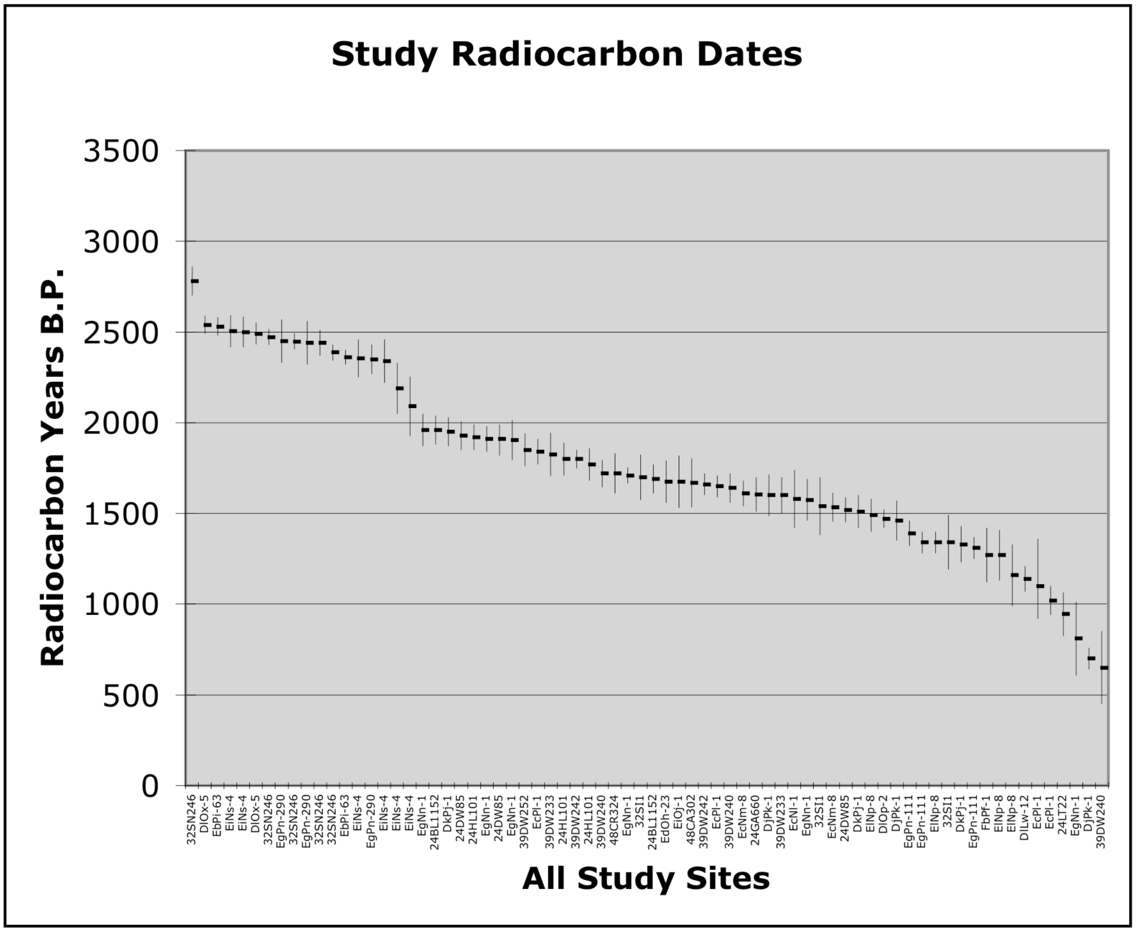

Figure 5.1. All Besant Phase radiocarbon dates included in the current analysis, with one standard deviation shown from the calculated B.P. date.

traditionally given to the Besant Phase (Reeves 1983a; Vickers 1986), while the earlier grouping of dates have been used by some researchers (Dyck and Morlan 1995; Shortt 1993) to push back the initial dates for Besant to 2500 B.P. According to the study findings, the material culture and site data also support these two groupings of the Besant Phase.

On the Northwestern Plains, radiocarbon dates are presented for Alberta (Figure 5.2) and for Saskatchewan (Figure 5.3). In Alberta, the early grouping of sites at

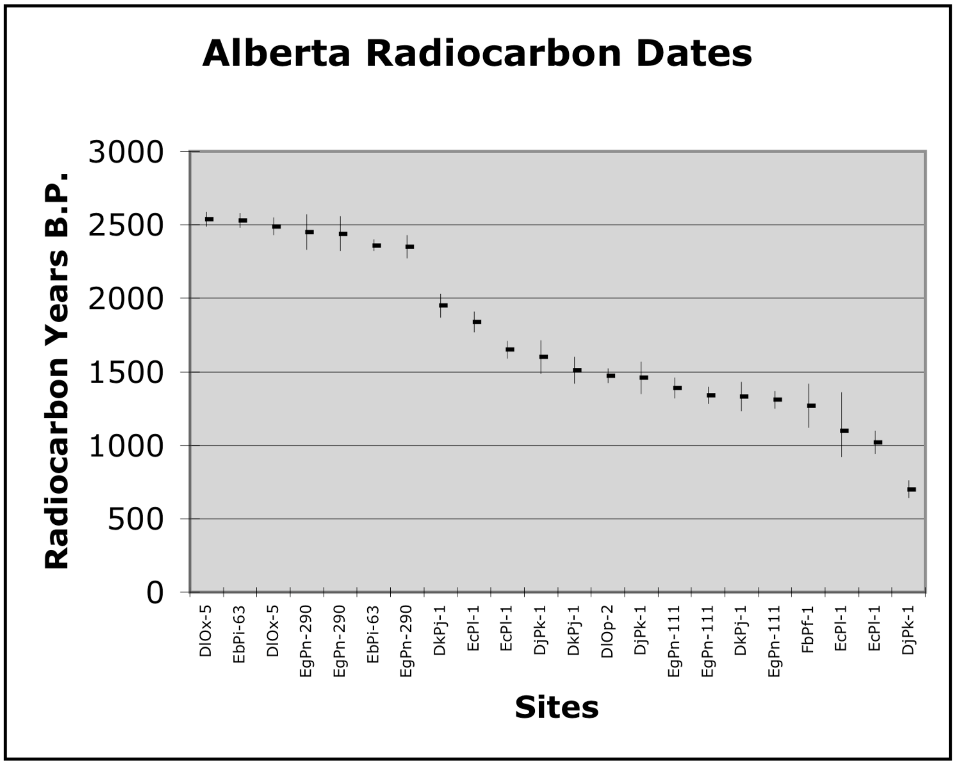

Figure 5.2. Alberta radiocarbon dates (n=22) from 9 sites during the Besant Phase.

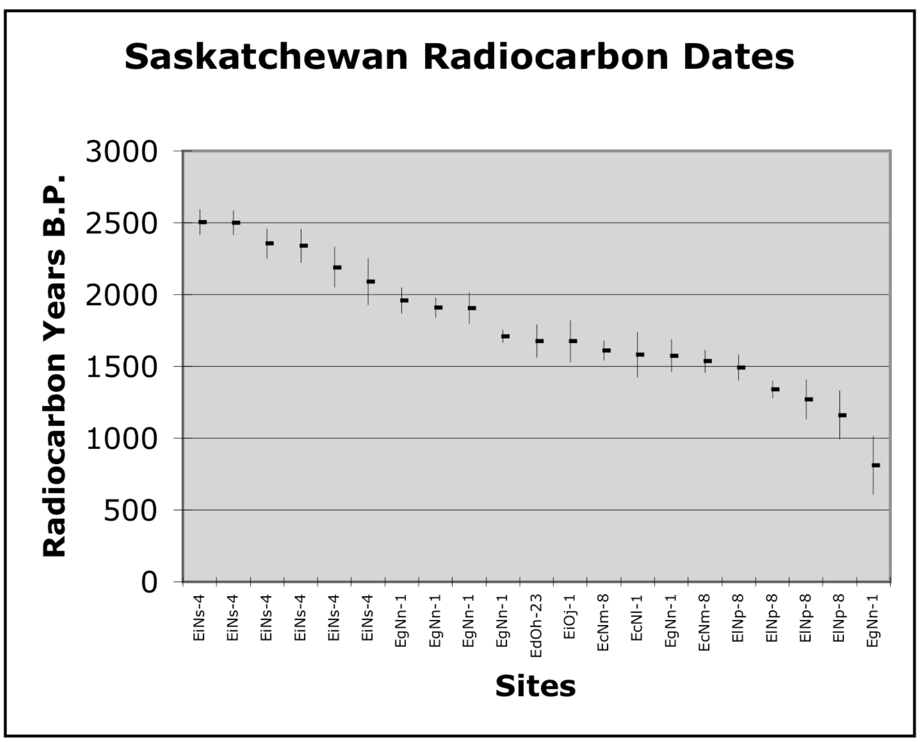

Figure 5.3. Saskatchewan radiocarbon dates (n=21) from 7 sites during the Besant Phase.

approximately 2300 to 2500 B.P. include the Fincastle site (DlOx-5), EbPi-63, and the Happy Valley site (EgPn-290). There is a break in the sequence of radiocarbon dates, then a later grouping of sites from approximately 2000 – 1200 years ago. The later sites include Head-Smashed-In (DjPk-1), Old Women's (EcPl-1), Kenney (DkPj-1), Ross Glen (DlOp-2), EgPn-111, and Muhlbach (FbPf-1).

In Saskatchewan, the relationship between these two groups is less clear. The Sjovold site (EiNs-4) falls within this early sequence, particularly Layers X, XI, XII, and XIV, from approximately 2500 – 2300 B.P. The Melhagen site (EgNn-1), EdOh-23, Elma Thompson (EiOj-1), Walter Felt (EcNm-8), Fitzgerald (ElNp-8) comprise the later grouping of sites.

Turning to the Northeastern Plains/Plains Woodland, radiocarbon dates are presented in Figure 5.4 from North and South Dakota. In the early group of dates plotted on the chart, the Naze site (32SN246) dates are presented at approximately 2500 B.P. There is a break in the sequence, and the later group of dates includes the Arpan Mound (39DW252), Swift Bird Mound (39DW233), Stelzer (39DW242), Grover Hand (39DW240), and Boundary Mound (32SI1) sites at approximately 2000 – 1300 B.P.

Radiocarbon dates from Montana (Figure 5.5) reflect only the later sequence of dates for the Besant Phase, ranging from approximately 2000 – 1250 B.P. These sites include Herdegen's Birdtail Butte (24BL1152), Mini-Moon (24DW85), Wahkpa Chu-gn (24HL101), Antonsen (24GA660), and Leavitt (24LT22). There were problems with the radiocarbon samples from the Leavitt site, as reported in Reeves (1983a); one of the samples omitted from the chart was a date of 1180±950, that was rejected due to its large standard deviation (Morlan 2006). The second date from Leavitt, 945±120 B.P. was

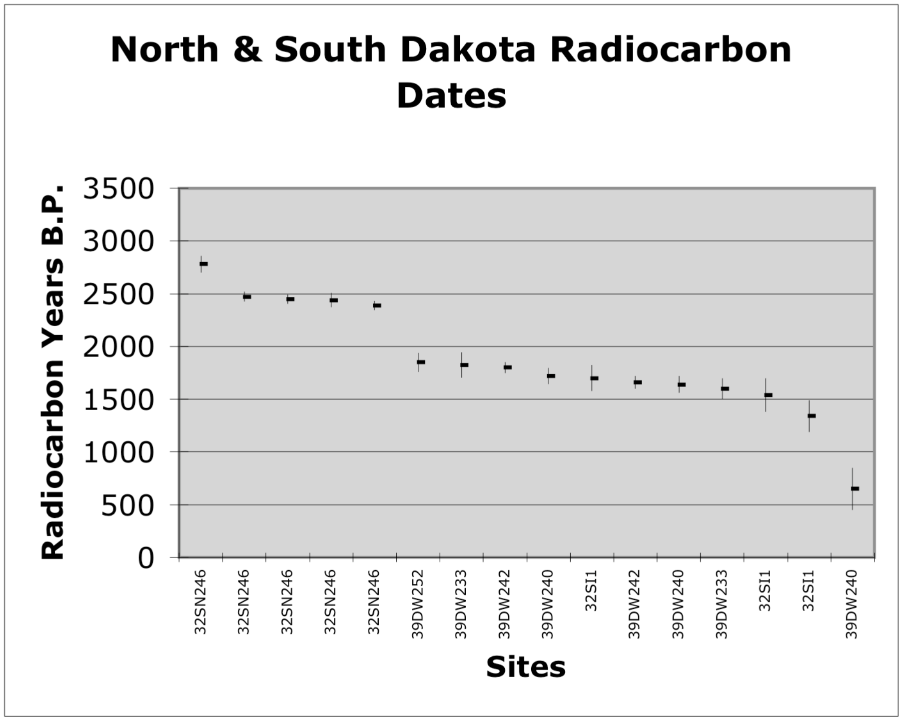

Figure 5.4. North and South Dakota radiocarbon dates (n=16) from 6 sites during the Besant Phase.

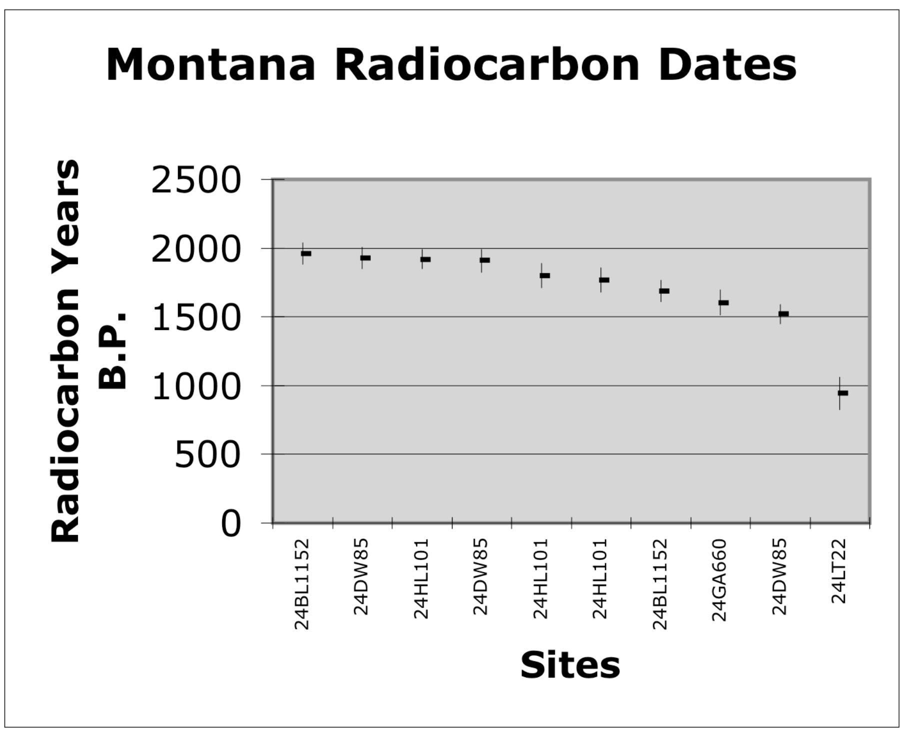

Figure 5.5. Montana radiocarbon dates (n=10) from 5 sites during the Besant Phase.

rejected by Reeves (1983a), but accepted within the present study as a later manifestation of Besant in Montana, as discussed further later in this chapter.

With this general pattern of the grouping of radiocarbon dates, with the early group at *c*. 2500- 2300 B.P. and the second group at *c*. 2000 – 1200 B.P., it is appropriate to next turn to the stratigraphic data.

Site types

As summarized in Tables 5.2 and 5.3, there are a variety of site types found in the sites distributed across the Northern Plains during the late Middle Prehistoric Period. Site types represented in the present study include kill sites, camp sites, processing sites, and burial sites. Obviously, different activities occurred at each of these site types, and the pattern of these activities is evident in the resulting material culture used in the present analysis. There are difficulties in trying to integrate these different kinds of sites in such an analysis because different site activities will yield different archaeological remains, but certain trends can be demonstrated.

There are a total of 34 sites in the study representing kill, camp, processing, and burial sites. In Alberta, 10 sites were reviewed, 9 sites representing kill sites (Fincastle [DlOx-5]; EbPi-63, EgPn-111, Happy Valley [EgPn-290]; Head-Smashed-In [DkPj-1]; Kenney [DjPk-1]; Muhlbach [FbPf-1]; Old Women's [EcPl-1]), and 1 camp site (Ross Glen [DlOp-2]). In Saskatchewan, 8 sites were reviewed, including 5 camp sites (Elma Thompson [EiOj-1]; Long Creek [DjMr-1]; Mortlach [EcNl-1]; Sjovold [EiNs-4]; Walter Felt [EcNm-8]), two kill sites (Fitzgerald [ElNp-8]; Melhagen [EgNn-1]), and one processing site (EdOh-23). There were two sites reviewed from Manitoba, one kill site

Table 5.3. Study site types by region.

Prov./State	Kill	Camp	Processing	Burial	Total
Alberta	9	1	-	-	10
Saskatchewan	2	5	1	-	8
Manitoba	1	1	-	-	2
Montana	4	1	-	-	5
North/South Dakota	-	2	-	4	6
Wyoming	2	-	1	-	3
TOTAL	18	10	2	4	**34**

(Richards [DhLw-1]), and one camp site (Wapiti Sakihtaw [DlLw-12]). In Montana, five sites were reviewed; there were four kill sites (Antonsen [24GA660]; Herdegen's Birdtail Butte [24BL1152]; Leavitt [24LT22]]; Wahkpa Chu'gn [24HL101]) and one camp site (Mini-Moon [24DW85]). In North and South Dakota, six sites were reviewed, featuring four burial sites (Arpan Mound [39DW252]; Boundary Mound [32SI1]; Grover Hand [39DW240]; Swift Bird Mound [39DW233]), and two camp sites (Naze [32SN246]; Stelzer [39DW85]). In Wyoming, three sites were reviewed, including two kill sites (Muddy Creek [48CR324]; Ruby [48CA302]) and one processing site (Butler-Rissler [24DW85]).

There is a tendency for certain site types to be distributed spatially across the Northern Plains in this study. Kill sites occur most frequently on Alberta's Northwestern Plains, then second most frequently in Montana. Campsites are most frequent in Saskatchewan, then in the Dakotas. Burial mounds occur only in North and South Dakota. There were likely processing activities at the kill sites; the processing designation was applied when only these activities were described in the site report.

Site environments

Archaeological sites included in this study are situated in a variety of site environments across the Northern Plains region. The designation of site environment in this study is used to refer to a site's topographic setting or landscape. Site landscapes include sand hills, river terraces, cliff bases, moraines, buttes, and an arroyo (Table 5.4). In Alberta, there are seven archaeological sites in three different site landscapes, with the exclusion of the Smith-Swainson site (FeOw-1), as no information was available regarding its environmental setting. Archaeological sites in Alberta fall into three environmental categories, with five river terrace sites (EbPi-63; EgPn-111; Happy Valley [EgPn-290]; Kenney [DjPk-1]; Ross Glen [DlOp-2]), two sand hill sites (Fincastle [DlOx-5]; Muhlbach [FbPf-1]), and two sites at cliff bases (Head-Smashed-In [DkPj-1]; Old Women's [EcPl-1]). Saskatchewan sites fall into three environmental categories, with four river terrace sites (Long Creek [DjMr-1]; Mortlach [EcNl-1]; Sjovold [EiNs-4]; Walter Felt [EcNm-8]), two sand hill sites (Fitzgerald [ElNp-8]; Melhagen [EgNn-1]), and one moraine site (Elma Thompson [EiOj-1]). The two sites from Manitoba are situated on moraines (Richards [DhLw-1]; Wapiti Sakihtaw [DlLw-12]). The five archaeological sites from Montana fall into two environmental categories, with three sites on river terraces (Antonsen [24GA660]; Leavitt [24LT22]; Wahkpa Chu'gn [24HL101]), and two sites at buttes (Herdegen's Birdtail Butte [24BL1152]; Mini-Moon [24DW85]). The six sites from North and South Dakota are located on river terraces (Arpan Mound [39DW252]; Boundary Mound [32SI1]; Grover Hand [39DW240]; Naze [32SN246]; Stelzer [39DW242]; Swift Bird Mound [39DW233]). The three Wyoming sites are

Table 5.4. Study site environments by region.

Prov./State	Sand hills	Terrace	Cliff	Moraine	Butte	Arroyo	Total
Alberta	2	5	2	-	-	-	10
Saskatchewan	3	4	-	1	-	-	8
Manitoba	-	-	-	2	-	-	2
Montana	-	3	-	-	2	-	5
North/South Dakota	-	6	-	-	-	-	6
Wyoming	-	2	-	-	-	1	3
TOTAL	5	20	2	3	2	1	**34**

located in two environmental settings, with two sites on river terraces (Butler-Rissler [24DW85]; Muddy Creek [48CR324]), and one site in an arroyo (Ruby [48CA302]).

River terraces are the most frequently represented environmental setting, with 20 of the 34 study sites falling within this type, occurring throughout the study area in the Northern Plains. The second most frequent environmental setting for archaeological sites were sand hills, which are geographically distributed on the Northwestern Plains in Alberta and Saskatchewan. Sites at cliff bases are represented predominantly in Alberta, while butte sites are restricted to Montana, and the single arroyo site occurs in Wyoming.

Site stratigraphic components

The 34 study sites cover a vast expanse of geography in the Great Plains culture area. Details of specific site stratigraphic sequences have been provided in Chapter 2. Table 5.5 summarizes the number of stratigraphic components at each of the study sites that has been assigned to the Besant Phase. In this section, sites have been noted as either single or multi component based on the excavator's interpretations. Multi component sites are those that represent more than one event; this designation includes sites where

Table 5.5. Study sites stratigraphic components.

Prov./State	Single	Multi
Alberta	5	4
Saskatchewan	4	4
Manitoba	-	1
Montana	-	5
North/South Dakota	1	-
Wyoming	2	-

there are multiple stratigraphic levels of Besant age components, as well as Besant Phase components stratified with earlier or later deposits. Stratigraphic information was not available for the projectile point collections gathered from surface exposures, including the Smith-Swainson site (FeOw-1) in Alberta, the Richards site (DhLw-1) in Manitoba, and the Muddy Creek site (48CR324) in Wyoming. Stratigraphic data was unavailable for the Stelzer site (39DW242) in South Dakota. Additionally, all of the burial mounds (Arpan Mound [39DW252]; Boundary Mound [32SI1]; Grover Hand [39DW240]; Swift Bird [39DW242]) were excluded due to the uniqueness of those particular site types.

In Alberta, stratigraphic data was available for 9 of the 10 study sites, with 4 multi component sites (EbPi-63; Head-Smashed-In [DkPj-1]; Kenney [DjPk-1]; Old Women's [EcPl-1]), and 5 single component sites (Fincastle [DlOx-5]; EgPn-111; Happy Valley [EgPn-290]; Muhlbach [FbPf-1]; Ross Glen [DlOp-2]). Eight archaeological sites were investigated from Saskatchewan, with four multi component sites (Long Creek [DjMr-1]; Mortlach [EcNl-1]; Sjovold [EiNs-4]; Walter Felt [EcNm-8]), and four single component sites (EdOh-23; Elma Thompson [EiOj-1]; Fitzgerald [ElNp-8]; Melhagen [EgNn-1]) in the study. In Manitoba, stratigraphic data was available for one of the two study sites, with one multi-component site (Wapiti Sakihtaw [DlLw-12]). In Montana, all five study sites were multi component (Antonsen [24GA660]; Herdegen's Birdtail Butte

[24BL1152]; Leavitt [24LT22]; Mini-Moon [24DW85]; Wahkpa Chu'gn [24HL101]). Only one of the sites from North and South Dakotas had stratigraphic data available; this archaeological site was single component (Naze [32SN246]). In Wyoming, two of the three study sites had data available for the number of stratigraphic components; these two sites were single component (Butler-Rissler [24DW85]; Ruby [48CA302]).

Discussion

After examining radiocarbon dates, site types, site environments, and stratigraphic data, several patterns have become apparent during the course of the present research. Radiocarbon dates during the Besant Phase cluster into two groups, at approximately 2500 – 2300 B.P. and at approximately 2000 – 1200 B.P. Integrating the radiocarbon data with the site data analysis, further trends become apparent. Kill sites are most frequent type of site on the Northwestern Plains based on the evidence from the study sites; these tend to occur in either sand hills or at cliff bases. Of particular note here in reference to the present study is that the kill sites in sand hill environments represent single events. Sand hills are increasingly being recognized as important environments well into prehistory (Neal 2006). The Fincastle site is one of the earliest single component sand hill kill site occurring on the Northwestern Plains. Other single component kill sites in sand hill environments include the Muhlbach site in Alberta, and the Fitzgerald and Melhagen sites in Saskatchewan. Kill sites at cliff bases in Alberta are multi component sites featuring thousands of years of reuse at such sites as Head-Smashed-In and Old Women's.

Examining the projectile point findings from Chapter 4 in conjunction with the site data described above also yields some intriguing insights. Despite the limited data, several trends are apparent. As described in Chapter 4, seven sites were examined in the projectile points study, including the Fincastle site, as well as EbPi-63, EgPn-111, Kenney, Leavitt, Muhlbach, and Smith-Swainson. Of particular interest is the raw material used in the projectile point assemblages, when viewed against the site data.

As noted by other researchers (Duke 1991; Joyes 1984; Syms 1977), there are high frequencies of Knife River Flint in certain Besant sites across the Northern Plains that need to be accounted for. Although Knife River Flint occurs in high frequencies at some sites, it also appears in small quantities at other Plains sites, such as the Ross Glen site in Alberta (Quigg 1983, 1986). The seven study sites in the projectile point analysis demonstrate this dichotomy between the frequencies of Knife River Flint during the Besant Phase. In Figure 5.6, frequencies of Knife River Flint are depicted in comparison with other raw materials, classified as miscellaneous cherts or as 'other', which includes quartzites, siltstones, mudstone, and petrified wood. It is evident that Knife River Flint as a projectile point raw material dominates the Fincastle, Muhlbach, and Smith-Swainson sites; also of interest is that Knife River Flint occurs in similar frequencies in comparison with chert and the other raw materials in Figure 5.6. At Fincastle, Knife River Flint represents 62 of the 75 points in the study. Knife River Flint represents 95 projectile points of the total of 112 projectile points examined from the Muhlbach site. At Smith-Swainson, Knife River Flint represents 111 of the total of 152 projectile points recovered from the site. In comparison, EgPn-111, Leavitt, EbPi-63, and Kenney feature either low frequencies or no Knife River Flint in comparison to cherts and other raw materials.

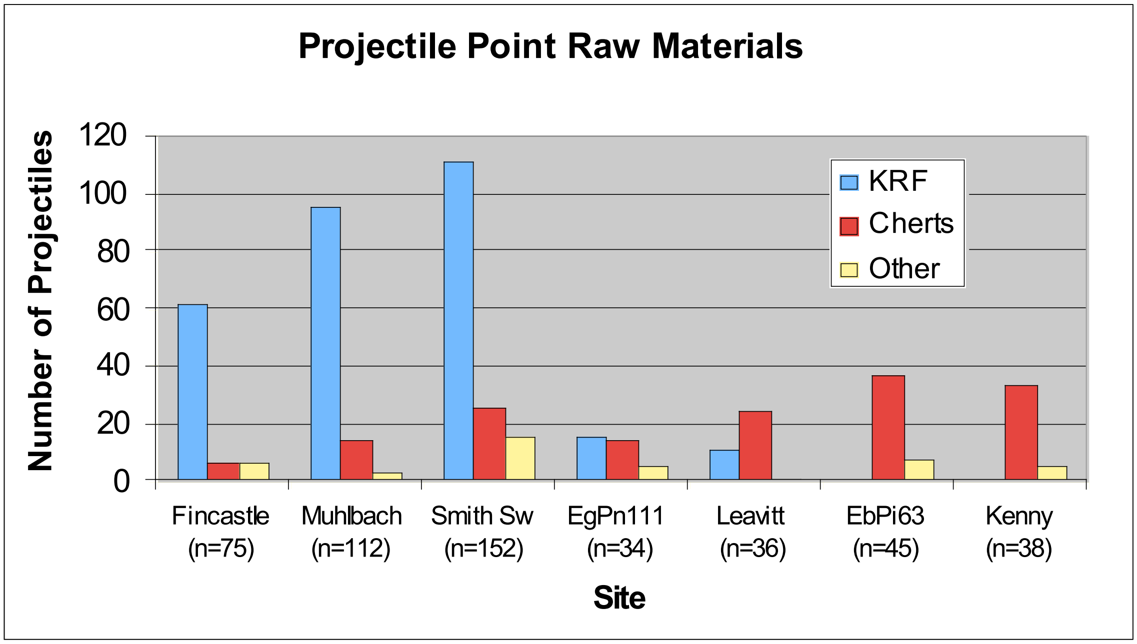

Figure 5.6. Projectile point raw materials from point analysis sites.

In Figure 5.7, the relative percentages of raw materials used in each projectile point assemblage is shown. As in Figure 5.6, the Fincastle, Muhlbach, and Smith-Swainson sites show high frequencies, ranging from approximately 70 – 80% of the raw materials used when compared with chert and other raw materials. EgPn-111 has the next highest frequency of Knife River Flint at approximately 40%, then Leavitt at over 20%. There was one single specimen of Knife River Flint from EbPi-63, and none at the Kenney site. Leavitt, EbPi-63, and Kenney were dominated by various cherts. EgPn-111, in addition to featuring approximately 40% Knife River Flint, also has approximately 40% of various cherts in the point assemblage. According to data in the study as shown in Figures 5.6 and 5.7, there are two groupings of sites: those that feature high quantities (over 70%) of Knife River Flint in their projectile point assemblages, compared to those that feature low quantities of Knife River Flint (less than 40%). Fincastle, Muhlbach, and

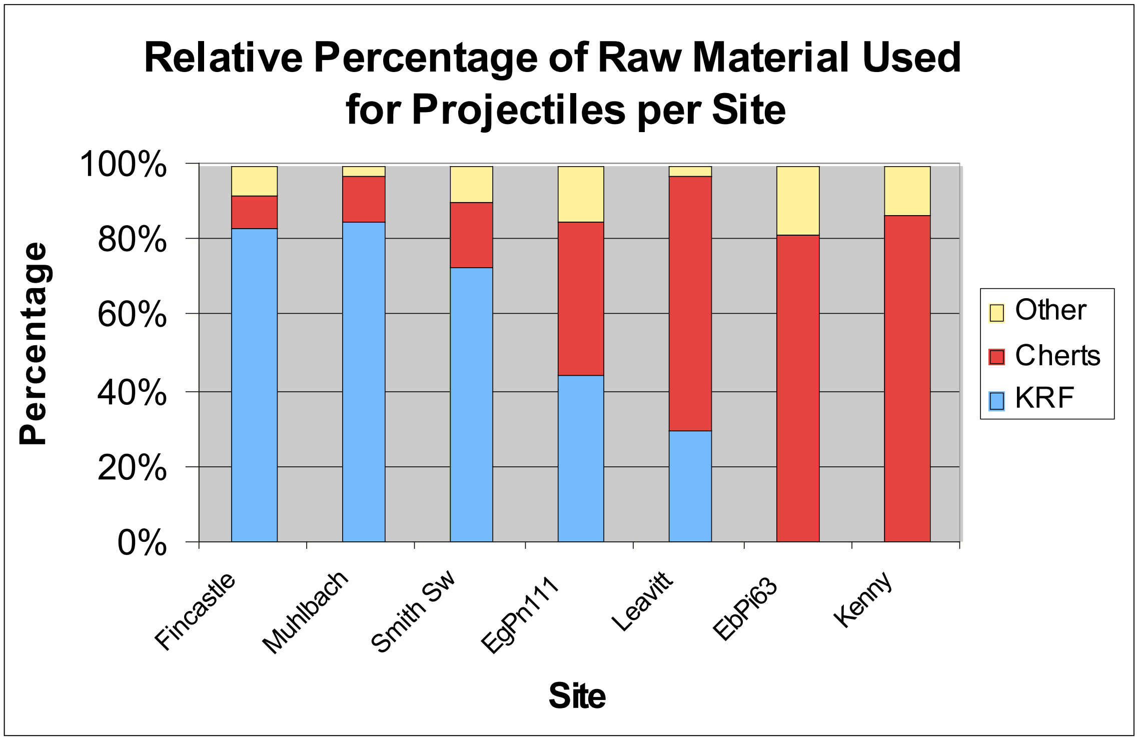

Figure 5.7. Relative percentage of raw material used for projectile points per study site.

Smith-Swainson feature high frequencies in the first group, while EgPn-111, Leavitt, EbPi-63, and Kenney fall into the second group with low frequencies of Knife River Flint.

With these two groupings of the projectile point study sites by raw material in mind, the radiocarbon dates, stratigraphy, site environment also yields further insights. At approximately 2500 B.P. in Alberta, there are only three sites that date to this period. They are the Fincastle site, EbPi-63, and the Happy Valley site. Fincastle is a single component bison kill site set in low sand hills, featuring both dart and arrow technology. EbPi-63 is a multi component bison kill site set along a river terrace, featuring dart technology. Happy Valley is a single component bison kill site also set along a river terrace; the Happy Valley site is problematic due to the low number of points recovered (n=6), as well as the fact that the projectile points were unavailable for study. This stated, the Fincastle site and EbPi-63 are a fascinating set of contrasts, and contemporaneous, each with a sizeable projectile point sample available for study. As analyzed in depth in Chapter 4, and described above, these point assemblages feature very different raw material choices by their manufacturers; Fincastle has high frequencies of Knife River Flint, in often elongated projectile points that appear to be very similar and well-made. EbPi-63 has low frequencies of Knife River Flint, and includes a wide range of raw materials—furthermore, the projectile point types themselves are highly variable from this site. Projectile points from EbPi-63 includes both Besant and Pelican Lake types within the Besant component. Pelican Lake projectile points, in contrast, were not recovered from the Fincastle site. This relationship between Besant and Pelican Lake points is significant in the present study, and important to keep in mind. Archeologists have debated whether the co-occurrence of Pelican Lake points with Besant points is an actual association or cases of stratigraphic mixing. Although there is no debate that Pelican Lake predates the Besant Phase, it is evident in the present study that this co-occurrence appears at several of the study sites and cannot be ignored. EbPi-63, like other sites in this study, features the shared presence of both Besant and Pelican Lake and offers a valuable interpretive insight.

Like the Fincastle site, the Muhlbach site features high frequencies of Knife River Flint, with both dart and arrow technology, and is also a single component bison kill site situated in low sand hills. The Smith-Swainson site, a surface collection nearby the Muhlbach site, follows a very similar pattern to the Muhlbach site in its point assemblage, dominated by long Knife River Flint points. Darts and arrows are both represented in the Smith-Swainson collection. Radiocarbon dates for the Muhlbach site indicated that this site approximately 1200 years more recent than the Fincastle site. Although similar in age to Muhlbach, the Kenney site features important differences. It does not feature Knife River Flint, and shows a considerable variation in the projectile point forms, as well as in the array of raw materials represented. Only one arrow point was identified among the point assemblage; the rest of the collection represents dart points. Like EbPi-63, the Kenney site is dominated by cherts; another similarity with EbPi-63 is the presence of Pelican Lake projectile points in shared association with Besant, but appearing approximately 1000 years later. EgPn-111 is a single component site that is temporally contemporaneous with Kenney and Muhlbach, and provides an intriguing case study in itself. EgPn-111, as discussed earlier, features similar quantities of Knife River Flint and chert within its projectile point assemblage, an unusual feature when compared with the other sites. EgPn-111 includes a few arrows within its assemblage. EgPn-111, like Kenney and EbPi-63, also includes Pelican Lake points co-occuring with Besant points, of diverse raw materials.

It is apparent that there are at least two coeval and related archaeological cultures on the Northwestern Plains. One of these archaeological cultures is exemplified by the Fincastle, Muhlbach, and Smith-Swainson sites; these findings are corroborated by the evidence from the Fitzgerald and Melhagen sites in Saskatchewan that are contemporaneous with Muhlbach. Another of these archaeological cultures is represented by EbPi-63, EgPn-111, and Kenney. In the next section, these findings are interpreted in light of the broader Besant Phase on the Northwestern Plains, and in light of the theoretical framework and taxonomic units outlined earlier within this chapter.

Archaeological Cultures of the Besant Phase

After assessing the data from the present study, a fifth model is proposed to explain the expression of the Besant Phase in Alberta that closely follows Joyes (1984) and Duke's (1991) model. As Duke observed (1991:92), Reeves' Besant Phase covers a great deal of spatial and temporal variation that results in obscuring cultural and social variability. Additionally, Reeves' use of phase also follows an ecological and positivist interpretive framework that does not explain the variation witnessed in the Besant Phase across the Plains. Following Willey and Phillips' (1965) meaning of the term 'phase,' with geographic restrictions, the Besant Phase is used here to reflect a series of interrelated archaeological cultures that act within a 'Besant interaction sphere.'

The Besant Phase consists of a minimum of three interrelated archaeological cultures in the Great Plains culture area during the late Middle Prehistoric Period (Figure 5.8). These archaeological cultures will be termed subphases, as suggested by Joyes (1984). The hypothesized subphases include the Kenney subphase (following Joyes [1984]), the Sonota subphase, the Wyoming subphase, and a possible Montana subphase.

The Kenney subphase represents the indigenous Alberta manifestation of the Besant Phase. In Alberta, the Kenney Phase demonstrates a continuation of the Pelican Lake I Phase at 3300 – 2800 B.P. (Varsakis and Peck 2005). At 2800 – 2300 B.P., Pelican Lake II Phase, Pelican Lake becomes more variable and shows a greater diversity of point types and workmanship (Varsakis and Peck 2005). Pelican Lake II is now termed as the Kenney subphase. The Kenney subphase is characterized by a diversity of raw material types, and an absence of flake arrow points until the second, later group

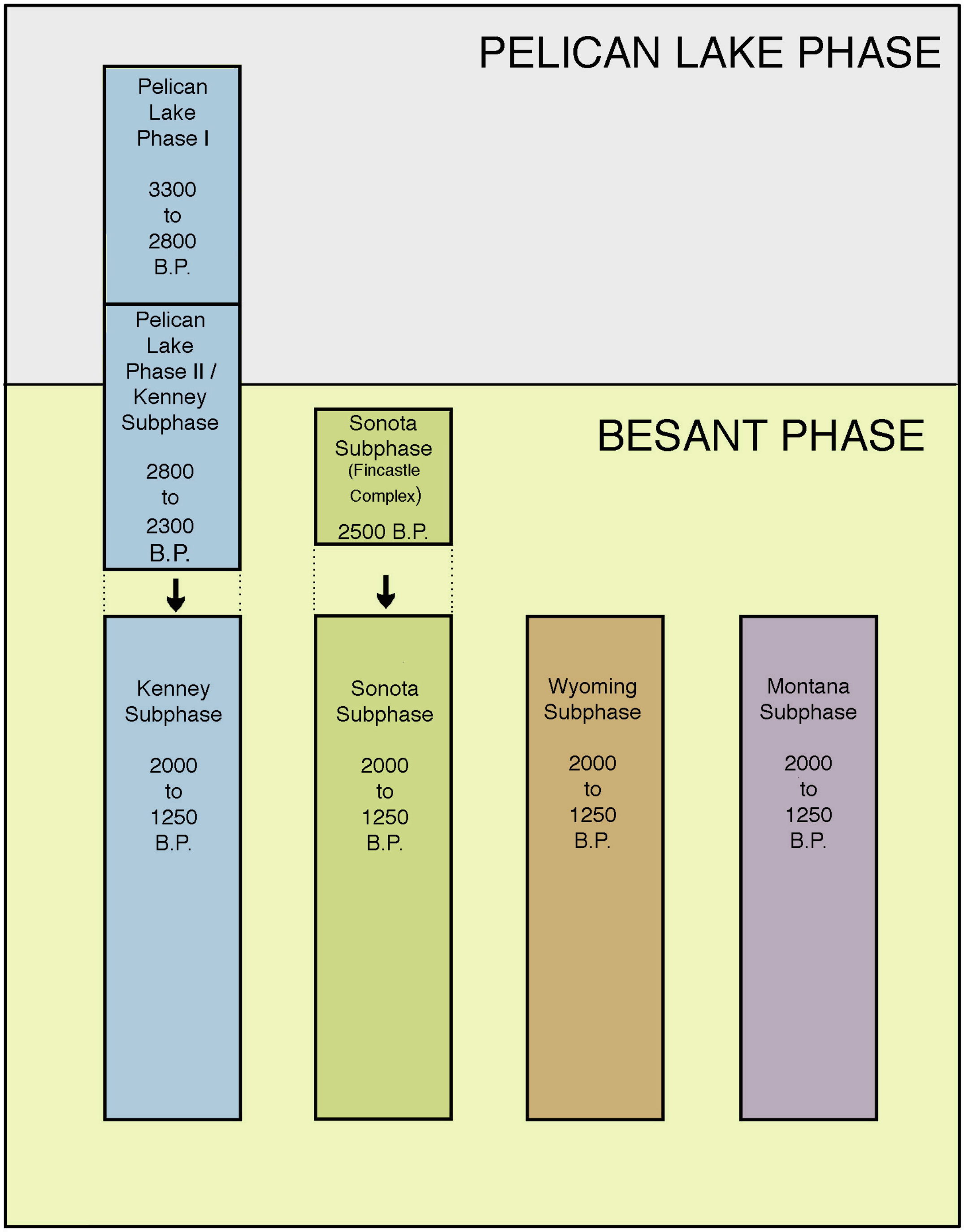

Figure 5.8. The Kenney, Sonota, Wyoming, and Montana subphases of the Besant Phase. The Kenney subphase is continuous from Pelican Lake (Varsakis and Peck 2005). The Sonota subphase includes the Fincastle Complex as its early manifestation on the Northwestern Plains at *c*. 2500 B.P.

of radiocarbon dates at approximately 2000 to 1200 B.P. Archaeological cultures within the Kenney subphase traded and interacted with peoples of the Sonota subphase, as evidenced by the low relative quantity of Knife River Flint as well as a shared ideology, subsistence economy, and technology centred on communal bison hunting. EbPi-63 is a representation of the Kenney subphase at *c.* 2500 B.P.; another example of a site from this subphase includes the Bow Bottom site, dating *c.* 2500 – 2300 B.P., with another mixed Pelican Lake/Besant assemblage. Interpretation of Bow Bottom is complicated by its site type, a campsite; issues include demonstrating that each tipi rings is contemporaneous and that it represents a single event.

The Sonota subphase includes the sites on the Northeastern Plains outlined in Neuman's (1975) monograph. Additional evidence for the Sonota subphase has been demonstrated by study sites on the Northeastern Plains. These include the Fitzgerald, Melhagen, Richards, and Wapiti Sahkitaw sites. The Naze site is also included here.

The Wyoming subphase includes the later manifestation of the Besant Phase in this part of the Plains. Projectile points tend to be longer than average, and a reliance on chalcedonies and a range of raw materials in distinctive, well-made projectile points characterizes this region. The data presented from the present study tentatively supports the designation of this subphase.

A possible Montana subphase is also named, as it shares traits with the Sonota, Wyoming, and Kenney subphases. Archaeological sites in Montana feature longer points as seen in the Sonota subphase, but with the raw material diversity seen in both the Kenney and Wyoming subphases, showing a preference for chalcedonies used to produce well-made projectile points. Further analysis of Montana archaeological sites needs to be made to strengthen the proposed Montana subphase.

Finally, within the Sonota subphase, the Fincastle Complex is named to distinguish the hypothesized *c.* 2500 B.P. initial manifestation of Sonota on the Northwestern Plains, becoming more widespread on the Northwestern Plains at 2000 – 1250 B.P. The Fincastle Complex includes the Fincastle site, Layer XIV at Sjovold, and the top of Layer 3 in the south kill at Head-Smashed-In. This incorporates Dyck's (1983) original hypothesized 'Unnamed Complex' as evidenced in Layer XIV at the Sjovold site that he later incorporated as the 'Outlook' type into his 'Besant Series.' Although there was a small sample of projectile points from this level at Sjovold at approximately 2500 B.P., they are made of Knife River Flint and appear very similar in form to those at the Fincastle site. 'Besant Series' is rejected as it does not explain the interrelationships between these archaeological manifestations, and has been applied only to the Sjovold site (Dyck and Morlan 1995). The Fincastle Complex is the first manifestation of the Sonota subphase that occurs more broadly after 2000 B.P. At present, there are no known Sonota sites in North and South Dakota dating between *c.* 2500 – 2000; however, the characteristics of the traditional Sonota sites are reflected in these early sites on the Northwestern Plains. Sites such as Fincastle, Muhlbach, Smith-Swainson, Fitzgerald, and Melhagen all represent single component bison kills in sand dune environments from the Sonota subphase; these site types appear to have had special utility to the peoples of this archaeological culture. The use of Knife River Flint likely also held ideological and symbolic value to peoples of the Sonota subphase, as well as utilitarian and practical uses. Furthermore, sites such as Mortlach (particularly occupation 4A with the Plains

Woodland house) hints at an increased social complexity between these archaeological cultures throughout the late Middle Prehistoric Period.

The present study indicates that the Besant Phase was a very rich time period on the Northern Plains, and hints at social complexity and organization through the surviving archaeological evidence. It is evident that the Northeastern Plains, with the Sonota subphase and the Plains Woodland influence through the Hopewellian Interaction sphere, played a significant role during the Besant Phase. Quantities of Knife River flint represented in the Sonota subphase assemblages are also seen at the Kenney subphase sites, although in smaller amounts. Alternatively, the rare presence of obsidian and other western-sourced raw materials suggests a limited interaction with groups to the west during the Besant Phase. It is hypothesized here that Alberta, with its impressive and extensive series of bison kill sites along the foothills of the Rockies that used sandstone cliff outcrops to drive bison, such as Head-Smashed-In, may have been recognized as a centre of bison hunting for many thousands of years since the early Middle Prehistoric Period. The 5500-year sequence at Head-Smashed-In indicates the longstanding and highly developed way of life based on communal bison hunting on the Northwestern Plains (Reeves 1983a).

Archaeological evidence from the Sonota mounds indicates that bison were just as significant to the peoples of the Plains Woodland, choosing to inter bison remains with human burials in their mounds. Reciprocal ways of life, based on trade, economy, and ideology throughout the Besant Phase of the late Middle Prehistoric Period appear to have existed; studies such as at Ross Glen (Quigg 1983, 1986) only begin to tease at the social organization that must have existed during this time. Archaeologists conducting research on the Plains are increasingly interested in social dynamics and ideology in interpreting the archaeological record, which serves to enrich the discourse regarding archaeological explanation on the Plains (Duke 1991, 1993; Forner 2005; Walde 2006).

Through this analysis and discourse, it is evident that archaeological cultures during the late Middle Prehistoric Period were anything but static; furthermore, the case has been made that the interpretive framework selected to analyze the archaeological past has significant implications for the resulting interpretations, even when dealing with the ephemeral archaeological remains of hunter-gatherer groups. Cultures are ultimately created by groups of people who share a similar environment, ideology, resources, material culture, and sets of symbols, and it is through attempts to appreciate their culture—in this case, reflected by bison, by raw material selection, by the kinds of tools and sites that people left behind—that the past is revealed. It is through this systematic middle-level analysis, by revisiting the Besant Phase, and revealing patterns in choices by prehistoric groups, as well as attempting to see the symbols in the material culture that were meaningful to these groups, that these results were provided. The present study has yielded some intriguing findings and hypotheses to help contribute to our understanding of the Besant Phase of the Great Plains region.

CHAPTER 6: SUMMARY AND CONCLUSIONS

Research Summary

As introduced at the beginning of this thesis, the present study was motivated by the recovery of a distinctive projectile point assemblage from the Fincastle site. The projectile point morphology, high quantities of Knife River Flint, and unexpectedly early radiocarbon dates at *c.* 2500 B.P. added intrigue to this puzzle at Fincastle. Through the task of trying to place the Fincastle site in Alberta's regional and temporal chronology, the analysis necessitated a review of archaeological cultures during the late Middle Prehistoric Period on the Northwestern Plains. These archaeological cultures included Pelican Lake, Sandy Creek, an Unnamed Complex, Besant, and Sonota.

After a discourse on the nature of archaeological explanation, and following an extensive literature review of archaeological sites during the late Middle Prehistoric Period in the Great Plains culture area, a projectile point analysis was conducted on assemblages from the Fincastle site (DlOx-5), EbPi-63, EgPn-111, Kenney (DjPk-1), Leavitt (24LT22), Muhlbach (FbPf-1), and Smith-Swainson (FeOw-1). As part of this study, nearly 40 metric and non-metric attributes were examined in approximately 500 projectile points from seven sites. Research findings from the projectile point study indicated that the Alberta sites fell into two groups. The first group includes the Fincastle, Muhlbach, and Smith-Swainson sites, characterized by well made long projectile point forms, and heavy use of Knife River Flint sourced from North Dakota. The second group includes the EbPi-63, EgPn-111, and Kenney sites, featuring diverse, short side notched projectile point forms, a co-occurrence of Pelican Lake projectile point types, and a broad range of raw materials with little or no Knife River Flint, made with variable skill. The Leavitt site is a later manifestation that relates better to the first group of sites than the second, but may also represent a third group. Additionally, technology from the first group includes both atlatl dart and arrow technology throughout the temporal sequence, while arrow technology is a later addition during the Besant Phase with the second group. Findings from the projectile point study were integrated with a study of radiocarbon dates, site types, site environments, and stratigraphic components, supporting the presence of two separate, but related, coeval groups in the Great Plains.

After a review of the taxonomic units used in North American and on the Great Plains, the Besant/Sonota debate was revisited. Four pre-existing models were presented: 1) Neuman's (1975) model, 2) Reeves' (1983a) model, 3) Syms' (1977) model, and 4) Joyes (1984) and Duke's (1991) model. Neuman (1975) describes Sonota as a regional expression within the broader cultural context of the Plains Woodland. Dropping the geographic restriction of Willey and Phillips' 'phase,' Reeves' (1983a) defines the Besant Phase across the Great Plains culture area as a homogenous entity. Syms' (1977) defines Besant as a horizon, and describes the Sonota Complex as a regional expression of Besant, following Neuman (1975), characterized by elongated projectile points predominantly made from Knife River Flint. Joyes (1984) and Duke (1991) incorporate aspects of both models, noting that Besant does feature variability across the Plains that needs to be addressed, and propose three subphases (Sonota, Kenney, Wyoming) to address this variability witnessed in the archaeological record within the Besant Phase.

A fifth model is proposed, expanding upon Joyes (1984) and Duke's (1991) model of the Besant Phase, incorporating the findings from the point analysis and site data study. The archaeological evidence suggests that there were minimally three coeval subphases during the Besant Phase: the Sonota subphase, Kenney subphase, the Wyoming subphase, and a possible Montana subphase. Furthermore, the Sonota subphase includes the Fincastle Complex, which may represent an early manifestation of Sonota that becomes more broadly distributed across the Plains following 2000 B.P. Fincastle Complex includes archaeological sites at *c*. 2500 B.P., featuring elongated projectile points made from Knife River Flint and an absence of corner notched Pelican Lake projectile points. All of these subphases of the Besant Phase represent archaeological cultures that were oriented toward communal bison hunting. Peoples of the Sonota subphase interacted with Alberta's indigenous Kenney subphase. The Kenney subphase represents the transition from Pelican Lake after 2800 B.P. in Alberta, with disparate projectile point forms and raw materials.

In this model, it is hypothesized that the Sonota bison hunters came to the Northwestern Plains for hunting and trade with Kenney subphase peoples at c. 2800 to 2300 B.P., and again at 2000 to 1250 B.P., reflecting a shared way of life based upon bison hunting. Social organization is merely hinted at in the present study; although difficult to ascertain, the evidence suggests a long-standing relationship between these archaeological cultures. Fincastle represents the earliest known manifestation of Sonota hunters on the Northwestern Plains, likely coming from the Dakotas; later sites such as Muhlbach, Smith-Swainson, Fitzgerald, and Melhagen represent the same dynamic occurring a thousand years later.

The interpretive framework used in the present study relies upon a middle-level approach, analyzing patterns in basic site data to try to understand archaeological cultures during the late Middle Prehistoric Period. The high-level issue is trying to understand the Besant Phase's broad distribution, and the relationship between these archaeological entities. The Besant Phase represents a widespread, long-standing, and complex cultural manifestation on the Northern Plains.

Future Directions

The preliminary findings from the present study provide several avenues of investigation for future research. This analysis has focused on the better known and published archaeological data; there is a vast literature of unpublished site data in consulting that will yield further data for analysis to determine whether the model proposed in this study for the Besant Phase holds in the future in Alberta and throughout the Northwestern Plains. Additionally, the data from the present study offers a valuable resource suitable for further study; this thesis represents a preliminary investigation of the major trends evident in the study, and the data will be analyzed in greater detail in the future as part of the Fincastle site research. As well, an analysis of the Sonota projectile points described in Neuman's (1975) monograph would also yield valuable data in order to expand the present study to accompany the Fincastle investigations., and efforts are presently ongoing to access these collections.

The addition of projectile point data from Saskatchewan, Montana, and North and South Dakota would also provide a useful expansion of the present study. As well, integrating a pottery analysis to add a further line of evidence to this study would also provide an interesting angle, and link to the Northeastern Plains. Finally, an analysis of the Sonota projectile points in Neuman's (1975) monograph would also yield valuable findings.

Further discussion of theoretical frameworks used in deriving interpretations of archaeological cultures on the Northwestern Plains would be of great value, when analyzing archaeological sites and artifacts. Ultimately, it is a necessary task to assign cultural affiliation to archaeological sites, and revisit interpretations and revise them with additional data, or old data viewed in a new light. Social organization during the late Middle Prehistoric Period is an intriguing topic, and further efforts need to be made to try and visualize this on Alberta's Northwestern Plains; this study represents only a preliminary step in this direction. This research demonstrates that the Northwestern Plains has a long-standing connection with the Northeastern Plains during *c*. 2500 to 1250 B.P, as witnessed through through the Fincastle site and comparative site analysis during the late Middle Prehistoric Period. This work is a contribution in the attempt to understand the enigmatic Besant Phase and its dynamics on the Great Plains.

REFERENCES CITED

Andrefsky, Jr., William
1998 *Lithics: Macroscopic Approaches to Analysis*. Cambridge Manuals in Archaeology, edited by Graeme Barker. Cambridge University Press, Cambridge.

Beaty, Chester B.
1975 *The Landscapes of Southern Alberta: A Regional Geomorphology*. University of Lethbridge, Lethbridge, Alberta.

Binford, Lewis R.
1963 A Proposed Attribute List for the Description and Classification of Projectile Points. In *Miscellaneous Studies in Typology and Classification*, edited by Anta M. White, Lewis R. Binford, and Mark L. Papworth, pp. 193-221. Museum of Anthropology, The University of Michigan Anthropological Papers No. 19. The University of Michigan, Ann Arbor.

Bird, Junius
1939 Artifacts in Canadian River Terraces. *Science, New Series* 89(2311):340-341.

Bowman, Sheridan
1990 *Radiocarbon Dating: Interpreting the Past*. University of California Press/British Museum, Berkeley.

Bradbury, Andrew
1997 The Bow and Arrow in the Eastern Woodlands: Evidence for an Archaic Origin. *North American Archaeologist* 18(3):207-233.

Brink, Jack, and Bob Dawe
1989 *Final Report of the 1985 and 1986 Field Season at Head-Smashed-In Buffalo Jump, Alberta*. Archaeological Survey of Alberta Manuscript Series No. 16. Alberta Culture and Multiculturalism, Historical Resources Division, Edmonton.

Brink, Jack, Milt Wright, Bob Dawe, and Doug Glaum
1985 *Final Report of the 1983 Season at Head-Smashed-In Buffalo Jump, Alberta.* Archaeological Survey of Alberta Manuscript Series No. 1. Alberta Culture, Historical Resources Division, Edmonton.

1986 *Final Report of the 1984 Season at Head-Smashed-In Buffalo Jump, Alberta.* Archaeological Survey of Alberta Manuscript Series No. 9. Alberta Culture, Historical Resources Division, Edmonton.

Brumley, John H.
1990 Investigations at Herdegen's Birdtail Butte Site (24BL1152). *Archaeology in Montana*, 31(1):17-86.

Brumley, John H., and Barry J. Dau
1988 *Historical Resource Investigations Within the Forty Mile Coulee Reservoir*. Archaeological Survey of Alberta Manuscript Series 13. Alberta Environment and Alberta Culture and Multiculturalism, Edmonton.

Bullchild, Percy
1985 *The Sun Came Down: The History of the World as My Blackfoot Elders Told It*. Harper & Row, San Francisco.

Calder, James M.
1977 *The Majorville Cairn and Medicine Wheel Site, Alberta*. National Museum of Man Mercury Series No. 62. Archaeological Survey of Canada, Ottawa.

Christenson, Andrew L.
1986 Projectile Point Size and Projectile Aerodynamics: An Exploratory Study. *Plains Anthropologist* 31(112):102-128.

Clark, Frances
1984 Knife River Flint and Interregional Exchange. *Midcontinental Journal of Archaeology* 9(2):173.

Clarke, David
1973 Archaeology: The Loss of Innocence. *Antiquity* 47(185):6-18.

Clayton, Lee, W.B. Bickley, Jr., and W.J. Stone
1970 Knife River Flint. *Plains Anthropologist* 150(50, Pt.1):282-290.

Cloutier, Riel
2004 Testing Contemporaneity: The Avonlea and Besant Complexes on the Northern Plains. Unpublished M.A. thesis, Department of Archaeology, University of Saskatchewan, Saskatoon.

Davis, Leslie B., and Emmett Stallcop
1966 The Wahkpa Chu'gn Site (24HL101): Late Hunters in the Milk River Valley, Montana. Memoir 3. *Archaeology in Montana* 7:70.

Davis, Leslie B., and Charles D. Zeier
1978 Multi-Phase Late Period Bison Procurement at the Antonsen Site, Southwestern Manitoba. In *Bison Procurement and Utilization: A Symposium*, edited by Leslie B. Davis and Michael Wilson, pp. 222-235. Memoir 14. Plains Anthropologist 23(82,Pt. 2).

Dawe, Bob
1997 Tiny Arrowheads: Toys in the Toolkits. *Plains Anthropologist* 42(162):303-318.

2006 Personal Communication. June 2006.

Dibble, H.L.
1988 The Interpretation of Middle Palaeolithic Scraper Reduction Patterns. *Études et Recherches Archéologiques de L'universite de Liège* 31:49-58.

Duke, Philip G.
1991 *Points in Time: Structure and Event in a Late Northern Plains Hunting Society*. University Press of Colorado, Niwot, Colorado.

Dyck, Ian
1983 The Prehistory of Southern Saskatchewan. In *Tracking Ancient Hunters: Prehistoric Archaeology in Saskatchewan*, edited by Henry T. Epp and Ian Dyck, pp. 63- 139. Saskatchewan Archaeological Society, Regina.

Dyck, Ian, and Richard E. Morlan
1995 *The Sjovold Site: A River Crossing Campsite in the Northern Plains. Archaeological Survey of Canada Mercury Series No. 151*. Canadian Museum of Civilization, Hull, Quebec.

Eyles, N., J.I. Boyce, and R.W. Barendregt
1998 Hummocky Moraine: Sedimentary Record of Stagnant Laurentide Ice Sheet Lobes Resting on Soft Beds. *Sedimentary Geology* 123:163-174.

Finnigan, J.T., and Elden Johnson
1984 The Elma Thompson Site: A Besant Phase Tipi Ring in the West-Central Saskatchewan Plains. *Saskatchewan Archaeology* 5: 27-35.

Foor, Thomas Allyn
1985 Archaeological Classification in the Northwestern Plains Region. *Plains Anthropologist* 30(108):123-135

Forbis, Richard G.
1962 The Old Women's Buffalo Jump. *National Museum of Canada Bulletin* No. 180, Contributions to Anthropology 1960, Part I. Department of Northern Affairs and National Resources, Ottawa.

Forner, Cheryl Irene
2005 A Model for the Examination of Gender within Domestic Spaces on the Northern Plains. Unpublished M.A. thesis, Department of Archaeology, University of Saskatchewan, Saskatoon.

Frison, George C.
1971 The Buffalo Pound in Northwestern Plains Prehistory: Site 48CA302, Wyoming. *American Antiquity* 36(1):77-95.

1978 *Prehistoric Hunters of the High Plains*. Academic Press, New York.

Gregg, Michael L.
1987 Knife River Flint in the Northeastern Plains. *Plains Anthropologist* 32(118):367-377.

1990 An Early Plains Woodland Structure in the Northeastern Plains. *Plains Anthropologist* 35(127:29-44

1994 Archaeological Complexes of the Northern Plains and Prairie-Woodland Border. In *Plains Indians, A.D. 500-1500: The Archaeological Past of Historic Groups*, edited by Karl H. Schlesier, pp. 71-95. University of Oklahoma Press, Norman.

Gregg, Michael L., and Paul R. Picha
1989 Early Plains Woodland and Middle Plains Woodland Occupation of the James River Region in Southeastern North Dakota. *Midcontinental Journal of Archaeology* 14(1):38-61.

Gruhn, Ruth
1969 Preliminary Report on the Muhlbach Site: A Besant Bison Trap in Central Alberta. Paper No. 4. *National Museums of Canada Bulletin* No. 232, Contributions to Anthropology VII: Archaeology, pp. 128-156. Ottawa.

Haberman, Thomas W., and Marion Travis
1995 Radiocarbon Dates for the Stelzer Site, 39DW242, Dewey County, South Dakota, *Plains Anthropologist* 40(151):73-76.

Harris, Stuart A.
1985 Evidence for the Nature of the Early Holocene Climate and Paleogeography, High Plains, Alberta, Canada. *Arctic and Alpine Research* 17(1):49-67.

Head, Thomas, Brent Murphy, and Thayer Smith
2000 *Final Report Historical Resources Impact Mitigation EgPn-111, ASA Permit No. 98-024*. Bison Historical Services. Submitted to the Heritage Resource Management Branch, Alberta Community Development, Permit No. 98-024.

2002 *Final Report Historical Resources Impact Mitigation, EgPn-111, ASA Permit No. 2000-097 (Incorporating Work from ASA Permit 1998-024)*. Bison Historical Services. Submitted to the Heritage Resource Management Branch, Alberta Community Development.

Hjermstad, Benjamin Edward
1996 The Fitzgerald Site: A Besant Pound and Processing Area on the Northern Plains. Unpublished M.A. thesis, Department of Anthropology and Archaeology, University of Saskatchewan, Saskatoon.

Hughes, Susan S.
1981 Projectile Point Variability: A Study of Point Curation at a Besant Kill Site Southcentral Wyoming. Unpublished M.A. thesis, Department of Anthropology, University of Wyoming, Laramie.

1991 Division of Labour at a Besant Hunting Camp in Eastern Montana. In *Approaches to Gender Processes on the Great Plains*, edited by Marcel Korneld, pp. 25-48. Memoir 26. Plains Anthropologist 36(134).

Johnson, Ann M.
1970 Montana Projectile Point Types: Besant. *Archaeology in Montana* 11(4):55-70.

1977 Woodland and Besant in the Northern Plains: A Perspective. *Archaeology in Montana* 18(1):27-41.

Johnson, Ann Mary, and Alfred E. Johnson
1998 The Plains Woodland. In *Archaeology on the Great Plains*, edited by W. Raymond Wood, pp. 201-234. University Press of Kansas, Lawrence.

Johnson, Eldon A.
1980 Some Experiments on the Thermal Alteration of Chalcedony. *Saskatchewan Archaeology* 1(2):82-88.

1983 EdOh-23: A Besant Site in the Great Sand Hills. *Saskatchewan Archaeology* 4: 41-44.

Joyes, Dennis C.
1984 Review of *Culture Change in the Northern Plains: 1000 B.C.-A.D. 1000*, by Brian O.K. Reeves. *Plains Anthropologist* 29(104):167-170.

Kehoe, Thomas F.
1974 The Large Corner-Notched Point System of the Northern Plains and Adjacent Woodlands. In *Aspects of Upper Great Lakes Anthropology: Papers in Honor of Lloyd A. Wilford*, edited by Elden Johnson, pp. 103-114. Minnesota Historical Society, St. Paul Minnesota.

Kooyman, Brian P.
2000 *Understanding Stone Tools and Archaeological Sites*. University of Calgary Press and University of New Mexico Press, Calgary and Albuquerque.

2005 Personal Communication. September 2005.

Landals, Alison
2006a Site EbPi 63: The Snow Dog Site. Manuscript on file, FMA Heritage Resources Consultants, Calgary Alberta.

2006b Personal Communication, April 2006.

Landals, A., B. Kulle, and D. Cockle
2004 *The Miniota Site: An Avonlea Component in Southwestern Manitoba.* Occasional Papers of the Archaeological Society of Alberta No. 3. Archaeological Society of Alberta, Calgary.

Lieff, Sam
2006 Applications of Geographic Information Science in the Archaeological Research of the Fincastle Kill Site (DlOx-5) Alberta, Canada, and Tel Beth-Shemesh, Israel. Unpublished M.Sc. thesis, Department of Geography, University of Lethbridge, Lethbridge, Alberta.

McClintock, Walter
1968 *The Old North Trail: Life, Legends and Religion of the Blackfeet Indians*. Bison Book, University of Nebraska Press, Lincoln and London.

Miller, E.M., B.R. Waitkus, and D.G. Eckles
1987 A Woodland-Besant Occurrence in Central Wyoming. *Plains Anthropologist* 32(111):420-423.

Morlan, Richard E.
1988 Avonlea and Radiocarbon Dating. In *Avonlea Yesterday and Today: Archaeology and Prehistory*, edited by Leslie B. Davis, pp. 291-309. Saskatchewan Archaeological Society, Saskatoon.

2006 Canadian Archaeological Radiocarbon Database (CARD). Electronic document, http://www.canadianarchaeology.ca/, accessed August 2006.

Mulloy, William
1958 A Preliminary Historical Outline for the Northwestern Plains. *University of Wyoming Publications* 22(1). Laramie, Wyoming.

Neal, Barbara S.
2006 Precontact Utilization of Sandhill Environments During the Pelican Lake and Besant Phases. Unpublished M.A. thesis, Department of Archaeology, University of Saskatchewan, Saskatoon.

Neuman Robert W.
1975 *The Sonota Complex and Associated Sites on the Northern Great Plains*. Publications in Anthropology 6. Nebraska State Historical Society, Lincoln, Nebraska.

Odell, George H.
1988 Addressing Prehistoric Hunting Practices Through Stone Tool Analysis. *American Anthropologist* 90:335-356.

Paulson, Lloyd
1980 The Richards Site: A Sonota Site in Southcentral Manitoba. *Archae-Facts* 7(3/4):1-39.

Peck, Trevor R.
2004 *Bison Ethology and Native Settlement Patterns during the Old Women's Phase on the Northwestern Plains*. BAR International Series 1278. Archaeopress, Oxford.

Quigg, J. Michael
1983 Social Structures at the Ross Glen Tipi Ring Site. In *From Microcosm to Macrocosm: Advances in Tipi Ring Investigations and Interpretations*, pp. xx-xx. Memoir 19. Plains Anthropologist xx.

1986 *Ross Glen: A Besant Circle Site in Southeastern Alberta*. Archaeological Survey of Alberta Manuscript Series No. 10. Alberta Culture, Historical Resources Division, Edmonton.

Ramsey, Allyson M.
1991 The Melhagen Site: A Besant Bison Kill in South Central Saskatchewan. Unpublished M.A. thesis, Department of Anthropology and Archaeology, University of Saskatchewan, Saskatoon.

Reeves, Brian O.K.
1966 Personal Communication to Leslie B. Davis and Emmett Stallcop, March 1966.

1970 Projectile Points: Working Papers in the Metric and Nonmetric Description and Classification of Chipped Stone Tools. Manuscript on file, University of Calgary.

1983a *Culture Change in the Northern Plains: 1000 B.C. – A.D. 1000*. Archaeological Survey of Alberta Occasional Paper No. 20. Alberta Culture, Historical Resources Division, Edmonton.

1983b The Kenney Site: A Stratified Campsite in Southwestern Alberta. *Archaeology in Montana* 24(1):1-135.

1990 Head-Smashed-In: 5500 Years of Bison Jumping in the Alberta Plains. Reprinted. J & L Reprint Company, Lincoln. Originally published 1978, in *Bison Procurement and Utilization: A Symposium*, pp. 115-x. Memoir 14. Plains Anthropologist 23 (82, Part 2).

2006 Personal Communication. June 2006.

Scribe, Brian
1996 Pinew Wachi, Wapiti Sakihtaw and Wawaskesiw Mitaskun: Plains Woodland (Pottery Bearing) Sites in South-Central Manitoba. *Manitoba Archaeological Journal 6(2):82-95.*

1997 Nistam Ka-ke Askihkokechik Puskwaw-askihk: An Assessment of Besant-Sonota Pottery on the Canadian Plains. Unpublished M.A. thesis, Department of Anthropology and Archaeology, University of Saskatchewan, Saskatoon.

Shortt, Mack W.
1993 The Happy Valley Bison Kill. Unpublished M.A. thesis, Department of Archaeology, University of Calgary, Calgary.

Shott, Michael J.
1997 Stones and Shafts Redux: The Metric Discrimination of Chipped-Stone Dart and Arrow Points. *American Antiquity* 62(1):86-101.

Steward, Julian
1955 *Theory of Culture Change: The Methodology of Multilinear Evolution*. University of Illinois Press, Chicago.

Syms, E. Leigh
1977 *Cultural Ecology and Ecological Dynamics of the Ceramic Period in Southwestern Manitoba*. Memoir 12. Plains Anthropologist 22(76, Part 2).

Thomas, David Hurst
1978 Arrowheads and Atlatl Darts: How the Stones Got the Shaft. *American Antiquity* 43(3):461-472.

Trigger, Bruce G.
1997 *A History of Archaeological Thought*. Reprinted. Originally published 1989, Cambridge University Press, Cambridge.

Van Dyke, Stanley, and Thomas Head
1983 Excavations at the Bow Bottom Site (EfPm-104). In *From Microcosm to Macrocosm: Advances in Tipi Ring Investigation and Interpretation*, edited by Leslie B. Davis, pp. 223-234. Memoir 19. Plains Anthropologist 28.

Varsakis, Rena, and Trevor R. Peck
2005 Pelican Lakes and Sandy Creeks: The Late Middle Prehistoric Period on the Alberta Plains. Paper presented at the 63rd Annual Meeting of the Plains Anthropological Society, Edmonton.

Vickers, J. Roderick
1986 *Alberta Plains Prehistory: A Review*. Archaeological Survey of Alberta Occasional Paper No. 27. Alberta Culture, Historical Resources Division, Edmonton.

Walde, Dale
2006 Sedentism and Pre-contact Tribal Organization on the Northern Plains: Colonial Imposition or Indigenous Development? *World Archaeology* 38(2):291-310.

Wettlaufer, Boyd N.
1955 *The Mortlach Site in the Besant Valley of Central Saskatchewan*. Anthropological Series No. 1. The Saskatchewan Golden Jubilee Committee, Department of Natural Resources, Regina.

Wettlaufer, Boyd N., and William J. Mayer Oakes (editor)
1960 *The Long Creek Site*. Anthropological Series No. 2. Saskatchewan Museum of Natural History, Saskatoon.

White, Leslie
1949 *The Science of Culture: A Study of Man and Civilisation*. Farar, Stroux and Giroux, New York.

Willey, Gordon R., and Philip Phillips
1965 *Method and Theory in American Archaeology*. Reprinted. Originally published 1958, The University of Chicago Press, Chicago and London, and The University of Toronto Press, Toronto.

Wormington, H.M., and Richard G. Forbis
1965 *An Introduction to the Archaeology of Alberta, Canada*. Denver Museum of Natural History Proceedings 11. Denver Museum of Natural History, Denver.

Zeier, Charles D.
1983 Besant Projectile Points from the Antonsen Site (24GA660), Gallatin County, Montana: Within-Sample Variance. *Archaeology in Montana* 24(2):1-57.