The Analysis of the Sherwin Campbell Site (EgOa-5): An Old Women's Phase Site of Southwest Saskatchewan

A Thesis

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Abstract

The Sherwin Campbell site (EgOa-5) is a partially disturbed habitation/processing site located 8.75km south of the town of Elrose, Saskatchewan. The site contains evidence of a single occupation within the time span of the Old Woman's Phase. In 1989, members of the Department of Anthropology and Archaeology from the University of Saskatchewan conducted extensive surface collections of this disturbed site. In total they collected 10,530 square meters, and retrieved 18,796 artifacts. Brief excavations of the site were also conducted during the summer of 2001. During this time period 29 test pits and one square meter were excavated, resulting in the discovery of 6,228 artifacts. In 2002, a detailed analysis of the lithic, faunal, and ceramic artifacts of this site provided a wealth of new archaeological information on this Old Woman's Phase site. Information including the use of the site during the months of May to late June, the reliance on bison within their subsistence economy, and evidence for different activity areas within the collected area such as marrow and grease rendering even though the site was disturbed. This report presents these results in greater detail.

Acknowledgements

Several individuals need to be mentioned for their efforts in helping me complete this project. First and foremost, I would like to thank my advisors Dr. David Meyer and Dr. Ernest Walker. The advice and help they gave which allowed me to meet my research objectives was invaluable. I would also like to thank the other individuals of my committee, Dr. Margaret Hanna, and Dr. Margaret Kennedy.

I would also like to thank several of my fellow graduate student colleagues that helped profusely with different aspects of my research. In particular, I would like to thank Riel Cloutier, Wade Dargin, Debi Farrow, Miggs Greene, Jen Harty, Steve Kaastan, Jace Moon, Barb Neal, Sean Webster, and Patrick Young. Your patience and advice as I hammered out ideas for this project is greatly appreciated.

In order to create this culture history several different individuals played roles in locating and identifying these sites. Some of the people involved in this endeavor were Leslie Amundson, Thomas Kehoe, Bradley Novecosky, Todd Paquin, Stanley Saylor, and Gilbert Watson. I would also like to thank Leslie Amundson and Kristen Enns Kavanaugh for their support, help, and patience as this project was completed.

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This thesis is dedicated to my parents Wayne and Linda Whatley who have been there with me from the start.

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Chapter 1. Introduction to the Sherwin Campbell Site

1.1 Introduction

In 1988 the Saskatchewan Power Corporation (SPC) proposed the construction of an underground powerline that extended through a portion of the Missouri Coteau, located 8km south of Elrose, Saskatchewan (Figure 1.1). In accordance with the Heritage Property Act, Stanley Saylor of the SPC conducted a Heritage Impact Assessment of the area that would be directly affected by this development. During the reconnaissance of this area, an archaeological resource was identified which would become known as the Sherwin Campbell site (EgOa-5) (Figure 1.1). At that time, the portion of the site that extended east of the proposed development was under agricultural use and as such was already disturbed. However, it was also made clear that the area west of the powerline was still intact and that this area was just being prepared for agricultural use. In order to get a better picture of the prehistoric nature of this site, a surface survey and four test units were excavated. Materials collected from the surface included thousands of fragments of bison bone, 500 or more pieces of debitage composed of multiple kinds of lithic material, and hundreds of pieces of fire-cracked rock (FCR). During the excavations of the four test holes, all of which were placed east of the powerline within the cultivated area, more bone, FCR, and debitage were recovered. According to Saylor's field notes, artifacts within the first 12cm of the excavations were found in a cultivated

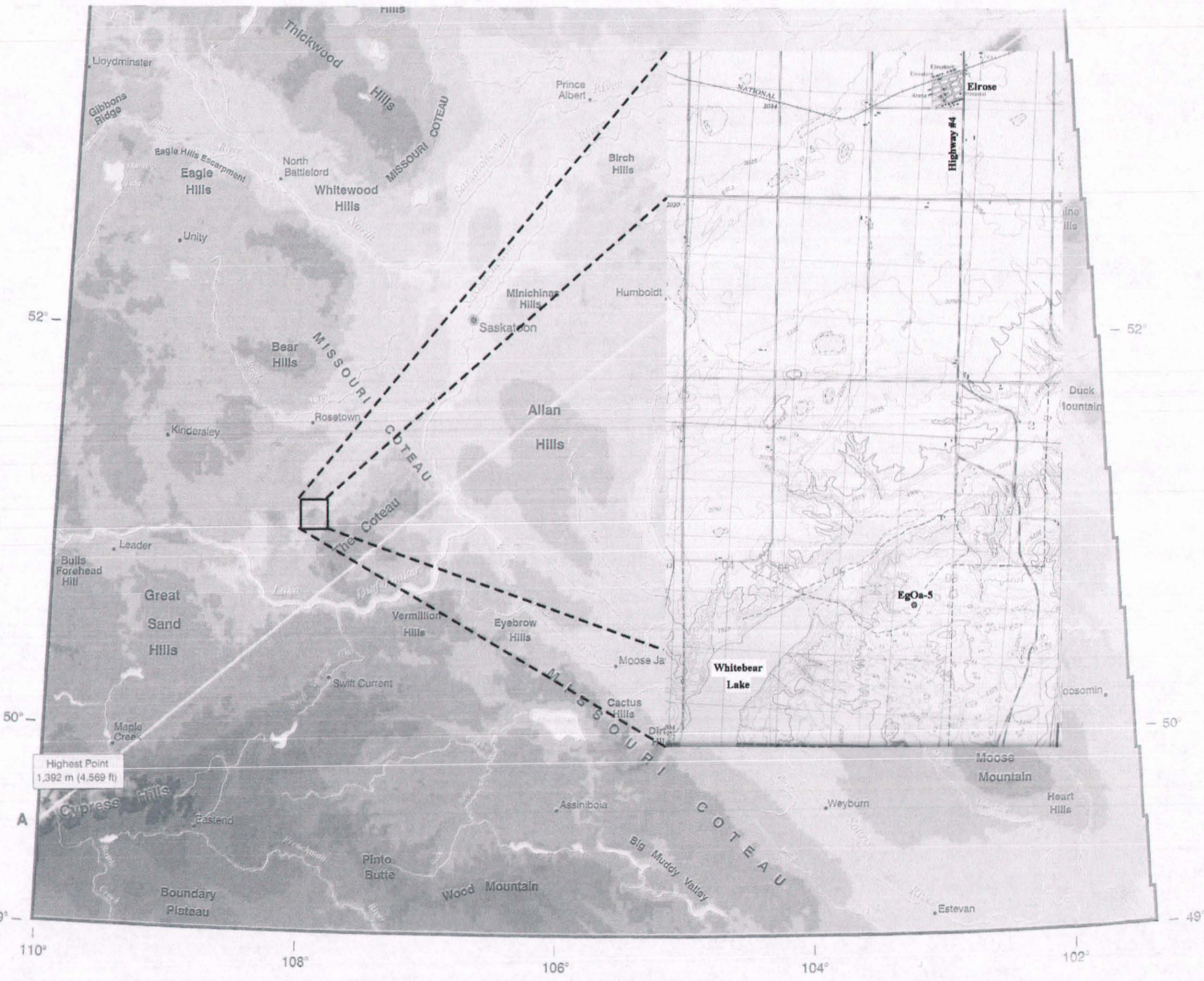

Figure 2.1 Location of the Sherwin Campbell site (EgOa-5); (Image courtesy of the Atlas of Saskatchewan Project - CD-ROM Edition. © University of Saskatchewan 2000).

context, however, the lower 5cm of the occupation were found to be undisturbed. During these excavations one biface and one cord marked potsherd were found and collected (SARR, 1988).

In the spring of 1989 the landowner, Tim Sherwin, proceeded to break the rest of the land west of the powerline construction. When artifacts began turning up, he contacted a local resident, Phyllis Lodoen, then an archaeology student at the University of Saskatchewan. With the help of professors and students from the Department of Anthropology and Archaeology an extensive, meticulous surface collection of the site took place in the fall of that year. In total 10,530 square meters were examined utilizing a five-meter grid system. In 2001, further work was done at the site by the author. During the month of July 2001, 29 test holes and a single square meter unit were excavated on pastureland just south of the area that had been collected. The excavation unit was situated approximately 50 meters south of the field from which cultural materials were collected in 1989.

1.2 Thesis Approach

The information that was gathered from the collected and excavated areas was then used to meet the objectives of this thesis. These included:

1) To provide a complete faunal, lithic, and pottery analysis of an Old Women's Phase (OWP) site.
2) To interpret the subsistence patterns, age, and time of occupational use of the site.

3) To identify activity areas by analyzing the distribution patterns of artifacts collected from the field surface.

4) To contribute information about the Old Woman's Phase.

1.3 Thesis Organization

Chapter two contains information about the surrounding physical environment of the Sherwin Campbell site. This includes information on the physiography, geology, soils, climate, hydrology, flora, and fauna of the site region. Also included in this chapter is a culture history of the Missouri Coteau, and background information about the Old Women's Phase.

Chapter three details information on the methodology used in the 1989 surface collection and the summer 2001 excavations. It describes the laboratory treatment and cataloging methods used for the different artifact categories and the qualitative and quantitative analysis used for the faunal, lithic, and pottery artifacts.

Chapter four provides a detailed analysis of the lithic assemblage with particular attention paid to the different tools found during the collection and excavation.

Chapter five presents the results of the analysis of the faunal materials. This includes information about the seasonality of the site and certain pathologies found on faunal elements. It provides statistical calculations such as NISP, MNI, MNE, MAU, and %MAU.

Chapter six presents the results of the ceramic analysis, especially the information gathered during the analysis of the rim sherds.

Chapter seven discusses the spatial relationships these different artifacts have to one another based on density contour maps. Based on these spatial relationships various activities that occurred at this site will be addressed.

Chapter eight compares the archaeological assemblage of the Sherwin Campbell site to other Old Women's Phase sites found within Saskatchewan.

The final chapter of this thesis presents results of the analysis and the conclusions drawn from them.

Chapter 2. Environmental and Culture History Overview

2.1 Introduction

The Sherwin Campbell site is located 8.75km south of the town of Elrose, Saskatchewan, within the Missouri Coteau (Figure 2.1). This area is located within the Mixed Grassland Ecoregion (Padbury and Acton 1999:160; Acton et al. 1998:157) (Figure 2.2). This ecoregion is a vast area that extends south from central Saskatchewan as far as the Gulf of Mexico. In Saskatchewan alone, it occupies approximately 13% of the province or about 8.6 million hectares (Acton et al. 1998:157). Within this area of Saskatchewan there are "...diverse landscapes [which] include level glacial lake plains; dune-covered, sandhill areas; the hilly, pothole country along the Missouri Coteau; and the rolling expanses of native grassland and intermittent badlands near the United States border" (Padbury and Acton 1999:162). More specifically, the Sherwin Campbell site is found in the landscape area known as the Beechy Hills. The western part of this landscape, is composed of "...steeply to very steeply sloping hummocky moraine..." (Acton et al. 1998:167) which form a portion of the Missouri Coteau.

2.2 The Missouri Coteau

The Missouri Coteau is a unique land form located in central and southeastern Saskatchewan extending south through North Dakota to South Dakota. In Saskatchewan it extends in a diagonal belt that in the northwes

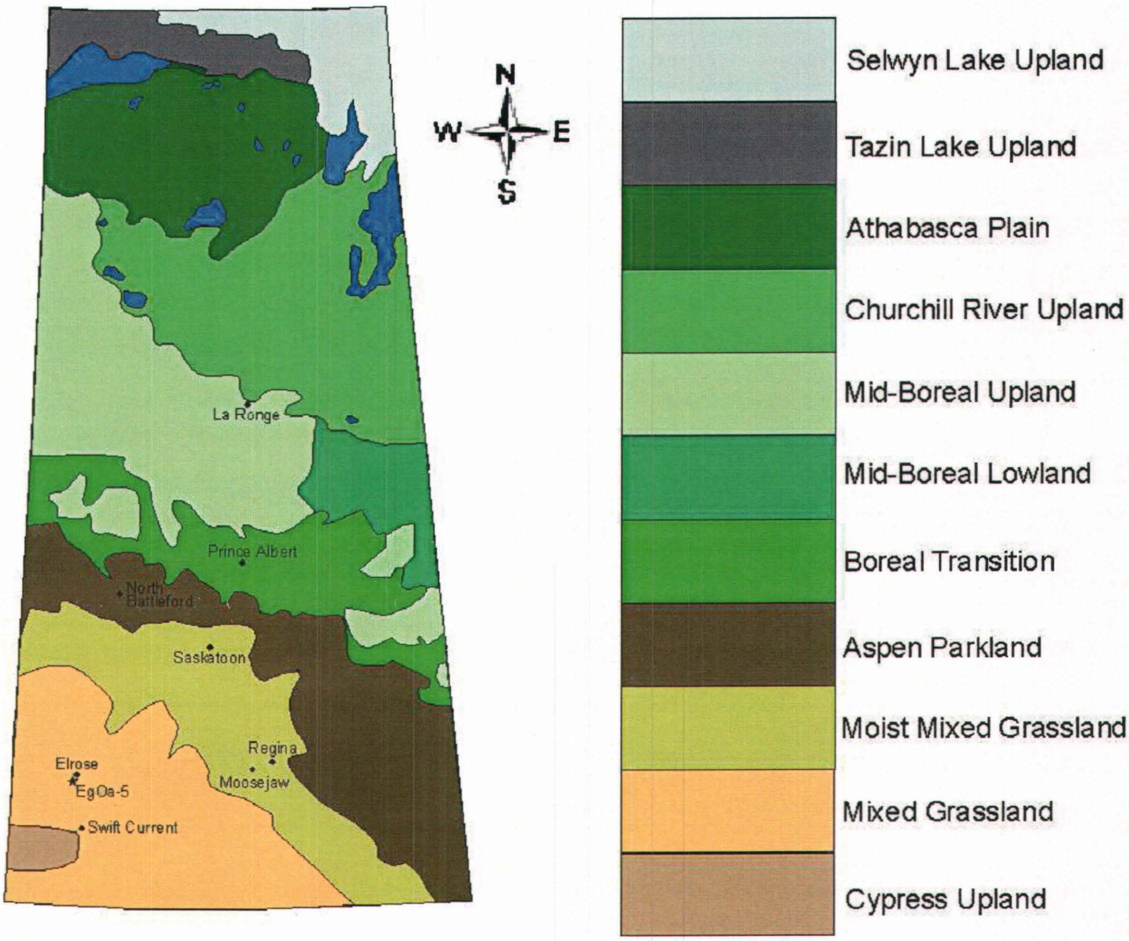

Figure 2.1 Ecoregions of Saskatchewan (Note location of EgOa-5).

includes the Mostoos and Thickwood Hills, then extends southeast to include the Vermilion, Cactus, and Dirt Hills (Enviroment Canada 2004; Richards and Fung 1969:42-43). This region of Saskatchewan, which covers some 23,000 square kilometers and reaches elevations of 609.6m (2000ft), "...represents hummocky moraine formed by deposition and ice-thrusting action along a pre-existing fault line escarpment during the Quaternary" (Martz and de Boer 1999:94). In the situation of ice-thrusting, a glacier, upon encountering a pre-existing highland, would develop shear planes within the ice. As the glacier exerted pressure on these highlands, blocks of earth would be dislodged and carried to the top of the glacier along these shear planes. Once the glacier receded, these blocks of earth would be laid down, forming ice thrust ridges which eventually were covered by layers of till (Rowe 1983:32).

2.3 Geology and Soils of the Region

"Soils are formed by the combined effects of the natural factors of climate, vegetation, parent (geological) materials, topography, drainage, and time" (Moss and Clayton 1999:129). The soils of the Sherwin Campbell site are located above the Judith River Formation. This Mesozoic age formation is composed of interbedded sand, silt, and clay-shale, and commonly includes carbonaceous concretions but lacks calcareous concretions (Whitaker et al. 1972). The soils located above this formation belong to the Haverhill Association. This association is mainly composed of medium-textured soils developed on undifferentiated boulder clay deposited by glacial action. One fact about the soils of this association is that more than half of them are in the rolling, hilly topography of the Missouri Coteau, Cypress Hills, and Wood Mountain regions (Mitchell et al. 1944:54). For the site in question, the soils are characterized as being a clay-loam brown chernozem (Richards and Fung 1969:70-71)

2.4 Climate of the Region

The Koppen Geiger system defines different climates by assigning values of precipitation and temperature taken on an annual or monthly basis to various areas of the world. To make the system more usable, a shorthand code of letters is employed which divides the world into major climatic groups, then further divides these into subgroups (Strahler and Strahler 1992:155). As a result, the climate for the mixed grasslands is given the designation of Dfb. This means it experiences a microthermal (D) snowy–forest climate with warm summer months (b) and cold moist winters (f) (Strahler and Strahler 1992:159).

According to Acton et al. (1998:158) the total annual precipitation for the mixed grassland region is around 352mm. The annual snowfall for the area is 101cm. The mean July temperature is about 18.9°C, and the mean January temperature is –12.6°C. The winds for the area, as averaged from 1961-1990, range between 16-18km/h from June to February and come from a general northwesterly direction. From March to May, however, the average wind speed increases to 18-20km/h and blows from a south by southeasterly direction (Padbury and Acton 1999:115).

Using several forms of data such as tree-ring records, geomorphology and the sedimentary record, climates for the past have been worked out for the Canadian plains going back for several centuries. When the Sherwin Campbell site was occupied, this region was experiencing a period of increased moisture with a cool climate, much like that of today (Beaudoin 2003:26-27; Wendland 1978:281).

2.5 Hydrology of the Region

There are two potential sources of water in the site vicinity. The first is located approximately 200m (656.2ft) southeast of the site and is a small slough-like pond. The second is located 200m (652.6ft) to the west and is a small coulee that periodically carries runoff that discharges into Whitebear Lake. During the time spent at the site, neither water source held any water, indicating they contain water only on an intermittent basis. The only water source that would have had the potential to contain water year round is Whitebear Lake, located about 2km (1.2miles) west by southwest of the site. However, this lake contains only alkaline water so it would not have been potable.

2.6 Floral Communities of the Region

In pre-European settlement times the vast majority of the region supported a mixture of mid-sized grasses and short grasses. The most important grass species that occupied the loamy textured morrainic uplands were (and are) the western porcupine grass and the northern wheat grass. The dry hilltops would have been covered with needle and thread grass and blue grama grass. On lower north facing slopes, rough fescue grass would be found although not as a dominant grass of the region (Smoliak, Ditterline, Scheetz, Holzworth, Sims, Wiesner, Baldridge, and Tibke 1990; Thorpe 1999:136-137).

As soils change from a loamy to a sandy texture the grass species that can be supported change as well. For example, in areas with sandy soils needle and thread grass replaces blue grama grass as being the most dominant grass species. Other species of grass that are present on these sandier soils include the sand reed grass, northern and western wheat grass, sand dropseed, and Indian rice grass. Other grass species that would be found in this area include the green needle grass, June grass, and Plains reed grass. Underlying these many grass species, clubmoss would be found forming a mat-like ground cover (Thorpe 1999:136-137).

Sedges are plants with a grass-like appearance that grow in wetter areas and include species such as low sedge, sun-loving sedge, and thread-leaved sedge (Thorpe 1999:136-137).

Broad-leaved plants or forbs are commonly found in association with sandier soils or on steep slopes with accelerated erosion. These plant species include pasture sage, moss phlox, scarlet mallow, small-leafed everlasting, prairie crocus, winter fat, hairy golden-asta, lance-leafed psoralea, broomwood, rubberweed, and the grass-like prairie muhly. Herbs comprise a very small number of these forbs. These are composed of two brightly flowering plants, the golden bean and milkvetches. Another plant that is often found with these forbs, as it too likes sandier areas or eroded hill slopes, is the prickly-pear cactus (Thorpe 1999:136-137).

A number of shrub species are also found in the area; for example, creeping juniper, chokecherry, saskatoon berry, hawthorn, Wood's rose, western snowberry, and buffalo berry (Budd 1987). Some small thickets of aspen poplar, river birch, cottonwood, Manitoba maple, green ash, and wolf willow are present in lower areas where there was a more ample supply of moisture (Budd 1987; Thorpe 1999).

Of these vegetative species some of the more important food resources available to native peoples would have included a variety of edible berries, as well as water parsnip, bulrushes, prairie turnip, and cattail. The roots and young stems of the water parsnips were consumed; for the bulrushes young shoots, the inner stem, and the leaf bases were exploited, and for the cattail young rhizomes, shoots, and the inner stem were consumed, or in the case of mature rhizomes ground into a flour. Of these, though, the most important was the prairie turnip. This plant had its root either eaten raw or dried for the use in soups (Kaye and Moodie 1978; Marles et al. 2000; Reese 1999).

Plants did not just serve the native people as a source of food, they also played an important role in their medicine, tools, and ceremonies. For example, saskatoon and chokecherry sticks were used to make bows. Scarlet mallow was chewed and applied to wounds as a salve. The bark of red-osier dogwood was boiled to make a medicinal tea. Indian hemp root was boiled to create a laxative and its fibers were used to make cords. Red-osier dogwood and bearberry were used with tobacco to form a mixture for smoking called kinnikinnick. Finally, sweet grass was burned during ceremonies (Epp 1991:36-37).

2.7 Pre-Agricultural Fauna of the Region

The faunal communities of the site region contain several different species. However, due to historical ecological change, particularly with the arrival of agriculture, these faunal communities have changed as species were either exterminated or extirpated.

Historically, the large herbivorous mammals that had ranges extending into the area in question were the Bison, Elk (Wapiti), Moose, Mule Deer, and Pronghorn. Smaller herbivorous mammals which had and continue to have ranges in the study area include the White Tailed Jackrabbit, Snowshoe Hare, and Nuttall's Cottontail (Wapple 1999:139-141).

The larger carnivorous mammals that had ranges in this area in pre-settlement times were the Mountain Lion (Cougar), Grizzly Bear, Black Bear, Coyote, and the Wolf. Smaller carnivorous mammals were the Bobcat, Red Fox, Wolverine, Badger, Striped Skunk, River Otter, Least Weasel, Long-tailed Weasel, Mink, and Raccoon (Wapple 1999:139-141).

A variety of rodents that occupied this area in precontact times include the Porcupine, Richardson's Ground Squirrel, Thirteen-lined Ground Squirrel, Franklin's Ground Squirrel, Least Chipmunk, Northern Pocket Gopher, and Muskrat. Various voles, mice, and shrews were also part of the fauna (Wapple 1999:139-141). For a more complete list of the different species of animals that had or continue to have home ranges in this area see Appendix A.

Many species of birds that had home ranges within, or regularly migrated through the area of study included several varieties of wading birds and waterfowl that occupied the sloughs and ponds in the surrounding area. Within the coulees and valley areas where shrubs and small stands of trees grow, several species of songbirds, raptors, and game birds would have been present. Even through the cold months of winter a variety of birds continued to live in the area (Smith 1999:145-149). For a more complete list of the different species of birds that have home ranges or migration routes through this area see Appendix A.

Within the region around the Sherwin Campbell site there are six species of amphibians and one species of reptile and presumably these were also present in precontact times. The amphibians are the Boreal Chorus Frog, Northern Leopard Frog, Wood Frog, Canadian Toad, Plains Spadefoot Toad, and the Tiger Salamander. The only species of reptile that exists in this area is the Plains Garter Snake (Didiuk 1999:143).

In regional water sources like the South Saskatchewan River, there are several different types of fish. In modern times there are 36 species of fish with ranges in the area of study (Merkowsky 1999:154). The most common fish species, excluding those that have been introduced, are the Walleye, Northern Pike, Yellow Perch, and Burbot. Other fish species in the South Saskatchewan River include the Goldeye, Lake Sturgeon, and Sauger (Scott and Crossman 1973:82, 327, 356, 641, 755, 762, and 767, Merkowsky 1999:154).

Of these different species of animals, the ones that played important roles in the subsistence economies of precontact aboriginal peoples would have included first and foremost Bison. Other animals like Deer, Pronghorn, Elk, Wolf, and a variety of rabbit species would have also been exploited. Furthermore, game birds and waterfowl would also have played a role in the subsistence of aboriginal residents (Dyck and Morlan 1995:248; Fagan 1991:123; Frison 1991:334-335; Morgan 1979:97).

2.8 Culture History Overview

It is important not only to provide the background physiographic information for the Coteau, but also to include a culture historical chronology for the four Borden blocks surrounding the Sherwin Campbell site. The following discussion is based on data from the provincial site inventory database. Although equally important to the history of the Missouri Coteau, discussion of the historical sites will not be included here.

The earliest archaeological expression found in the region of the Coteau around the Sherwin Campbell site is the Cody complex. This complex is known to date to 8800 – 8400 years BP (before present) in the northern plains (Walker 1999:25). Two different types of stemmed lanceolate spear points, the Scottsbluff and Eden points, characterize this complex. Another unique tool of this complex is the Cody knife which is a stemmed knife with a triangular shape (Wormington 1957; Dyck 1983:79-82; Meyer and Walker 1999:20).

The Late Paleo-Indian Lanceolate complex and the many forms of side-notched projectile points associated with the Mummy Cave complex are absent within this chronology, probably because they simply were not recognized and were instead labeled as either Besant or Hanna points (Dyck 1983:92; David Meyer 2004, personal communication). A succeeding cultural complex in this sequence is the Oxbow complex. It is characterized by a very distinctive dart point that is side-notched with a basal concavity, giving the base of this point an 'eared' shape (Dyck 1983:96-100; Mulloy 1954; Walker 1999:25).

Directly following the Oxbow complex within this cultural chronology is the McKean Series (Dyck 1983:100-105). Existing on the Northern Plains from ca. 4100 to 3100BP, it is characterized by three styles of dart point tips. The earliest within the series is the McKean point. This lanceolate dart point lacks any form of notching, but has a concave base. The next point style, Duncan, is stemmed with a concave base. The final point within this series is named Hanna. This mid-sized dart point is side-notched, and has a tanged shoulder shape, and a flared 'eared' basal shape (Walker 1999:26).

A later Middle Period complex represented within this sequence is named Pelican Lake. Corner-notched dart points characterize it; however, smaller versions of the dart tip have been found suggesting the use of bow and arrow technology. This complex dates from ca. 3300 to 1850 years BP (Dyck 1983: 105-107; Walker 1999:26).

Moving to the Late Precontact Period, the first complex that has been recognized is Besant. This complex has a diagnostic side-notched dart point which usually has a straight base, but convex and concave basal shapes also occur (Dyck and Morlan 1995:243). Like the Pelican Lake complex, a smaller version of the dart point, which is arrowhead-sized, has also been noted within this complex. This smaller point is known as the Samantha point (Kehoe 1974:103-114). This complex is also the first on the prairies to exhibit ceramics.

These vessels are typically conoidal in shape with an exterior surface finish that is either cord-roughened or smooth. This complex is dated between 2600-1650 BP (Dyck and Morlan 2001:123-124).

The Besant complex was followed by the Avonlea Horizon (Walde and Meyer 2003:139). The diagnostic points of the Avonleas Horizon are finely crafted, thin, and side-notched, and have concave bases (Walker 1999:26; Dyck 1983:122-125). Alongside these projectile points are several different pottery wares such as Rock Lake Net/Fabric Impressed, Truman Parallel-Grooved Ware, and Ethridge Ware (Walde and Meyer 2003:139-142). Vessels with a simple conoidal profile and a net or fabric-impressed exterior surface finish characterize the first of these wares. Decorations on these vessels include punctates, bosses, finger pinching, and tool impressions. Truman Parallel-Grooved is also characterized by vessels with a simple profile but with a surface finish composed of parallel groves. In this ware decoration is uncommon, but when present consists of cord-wrapped tool (CWT) impressions. The final ware of the Avonlea Horizon consists of complex-profiled vessels with cord-roughened or plain exterior surface finishes. Though decoration is also not common to this ware, when present it exhibits a variety of different forms including punctates, CWT impressions, and incising (Walde and Meyer 2003:139-142).

The most recent of the different occupations that make up this cultural sequence are those identified with the Prairie and Plains Side-Notched type projectile points. The Plains Side-Notched points employ side notches that are deep, angular, and placed high up from the base, giving the stem a rectangular shape. Prairie Side-Notched points also use side-notching but these points have more irregular flake removal and their notches are broad, shallow, and placed lower to the base than the notches on the Plains points.

The Prairie Side-Notched point is associated with the Early Old Women's Phase. This phase is dated from 1200 BP to 200 BP. The ceramics of this phase have a globular shape and the exterior surface is commonly cord-roughened. Though often undecorated, the different forms of decoration that have been noted include CWT impressions, incisions, and punctates (Walker 1999:27; Dyck 1983:132-135).

Plains Side-Notched projectile points are associated with at least two phases, the Mortlach Phase and the Late Old Women's Phase. The Mortlach phase is characterized not only by the use of the Plains Side-Notched projectile point but also by a unique ceramic ware. This ceramic ware is characterized by vessels with an exterior surface covered with smooth fabric-impressed or check-stamped textures with the use of incising, CWT impressions, and punctates for decoration. These characteristics suggest that this ware was influenced by pottery of the Selkirk Phase to the north and the Middle Missouri region to the south (Walker 1999:27). The Late Old Women's Phase also used the Plains Side-Notched point; however, these people continued to use the ware recognized from the earlier expression of this phase. These two cultures date from approximately 650 BP to the time of European contact (Walker 1999:27; Dyck 1983:132-135).

2.9 Background Description of the Old Women's Phase

Reeves (1969:6-46) was the first author to employ the term "Old Women's Phase" (OWP). He described the phase on the basis of its ceramics, its emphasis on the use of local lithics, its use of split pebble technology, and its unique projectile points (Walde et al. 1995:26). Since that time a multitude of OWP sites have been found on the plains and much has been discovered about it. Numerous radiocarbon dates, indicate that the phase spans a time period beginning around 1150 BP and extending up to 200 BP when European goods start appearing in the artifact assemblage (Walde *et al.* 1995:24, 32).

This period of time has been divided into early and later variants (Meyer 1988:57, 60), the former from ca. 1150 to 650 BP, and the later from ca. 650 to 200 BP (Walde *et al.* 1995:24, 32). One of the major reasons for creating this split was a perceived change in the frequency of occurrence of projectile point types in the latter half of the phase's time span. Initially during the early portion of the OWP in Saskatchewan there was a predominant use of the Prairie Side-Notched projectile point. These points were made from thin flakes, lacked symmetry, and had broad, shallow side notches that at times could be mistaken for corner notches (Forbis 1960; Foster 1968; Kehoe 1966 and 1973; Linnamae et al. 1988; MacNeish 1958; Nicholson 1976; Peck and Hudecek-Cuffe 2003). During the period of the late variant, the Plains Side-Notched projectile point was thought to have gradually replaced the original projectile point style. These points are usually better flaked than the Prairie Side-Notched points, maintain a symmetrical shape, and have angular deep notches set up higher from the base, resulting in high angular basal edges (Forbis 1960; Kehoe 1966 and 1973; Linnamae et al. 1988; MacNeish 1958; Nicholson 1976; Peck and Hudecek-Cuffe 2003) (For greater detail on these point styles see Chapter 4, Section 4.1.1.3; 4.3).

It should be noted, however, that Peck and Ives (2001:174) have proposed that the Prairie Side-Notched point was used throughout the entire time span of the OWP. The presence of some Plains Side-Notched points in late OWP assemblages would simply be the result of interaction with peoples of the Mortlach phase. To the south in the United States the points associated with the Old Women's Phase are also side-notched like the styles in Canada, but some are corner-notched, tri-notched, or even un-notched (Frison et al. 1996:28).

Another technological similarity between both the early and later variants of the OWP is its ceramics. The ceramics of the OWP are composed of globular vessels with rounded bases, although flattened bases have also been noted occasionally (e.g. Green 1993). The walls of these vessels are typically thick with poorly consolidated paste. Pronounced shoulders are common and are sometimes angular and thickened. Necks are shallow and short. The exteriors of these vessels are often cord-roughened or fabric-impressed with smoothing of these impressions often taking place after the initial forming. Decoration may be absent, but when present it is located on the lip, rim, neck, or shoulder portions of the vessel. A variety of decorative elements was used on these vessels, including CWT impressions, punctates, and incisions.

The method of creation of these vessels is a debated subject. Most authors believe that these vessels were constructed using the paddle and anvil technique; however, others suggest the use of bag molding or even a combination of the two techniques (Walde *et al.* 1995:28-30) (for a more detailed discussion of the ceramics of the OWP see Chapter 6. Section 6.1).

The consensus is that these people were heavily reliant on bison in their subsistence economy due to the number of bison pounds, jumps, and traps that date to this phase (Frison *et al.*1996:28). This reliance on the bison was almost certainly reflected in their religion as ammonite septa '*iniskim*' have been found at OWP sites (Kehoe 1965:212-213). Historically, these stones were sanctified and acted as a focus of sacred power and were associated with personal bundles, sacred tipi bundles, and society bundles (Peck 2002:148. In particular, they were central to ceremonies held to call the bison to jumps and pounds (Peck 2002:149-150). It should be noted, however, that some sites show a diversity in the animal species used as food sources. Examples include a variety of bird species, ungulates, and canids (Walde et al. 1995:34).

Rock art associated with the OWP has also been identified. For example, rock art identified in the Writing-On-Stone Provincial Park, contains two forms of art. The first is biographical in nature, which are depictions of events that actually happened or were witnessed by an individual. The second is ceremonial which portray images from dreams, vision quests or prayers. An example of biographical rock art are images of humans bearing shields dated from 650 to 200 BP (Russill 1997; Keyser 1977:15-80).

Another important characteristic of this phase is its apparent association with a number of different rock feature sites. It has been noted by several archaeologists that tipi ring sites are very characteristic of the OWP. In fact, in some areas of the plains over half of the tipi ring sites excavated have yielded OWP diagnostics (Frison et al.1996:28). A second type of rock feature that seems to have a relationship to the OWP is the medicine wheel. Several of these structures, such as the Majorville Medicine Wheel, British Block Cairn, and Grassy Lake Cairn have yielded Prairie Side-Notched projectile points as well as OWP ceramics (Peck and Hudecek-Cuffe 2003:89). There is a medicine wheel 5.6km east of the Sherwin Campbell site. This medicine wheel, known as the Hughton Medicine Wheel (EgNx-1), shares several features with the Majorville Medicine Wheel in that it has a large central cairn, and five radiating spokes of stones which connect to an outer circular perimeter of stone (Watson 1974:9).

The OWP type site is the Old Woman's Buffalo Jump (EcPl-1) located in southwestern Alberta (Forbis 1960:57) 2km (1.2 miles) northeast of the town of Cayley. The name for the site was translated from the Blackfoot toponym for the site, "Akee'-Paskun" (Forbis 1960:61). It was initially made known to archaeologists in 1952, but was not examined until 1957. It is composed of a steep 24.2m (79.4ft) drop from the Paskapoo sandstone cliffs. The bone bed beneath the drop is about 30.5m (100.1ft) feet wide by 61m (200.1ft); however, a campsite measuring 152.4m (500ft) on either side of the cliffs was also discovered (Forbis 1960:57, 59). When excavations were conducted during the following two years, Forbis (1960:70) discovered that the site had been in use for over 1500 years. Use of the site started around 1840±70 BP (S-91) and intermittent use of the site continued on up to 350 BP (Forbis 1960:66, 82).

Based on these excavations, a projectile point chronology for the last 1840 BP years of southern Alberta was produced, as 90% of the artifacts found were of that type (Forbis 1960:83, 85). In addition to the large number of projectile points, other lithic artifacts included blunted point bifaces, endscrapers, choppers, and hammerstones (Forbis 1960:113-118). Only four sherds were found at the Old Woman's Buffalo Jump - all belonging to the same vessel. This vessel was grit tempered, had a smoothed cord-roughened exterior, a lip which was flattened on the brim, but rounded on the exterior and interior corners, a neck that sloped inwards from the shoulder constricting the mouth of the vessel, and a sharp angular shoulder. Decoration on this vessel consisted of finger pinching on both the shoulder and rim with vertical CWT impressions between. Forbis (1960:118) felt that this vessel was a good representative of Ethridge Ware.

The origins of the OWP have been a highly debated subject among archaeologists for several years. One hypothesis is that the OWP developed out of the Avonlea Horizon. Data used to support this hypoethesis include artifact and stratigraphic evidence for cultural continuity between these two cultures. Transitional occupations relating late Avonlea to the early OWP occur at the Junction and Gull Lake sites (Walde et al. 1995:26). Some archaeologists even see similarities between the flaking style of OWP and Avonlea points (Duke 1991a:99-100). Other similarities include the size of the points, the basal shape, and the flaking patterns. Another possible link between the tool industry of these two cultures is the use of small bifaces and the use of split pebble technology to make formed tools. Another line of evidence used to support this connection is that Ethridge ware, characteristic of the OWP, is also associated with some assemblages of the Avonlea Horizon (Walde and Meyer 2003:141-144). One final note is that radiocarbon dates for these two cultures overlap by about 150 years (Walde et al. 1995:34).

A second hypothesis is that the OWP developed out of the Besant Phase. Evidence used to support this concept includes similarities between the Prairie Side-Notched point style and Besant points, with the reduction in size simply explained as a change from atlatl to bow and arrow technology. Furthermore, both phases use similar flaking styles to make tools. For example, both have flake removal patterns which are irregular, hinge scars are often left on the finished tools, and the cortex is often not completely removed (Duke 1991a:99).

A third hypothesis, devised by Reeves (1983), postulates that there were:

> ...two separate cultural traditions that existed in southern Alberta during the last 2000 years. The indigenous Tunaxa Tradition originated about 2000BC. Its terminal phase, Avonlea, began about 200AD.... Contemporary with the Avonlea Phase was the Besant Phase, belonging to the intrusive Napikwan Tradition...For the next 500 years, there was increasing contact between these two cultural systems, resulting in their ultimate merger in the Old Women's Phase, the final indigenous phase of the Prehistoric Period (Duke 1991a:78).

Reeves's hypothesis appears to be the most valid. The fact that archaeologists have made connections between both the OWP and the Besant and Avonlea groups would best be explained if a gradual merger of the two cultural traditions took place ultimately resulting in the development of the OWP.

This would explain how the OWP could incorporate characteristics of both cultures. The other two hypothesis never give reasons as to why the OWP has characteristics of one group, but not the other, making it difficult to ascertain if they are valid theories.

The final debate that needs to be discussed is what historic cultural ties can be linked back to the OWP. Some of the first researchers to attempt this were Wormington and Forbis (1965). They suggested that, since the Old Women's Buffalo Jump existed in the oral tradition of modern Blackfoot, an association between these two entities was possible. McCullough (1982:55-57) has also researched the idea that the OWP can be linked to the Blackfoot. Reeves (1983) also supports this tie between the OWP and the Blackfoot, but takes it a step further and suggests that the later variant of this phase is the archaeological percursor to the Peigan group while the early variant is the archaeological precursor to the Siksika. Reeves (1983:20) also argues that the OWP can be divided into different variants that can then be linked to various tribal groups like the Blood and Atsina, an hypothesis supported by Byrne (1973:555) and Brumley and Dau (1988:54-55). However, Byrne (1973:515) suggests two other potential candidates, the Kutenai and Shoshone. An individual who supports a link between the OWP and the Shoshone is Keyser (1975). He studied rock art in the Writing-On-Stone Provincial Park in southern Alberta and noted similarities between Shoshone and OWP rock art motifs. However, some authors, in particular Loendorf (1990:45-54), have argued against this link.

It should be noted though that some researchers have disagreed with the application of the direct historical approach and ethnographic analogy to make ties between prehistoric and historic groups.

> Cultural continuity between the prehistoric and historic groups [was being] explained by one, or a combination, of the following hypotheses: (1) the prehistoric archaeological record was produced by the predecessors of historic period groups, and peoples in both periods had essentially the same ethnic identities and social organizations; (2) historic groups were recent immigrants to southern Alberta, with the implication that any cultural continuity cannot have resulted from the records of the two periods being produced by the same people; (3) the adaptive requirement of living in the area resulted in entirely separate groups, regardless of their individual histories prior to their arrival, developing the same cultural responses; and (4) factors other than adaptive necessity created similar cultural patterns among separate groups, both indigenous and immigrants (Duke 1991b:106-107).

Duke then goes on to say that there are several things that a person has to be aware of while attempting to use the above methods to tie people of the prehistoric and historic periods together. The first is the type of analogy being used by a researcher to make these links. Formal Analogy states that if two things are related in some aspects then they must be related in all aspects. This form of analogy is highly criticized. Relational Analogy, is applied only if it can be shown that there is a cultural and non-accidental relationship between items being compared.

When applying analogy to make a comparison between two items Duke states that there are two conditions that have to be understood and met to make the results valid.

> The first condition requires a researcher to have a contextual awareness of how the different elements of culture are functionally linked. These

> relationships are rarely deterministic, and similar objectives can be met by different coping strategies. The second condition is to establish a homologous relationship between the prehistoric and historic periods (Duke 1991b:113).

In fulfilling either of these conditions one risks "...positing an unbroken cultural line between prehistory and history because groups have similar cultural lifestyles" (Duke 1991b:113).

In order to meet these two conditions the Direct Historical Approach was often used. This approach, however, is not as capable of doing this as some researchers think, particularly when dealing with nomadic groups (Duke 1991b:115-116). As a result, Duke states that it is questionable if the precontact Blackfoot existed with precisely the same social structure as they did in the historic period. Furthermore, Duke (1991b:119) questions the assumption that, regardless of their social structure, they produced a distinct material culture that would be archaeologically recognizable. Many authors, such as Dobyns (1983), have shown that First Nations cultures were greatly modified both socially and technologically after epidemics such as small pox depleted their populations (Wood 2003:50-51). If that is the case then what is recovered by archaeologists from precontact sites may not have a relationship to what is found after these epidemics made their impact, making it nearly impossible to relate historic groups to these archaeological cultures. Duke argues that in order to make a link between historic Blackfoot and material found at these sites it has to be assumed that the historic Blackfoot were the only users of the sites. Archaeologists would also have to show that the spatial and temporal boundaries of the archaeological phase are determined by the same factors that conditioned the boundaries of the tribal ethnic unit (Duke 1991b:121).

2.10 Summary

To summarize, Stanley Saylor discovered the Sherwin Campbell site in 1988, but it was not examined until 1989. It is located 8.75km south of Elrose in an area of the Missouri Coteau known as the Beechy Hills. Clay-loam brown chernozemic soils of the Haverhill Association make up the soils surrounding the site. The site is located in the mixed grassland ecoregion, which experiences a snowy-forest climate that has warm summer months and cold moist winters. The closest potential source of water of any size is Whitebear Lake found about 2km west by southwest of the site. Numerous animal and plant species were present in the region, but of particular importance to the subsistence economy of aboriginal peoples would have been bison, deer, pronghorn, elk, wolf, and a variety of rabbit species. Game birds and waterfowl would have also played a role in their subsistence. The various floral species that could be exploited as a food resource included the several different berries, water parsnip, bulrushes, cattail, and prairie turnip.

The culture history of the Missouri Coteau is represented by several different archaeological cultures. The earliest expression is the Cody complex, generally dated to 8800 – 8400 years BP. However, also identified were the Oxbow complex, McKean series, Pelican Lake complex, Besant complex, Avonlea horizon, the Old Women's phase, and the Mortlach phase.

Since the time of occupation of the site was during the Old Women's Phase, this too was also described in some detail within this chapter. Some of the more important points regarding this phase include the fact that it is based on the presence of Prairie and Plains Side-Notched projectile points, the use of distinctive ceramic vessels, and the employment of local lithic materials, particularly silicified wood. It is likely that this phase originated from expressions of both the Besant complex and the Avonlea horizon. Finally, it seems that there is a consensus among archaeologists that the Old Women's Phase represents an early material culture produced by the ancestors of the Blackfoot people

Chapter 3. Excavation and Surface Collection Methodology

3.1 Excavation Methodology

During the summer of 2000, the author attempted to locate the landowner for the Sherwin Campbell site. The idea initially was to get permission to obtain a second surface collection from the site, as more cultural material should have been brought to the surface through a decade of agricultural work. During the upcoming school year, however, upon starting the analysis of the previously collected artifacts, it was decided that it was not necessary to recollect the site. Rather it was considered more important to excavate some units to determine the stratigraphic nature of this site. A second benefit of these excavations would be to get some in situ artifacts that would further the author's knowledge about the events taking place at the site. At this time the author obtained the original Saskatchewan Archaeological Resource Report (SARR), produced when the site was initially found during the reconnaissance for a SaskPower line. Within the SARR was a hand drawn map which gave the impression that the site extended south past the land boundary line and onto neighboring pasture land located on NW/SE 9-25-15-W3M.

Through the help of the author's father, Wayne Whatley, the landowner Arnold Hobbs was contacted. He agreed to the author's proposal to do archaeological testing and excavation on his land for the month of July 2001. In preparation for these excavations the author discussed with his advisors, as well as some fellow students, various approaches that could be employed in order to conduct these excavations. At this time the author contacted the Heritage Resources Unit, Culture and Heritage Branch, Saskatchewan Culture, Youth and Recreation to get an Archaeological Resource Investigations Permit to conduct these excavations. Permission was received under the permit number 00-069.

On July 21, the author met with Arnold Hobbs in the town of Elrose to discuss access to the land and the location of the excavations (Figure 3.1). Throughout much of that afternoon, using the hand drawn map from the SARR and Mr. Hobbs' extensive knowledge of the area, the author was able to determine where excavations would occur. Mr. Hobbs was also able to point out some nearby archaeological sites, including several tipi rings that occupied a ridge of hills that looked over a coulee.

Thirteen test were excavated in order to determine an appropriate location for the excavation units. All of these test holes were 50cm square and dug to an approximate depth of 30cm. Initially these test holes were placed just east of a pipeline right-of-way, 10m south of the land boundary, and 10m apart in what has subsequently been referred to as the East Excavation area (Figure 3.1). After having dug five sterile test holes (Nos. 1-5), two more units (Nos 6,7) were put in 10m south of the land boundary but spaced 20m apart (Figure 3.1). Since these were also found to be sterile, a surface reconnaissance was conducted along the land boundary, in the hope of getting a better idea of where cultural remains might be found.

During this survey a dried slough depression was noted in the extreme

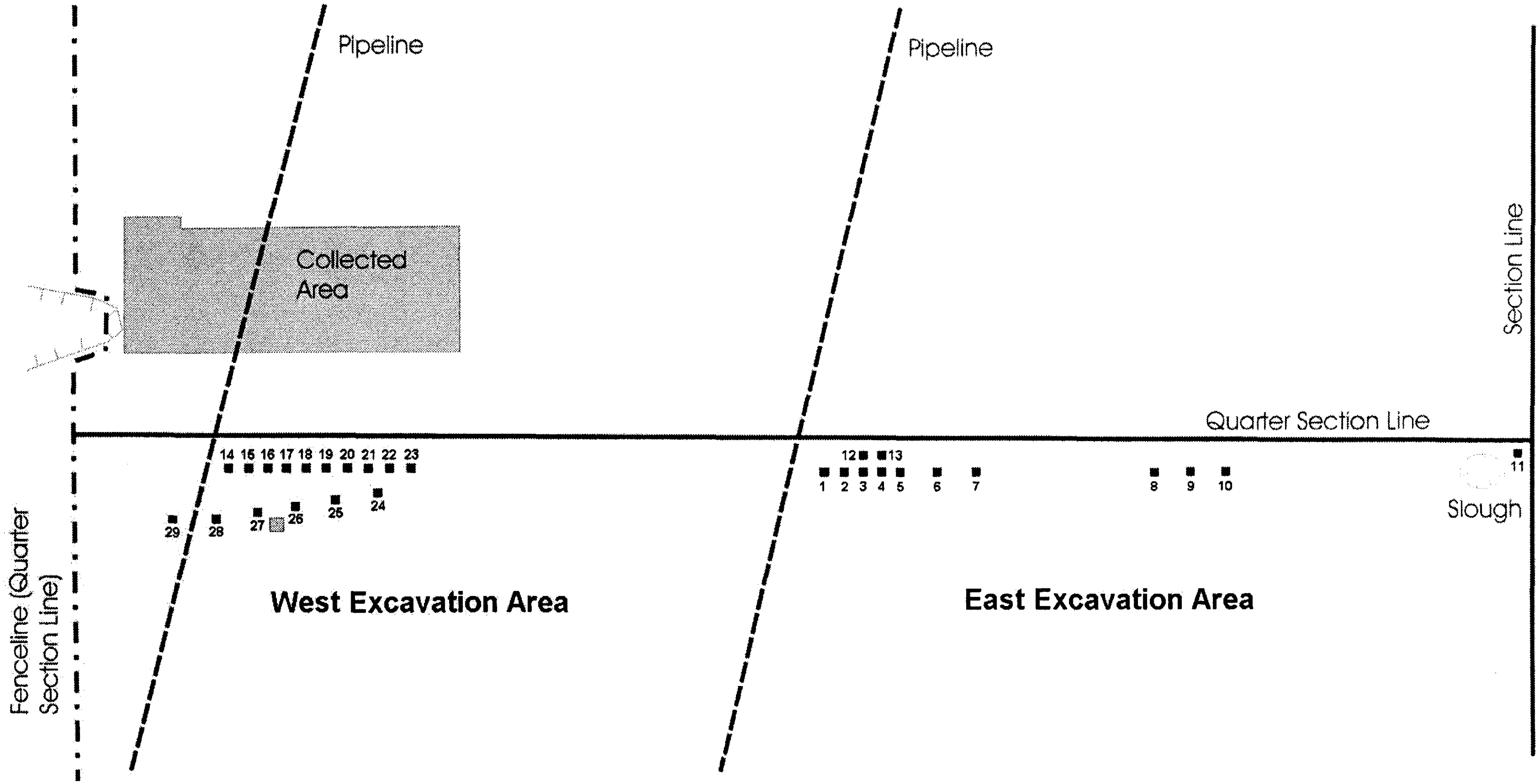

Figure 3.1 Total Excavation Area.

northeast corner of the Hobbs' pastureland. This depression, it was reasoned, might have been an acceptable place to put a nearby encampment if it had contained water in the past. As a result, another four test holes (Nos 8-11) were excavated there. The first of these was placed 120m east of the last excavated test hole, and was again positioned 10m south of the land boundary (Figure 3.1). Two more units, 20m apart, were dug to the east. Another test pit was placed immediately east of the pond depression. Since all of the excavated test holes were sterile, two more test holes (Nos 12,13) were put in directly north of test holes three and four and 5m south of the land boundary (Figure 3.1). Again these were found to be sterile.

The next day, July 23, a second faint pipeline disturbance was noted, one that had been missed the previous day. Since the day before had not been productive, it was decided that some test holes would be excavated here (Figure 3.1). Test hole 14 was placed just east of this second pipeline. These test holes were measured in from the corner post of a fence line that ran along the west boundary of the Sherwin land. It then ran further south splitting the section of land where this work was conducted from the rest of the Hobbs pasture. The first test hole (No. 14) was 87m east of the corner post, and was 10m south of the land boundary. Nine more test holes were dug at 10m intervals, moving farther to the east. As a result, the last of these test holes (No. 23) was 177m east of the corner fence post. Cultural materials started appearing in test hole 18. Coincidentally, this test hole and the ones placed further east were located in a small coulee that extended southwest off the Sherwin land. Having found cultural materials in this coulee; six more test pits were put in following the southwesterly direction of the coulee. It should be noted that the spacing between test holes 24 to 29 was only paced out to approximately 20m. It was observed that as these test holes extended further down the coulee, more artifacts were found. Test hole 28 ended as the most productive, and test hole 29 was sterile. At the end of the day the datum point was measured to the area where excavations were to take place, which was just east of test hole 27. It represented the northwest corner of the excavated unit, which was designated 0 South 0 East.

Excavation of a 1x1m unit commenced the next day. The crew for this excavation was the author, Wayne Whatley, and the author's uncle Barry Whatley (Figure 3.2). Five centimeter arbitrary levels were employed in the excavation. All provenienced artifacts were given southing and easting measurements and a depth below surface (DBS) relative to the northwest corner. Each level was dug in separate 50cm by 50cm quadrants. The sod layer was removed using a flat-bladed spade and all soil clinging to the roots was screened in a ¼ inch mesh. Starting with level 2 and going down to the base of level 5, excavations were conducted by trowel and grapefruit knife. Soil was collected by brush and dustpan for each separate quadrant and was screened. Most artifacts were kept in place to be measured and drawn on planviews. These artifacts, as well as those found in the screen, were bagged with an artifact card with separate field numbers (Figures 3.3, 3.4, 3.5). The bottom of level 5 encountered an extremely hard clay matrix. In order to make sure that no further cultural materials were present, the northwest quadrant was excavated down one more level (DBS 30cm). This quadrant, due to the difficulty involved in excavating

Figure 3.2 Excavations at the Sherwin Campbell site (facing south).

it by trowel, was dug with the spade. This final level was found to be sterile. As a result excavations ceased, following which profile drawings were made of all four walls to record their stratigraphy. Depth measurements were taken from the surface datum at the northwest corner. Since the surfaces of the northeast, southeast, and southwest quadrants were above the datum point, the first layer was measured above datum. Then, all layers from there were measured in below the datum point. Due to time constraints, no further units were excavated.

Figure 3.3 Arbitrary Level#2 (Occupation Level).

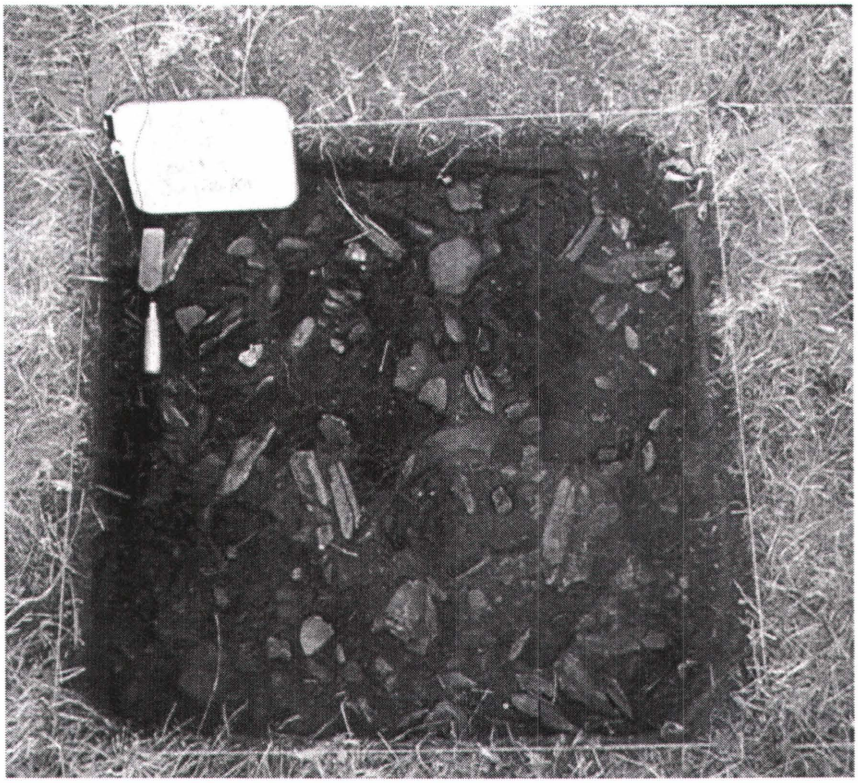

Figure 3.4 Arbitrary Level#3 (Occupation Level).

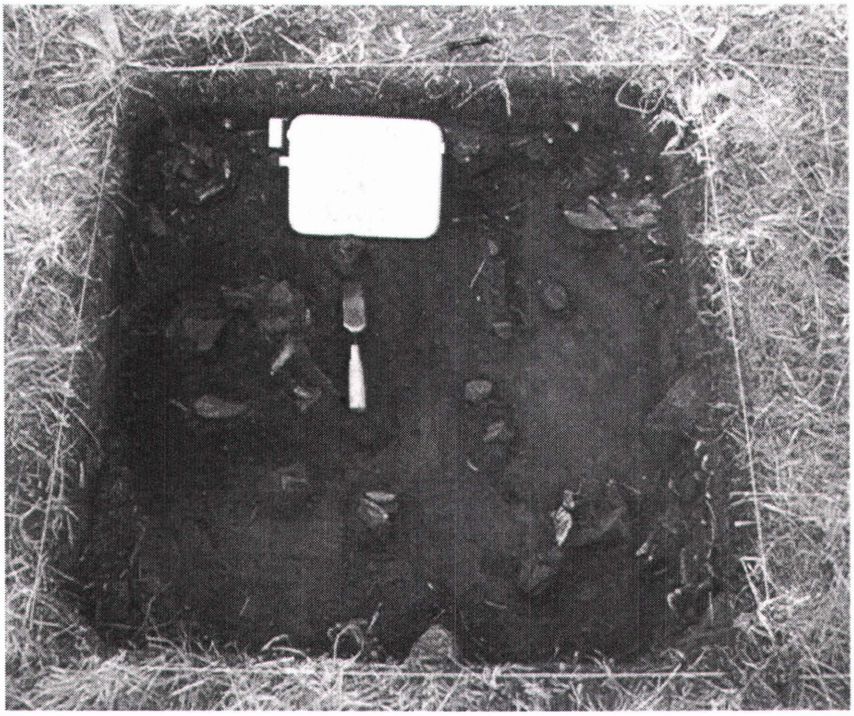

Figure 3.5 Arbitrary Level#4 (Bottom of Occupation Level).

3.2 Excavation Laboratory Procedures

Artifacts were taken to the Department of Archaeology laboratory at the University of Saskatchewan to be washed and allowed to dry. The author then proceeded to sort and identify as many items as possible. All of this relevant information, as well as counts and weights in grams of each item, was then entered into the Archview database designed in Microsoft^{TM} Access, which had been developed for the SCAPE project (http://scape.brandonu.ca). As this cataloging proceeded, each cataloged item had a card printed that provided that item's unique catalogue number and relevant descriptive information.

3.3 Stratigraphy of the Sherwin Campbell Site

Stratigraphically the Sherwin Campbell excavation unit can be split into two different types of levels, cultural and natural (Figures 3.6, 3.7, 3.8, and 3.9).

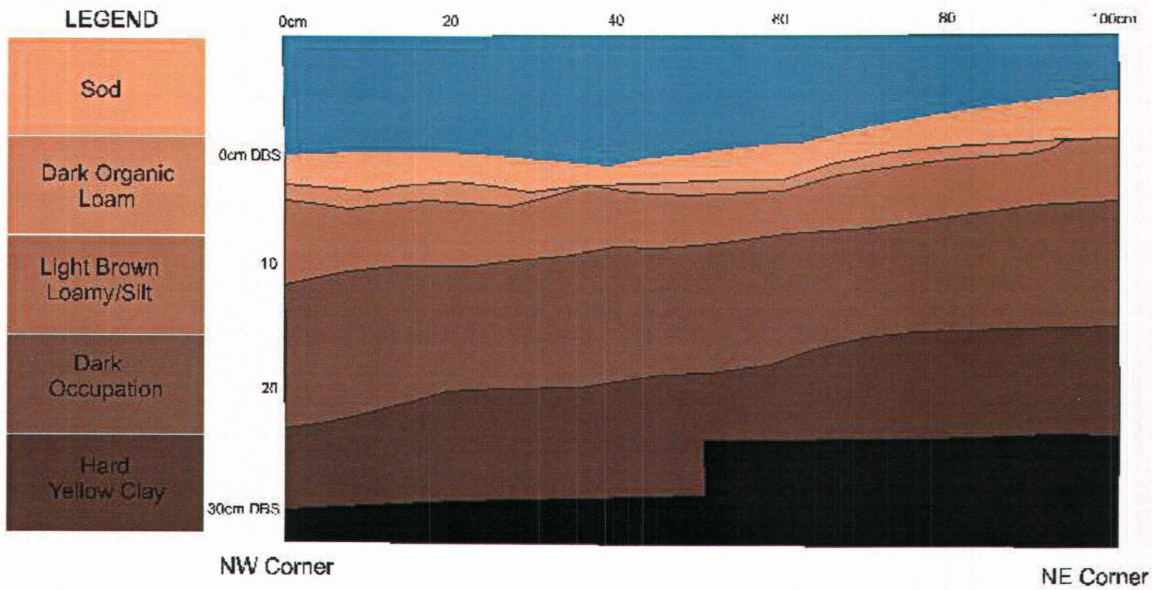

Figure 3.6 North Wall stratigraphic profile.

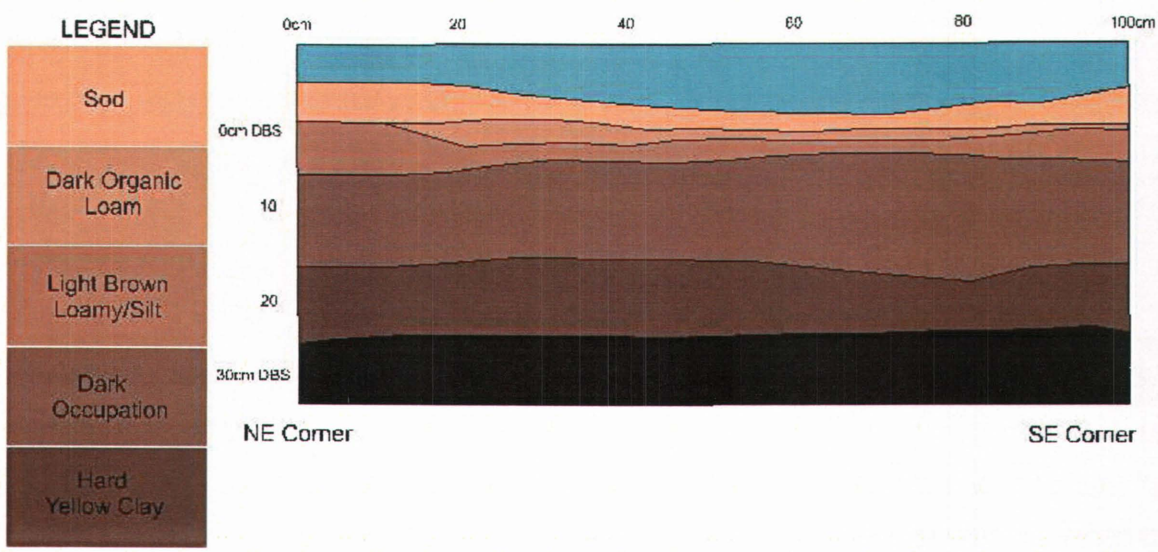

Figure 3.7 East Wall stratigraphic profile.

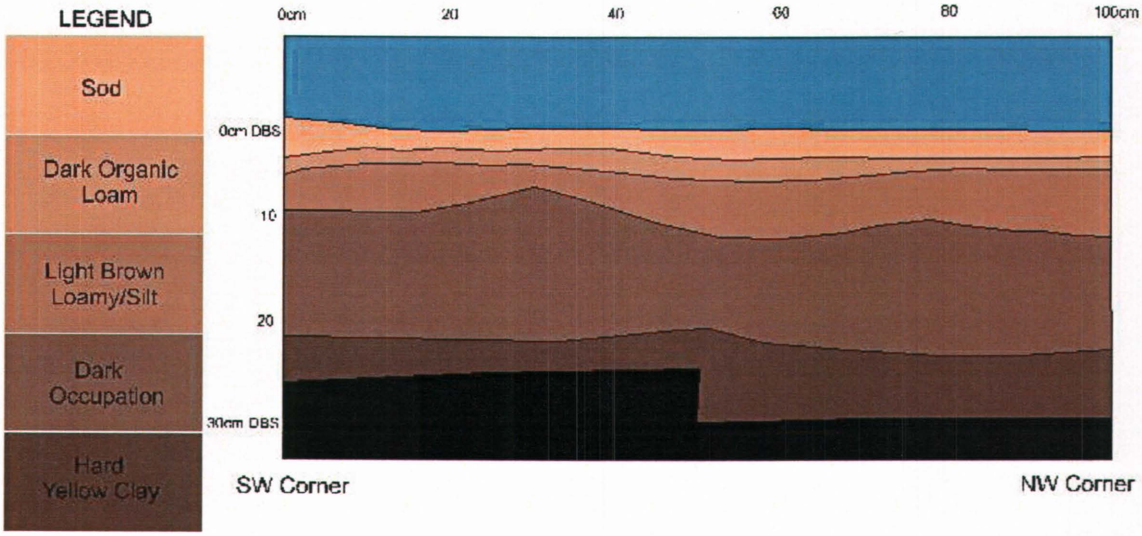

Figure 3.8 South Wall stratigraphic profile.

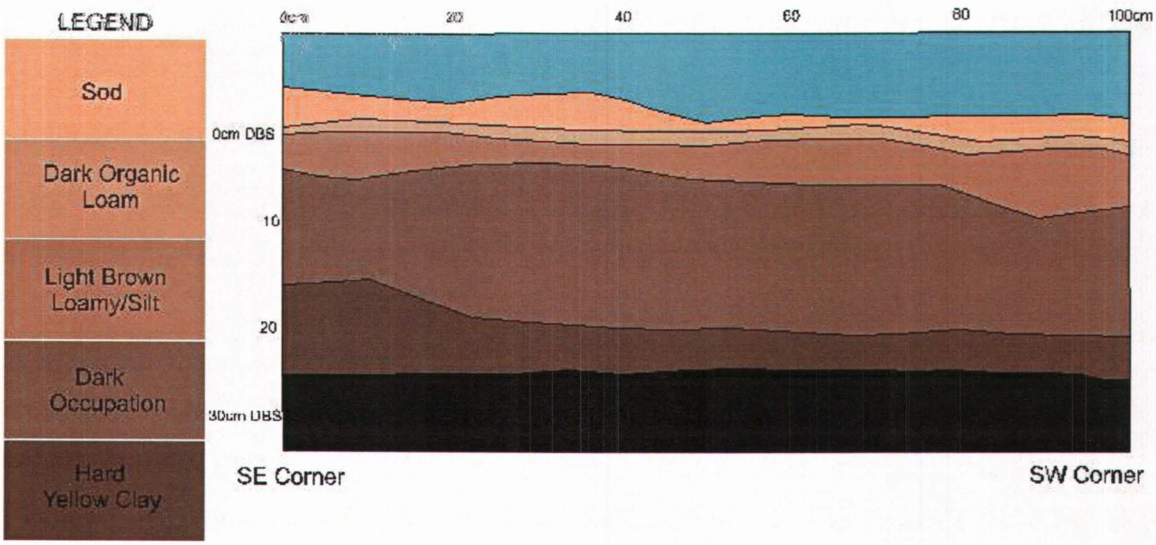

Figure 3.9 West Wall stratigraphic profile.

The top layer in the stratigraphic sequence was composed of sod. This layer, at its thickest, was 7.5cm thick. Within this layer, five small pieces of bone were found clinging to the grass roots. Based on further examination of this layer, it was determined not to be cultural, and that these few artifacts had moved up from the cultural level. Immediately below this layer was a thin natural soil layer which at most was only 3.5cm thick. This thin layer was composed of dark organic soil filled with decomposing vegetative matter.

The third level was also natural, composed of a light brown silty/loam. The thickness of this layer ranged between 2 to 7cm. At the very base of this level, quantities of artifacts began making their appearance; however, due to the distinct change in color between this layer and the occupation layer below it, it was decided that these artifacts had moved up in the soil possibly due to rodent disturbance or some other natural process.

The fourth layer was a dark black paleosol that was 9.5 to 16cm thick. Within this layer were numerous artifacts, including large quantities of broken faunal elements, Prairie Side-Notched projectile points, Old Women's Phase potsherds, fire-cracked rock (FCR), and a variety of unworked lithics. The final stratigraphic layer was a light yellow hard clay. The upper portion of this layer contained two artifacts. Again it was not recognized as a cultural level. Complete excavation of this level was never done; instead it was excavated to a maximum depth of 30cm DBS. Once it became apparent that no further cultural levels would be encountered, continued excavation of this layer seemed redundant, and excavations ceased.

3.4 Collection Methodology

The controlled surface collection of the Sherwin land (SW/NE 9-25-15-W3M) was conducted in the fall of 1989 (David Meyer 2003, personal communication) (Figure 3.10). During Saylor's original reconnaissance, he noted that the area east of the proposed development was already heavily disturbed through agricultural practices, but that the area to the west was just being prepared for agricultural use, and, as such, was not disturbed. During the spring of the following year, the rest of the land was ploughed for agricultural use, and the landowner noted the presence of archaeological material. Realizing its importance he contacted Phyllis Lodoen, a resident of the area and a student of archaeology. She contacted individuals in the (then) Department of Anthropology and Archaeology to organize a collection of the site before artifacts were further disturbed (David Meyer, personal communication 2003). Dr. E. G. Walker (personal communication 2003) gained permission to conduct the collection under the permit number 89-63. In September of that year a one-day collection took place. This collection was conducted by Phyllis Loeden, Dr. Urve Linnamae, Dr. David Meyer, and several students of the department (David Meyer, personal communication 2003). A controlled surface collection was carried out, employing a five-meter square grid system. This was a system that had been found worthy due to use at the Lozinsky site, a late precontact bison processing camp located 50km northeast of Saskatoon (Malainey 1995: 85). This collection was done in a large rectangular pattern. The most southwesterly

Figure 3.10 Surface Collection of the Sherwin Campbell site (Courtesy of U. Linnamae, photographer, looking north), September 1989.

unit was designated 100N 105E. Each square within this grid was carefully surface collected, and all artifacts found within one square were placed in a separate artifact bag. A total of 10, 530 square meters were collected in this manner.

3.5 Laboratory Procedures

Once these artifacts were collected, apparently no further work was done with them until the fall of 1992. At this time student helpers from several local schools were employed under the Extended Learning Opportunities Program (Debi Farrow, personal communication 2003) to help clean, sort, and catalog items found at the site. This work took place at the Wanuskewin Heritage Park archaeological laboratory. When these catalogue sheets were re-analyzed by the author, it became apparent that total re-analysis would have to be done, as all catalogue sheets started with the number one for each unit, and several sheets were missing or incomplete. Re-analysis began in February 2002 and was completed in April 2002. One of the author's advisors, Dr. E. G. Walker, noted that some information was missing within the faunal analysis, so from September to mid-November 2002 this second analysis took place. For the month of December data collected during the cataloging was entered into a spreadsheet on Microsoft™ Excel. During the classification of different faunal remains, it was not always possible to identify faunal remains to a particular taxon. In these cases the author developed a system that identified elements to a particular size category. These were based on certain recognizable features, i.e. size and weight. For the purposes of this system, large mammals were those that weighed between 100-700 kg, medium mammals were those that weighed between 5-99kg, small mammals (although none were present in the collection) were identified as weighing between 4g-4kg. At times, some of the larger mammal specimens could be identified as belonging to the order Ungulate, so this designation was substituted instead. The final category that was used was a general mammal classification, indicating that the elements were mammalian, but no further classification was possible. Starting at the end of November, and continuing through January to the end of February 2003, the author did an in-depth analysis of all lithic tools and pottery fragments.

3.6 Qualitative and Quantitative Analysis

The faunal qualitative analysis was conducted during the process of cataloging the archaeological materials. This descriptive analysis involved identifying elements, elements to species, presence or absence of burning and butchering marks, count of items, weight in grams of artifacts, and when possible articular end measurements and metacone cusp heights on lower 1st molars.

When this descriptive analysis was completed, a quantitative analysis was done using NISP, defined as "...the number of identified specimens per taxon" (Lyman 1996: 100) MNI, which is the "...minimum number of individual animals which are necessary to account for some analytically specified set of identified faunal specimens" (Lyman 1996: 100), and MNE, which is the "...minimum number of a particular skeletal element or portion of a taxon" (Lyman 1996: 102). For the purposes of this thesis, MNE calculations were done by counting particular anatomical landmarks found on various elements. As a result, the anatomical landmark with the highest value represented the MNE for that particular element. With the use of the MNE values, MAU calculations were done. These calculations estimate the "...minimum number of animal units [MAU] necessary to account for the specimens [MNE] in a collection" (Lyman 1996: 105). The next calculation completed was the %MAU, which involves dividing all MAU calculations by the highest MAU value calculated for the entire faunal assemblage, and multiplying by 100 to produce a percentage. This indicates which elements are abundant in a faunal assemblage.

The lithic qualitative analysis was conducted at the same time as the cataloging. At this time the lithic material of the specimens was determined, as were the different artifacts represented (i.e. flake, shatter, FCR, core, or tool). They then were counted and weighed. Further descriptive and metric analysis was conducted on the different tool types represented in the collection. Very little of the pottery analysis was done during the process of cataloging. Sherds at this point were simply counted and weighed. However, after the cataloging process was completed, descriptive and metric analyses were done. This information will be presented in greater detail in subsequent chapters of this thesis.

Chapter 4. Lithic Analysis

4.1 The Surface Collected Lithic Assemblage

The lithic assemblage collected from the Sherwin property in 1989 has been divided into a variety of categories including several lithic material types. During the identification process artifacts were placed into one of the following categories:

1) Debitage: This category represents the by-products of core reduction and tool manufacture. Within this category two different forms of detritus were recognized, flakes and shatter. The differentiation between these two was based on the presence or absence of specific lithic diagnostic features. The features included presence of a striking platform, a bulb of percussion, and a point of termination. If artifacts had any of these features in a readily recognizable manner they were designated as flakes. If these features were missing they were placed into the shatter category.
2) Cores: These artifacts are those larger nodules of lithic material from which flake blanks are detached, often with resulting shatter. In this artifact category five different core groups have been defined. Unifacial cores only one striking platform present (Kooyman 2000:100). Bifacial cores "...have flakes detached from two different directions." (Kooyman 2000:100).

Polymorphic cores have three or more striking platforms often resulting from flake removal taking place on all sides of the core (Kooyman 2000:100). Bipolar cores are smaller pebbles that were split by placing them on an anvil stone, then striking the opposite end with a hammerstone. Due to this force the stone was split in half, resulting in pieces that could be worked further (Kooyman 2000:100). The final category is that of core fragments. A core fragment is recognizable as such since it has a striking platform, however, whether it was a fault in the raw material or in the skill of the knapper, during the process of flake removal the core broke resulting in these fragments instead of the desired flake.

3) Fire Cracked Rock (FCR): These stone cobbles or pieces are the by-products of heating stones for several different purposes. Through the stresses of change from a very hot state to a cooler state and often a repeat in this heating/cooling process, these nodules become friable frequently cracking and breaking apart. This activity results in cracks or angular fractures that can be used to identify these by-products.

4) Bifacial Tools: These are tools formed through the careful removal of flakes from both the dorsal and ventral surfaces of a flake blank. Within this category four different tool groups were recognized. Projectile points were hafted to an arrow shaft that was used with a bow as a hunting implement. Knives were used in the process of cutting materials such as hides or meat. The "Chi thos is a...large crude scraper.... Used in hide preparation, the edges of the chi thos are often bifacially worked but the nature of the rock

restricts the flake scars to the immediate edge of the tool" (Wilson 1983:27). Finally, pièces esquillèe are tools that may have been used as wedges to split materials like bone or wood (Dyck 1983:31-32).

5) Unifacial Tools: These are tools created through the removal of flakes from either the dorsal or ventral surface of the flake blank. Within this category three different tool types were recognized. The first of these were scrapers. Two sub-groups of scrapers were recognized. The first was the endscraper which has the working edge formed on the distal end of the tool. The second type of scraper was the sidescraper which has the working edge flaked on one or both of the lateral edges. Another unifacial tool type recognized was the spokeshave. This tool has a concave flaked working edge and was used to straighten and smooth arrow shafts (Kooyman 2000:102). The final tool group under this heading was the graver. This tool has had one or both lateral edges flaked to form a pointed spur for the purposes of etching or incising materials such as bone or antler (Dyck 1983:31).

6) Retouched and Utilized Flakes: These lithic tools are those artifacts that have some marginal retouch. The tools have often been referred to as expediency tools as they require little time to make and can be discarded once the job is completed. Within this category are items that were unifacially retouched on just one flake surface, bifacially retouched on both flake surfaces, unifacially/bifacially retouched (which has a combination of the previous two types of retouch located in different areas of the tool), and utilized flakes which have no form of retouch but still show edge wear.

7) Heavy Stone Tools: These tools include those artifacts that are made from heavier stone cobbles. Most are modified by pecking, like the hammerstone and anvil, or formed by flake removal, like the chopper.

8) Manuports: Manuports are unique stones that may or may not have arrived at the site through human intervention. These rocks, since they show no form of human modification, could not be designated as actual tools; however, since they exhibit features that might reflect their being transported into the site area, these items were included in the site assemblage and were cataloged.

9) Ochre: Ochre includes minerals like hematite and limonite that might have been a source for the preparation of pigment.

4.1.1 The Chipped Lithic Assemblage

In total, the surface-collected lithic assemblage is composed of 3260 items with a total weight of 287.6kg. These items were split into two groups, the chipped lithic assemblage and the non-chipped lithic assemblage. Within the chipped lithic assemblage, 28 different kinds of raw material were recognized based on such characteristics as texture, colour, and diaphaneity (Table 4.1). Of importance in helping differentiate between different raw material types were the descriptions provided by Eldon Johnson's (1998) study of Saskatchewan lithic material types and source areas. Of these 28 different lithologies, six stand out due to their frequent occurrence. These include, in order of highest to lowest frequency: Swan River chert (SRC) (27.0%, n=496), silicified wood (17.3%, n=317), chert (13.1%, n=241), quartzite (11.0%, n=201), quartz (7.6%, n=140), and silicified siltstone pebble (SSP) (7.5%, n=137). The remaining 22 raw material types all fall into a percentage range between 0.05% to 5.9%.

Table 4.1 Lithic Material Types of the Chipped Lithic Assemblage.

Material	Frequency	Weight (g)	% Frequency	% Weight
Agate	1	1.4	0.05	0.005
Andesite	1	93.7	0.05	0.3
Argillite	1	1047.0	0.05	3.8
Basalt	58	7235.2	3.2	26.2
Brown Chalcedony	15	5.6	0.8	0.02
Red River Chert	16	47.2	0.9	0.2
Chalcedony	19	59.8	1.0	0.2
Chert	241	770.7	13.1	2.8
Diorite	2	5.9	0.1	0.02
Dolomite	2	6.4	0.1	0.02
Feldspathic Siltstone	4	21.2	0.2	0.08
Fused Shale	12	34.1	0.7	0.1
Granite	1	8.1	0.05	0.03
Gronlid Siltstone	18	30.5	1.0	0.1
Jasper	6	7.3	0.3	0.03
Knife River Flint	8	11.0	0.4	0.04
Limestone	4	400.2	0.2	1.4
Mudstone	1	36.8	0.05	0.1
Obsidian	2	3.3	0.1	0.01
Quartz	140	2614.3	7.6	9.5
Quartzite	201	9157.8	11.0	33.1
Sandstone	11	1650.4	0.6	6.0
Schist	5	257.6	0.3	0.9
Silcified Peat	109	318.2	5.9	1.2
Silicified Siltstone Pebbles	137	369.7	7.5	1.3
Silcified Wood	317	826.2	17.3	3.0
Siltstone	7	75.8	0.9	0.3
Swan River Chert	496	2556.7	27.0	9.2
Total	**1835**	**27652.1**	**100**	**99.9**

4.1.1.1 Debitage

The debitage was composed of 1584 artifacts, or 49.6% of the total chipped lithic collection. Using the techniques previously presented, these artifacts were separated into their respective lithic raw material types and into the flake or shatter artifact groups. They were counted and weighed to the nearest tenth of a gram. If an artifact weighed less than a tenth of a gram, and thus did not register a weight on the electronic scale, it was given a weight of 0.01g. This was done for two reasons. First, a designation of 0.0g would be misleading as to how much the artifact actually weighed, and second, a weight of 0.0g would not have registered the artifact when it came time to create a density contour map using the Arcview GIS program.

This artifact category was divided into 26 different lithic types (Table 4.2). By far the most common material was SRC making up 28.6% (n=454) of the collection. The next most common materials included silicified wood (18.1%, n=288), chert (13.5%, n=215), quartzite (10.3%, n=164), quartz (8.2%, n=130), silicified peat (6.1%, n=98), SSP (5.2%, n=83), basalt (2.8%, n=45), chalcedony (1.0%, n=17) and Red River chert (1.0%, n=16). The remaining lithic material types ranged between 0.06% to 0.9% making up a smaller portion of the collection.

As can be seen from the above percentages, the top ten lithic materials all represent local materials. The fact that these local materials make up such a high percentage of the assemblage is of interest. Other archaeologists that have studied the Old Women's Phase have noted the high reliance and emphasis placed on the use of local materials within the lithic assemblage (e.g. Meyer 1988:59; Walde et al. 1995:26).

Furthermore, during his assessment of the Old Women's Phase in Alberta, Reeves (1983:19) also noted that one of the most common local materials to be used at these sites was silicified wood. As can be seen within the material

Table 4.2 Lithic Material Types of the Sherwin Campbell Debitage.

Material	Frequency	Weight (g)	% Frequency	% Weight
Andesite	1	93.7	0.06%	1.1%
Basalt	45	1410.9	2.80%	17.1%
Chert	215	629.8	13.50%	7.6%
Breccia	1	43.7	0.06%	0.5%
Brown Chalcedony	14	4.5	0.80%	0.5%
Chalcedony	17	52.9	1.00%	0.6%
Diorite	2	5.9	0.01%	0.07%
Feldspathic Siltstone	1	3.9	0.06%	0.04%
Fused Shale	10	31.9	0.60%	0.3%
Granite	1	8.1	0.06%	0.09%
Gronlid Siltstone	15	23.9	0.90%	0.2%
Jasper	4	2.8	0.20%	0.03%
Knife River Flint	5	5.8	0.30%	0.07%
Limestone	2	4.6	0.10%	0.05%
Obsidian	1	0.01	0.06%	0.00012%
Quartz	130	700.9	8.20%	8.5%
Quartzite	164	2111.4	10.30%	25.6%
Sandstone	6	133.5	0.30%	1.6%
Schist	3	93.6	0.10%	1.1%
Silicified Peat	98	255.6	6.10%	3.1%
Silicified Siltstone Pebbles	83	185.8	5.20%	2.2%
Silicified Wood	288	714.4	18.10%	8.6%
Siltstone	7	75.8	0.40%	0.9%
Swan River Chert	454	1580.4	28.60%	19.1%
Red River Chert	16	47.2	1.00%	0.5%
Mudstone	1	21.2	0.06%	0.2%
Total	**1584**	**8242.21**	**99.9%**	**99.7%**

percentages, silicified wood was the second most commonly used lithic at the Sherwin Campbell site, making up 18.1% of the assemblage.

When considered separately from one another, the shatter and flake groups of debitage show unique characteristics. The flakes, for example make up only 25.2% (n=399) of the entire debitage category (Table 4.3), while the shatter makes up the remaining 74.8% (n=1185) (Table 4.4). When a weight percentage is calculated, the flakes make up 53.1% of the weight and the flakes 46.8%. This shows that the flakes have a greater weight, even though they are found in smaller numbers. As a result, an explanation is needed to determine what these percentages are reflecting. Why would the flake category have the most weight with the fewest number of items and why would the shatter reflect the highest count but the lowest weight?

Table 4.3 Lithic Material Types of Flakes.

Material	Frequency	Weight (g)	% Frequency	% Weight
Andesite	1	93.7	0.2%	2.1%
Basalt	28	1314.4	7.0%	30.0%
Chert	56	128.3	14.0%	2.9%
Breccia	1	43.7	0.2%	0.9%
Brown Chalcedony	8	2.4	2.0%	0.05%
Chalcedony	9	2.0	2.2%	0.04%
Diorite	2	5.9	0.5%	0.1%
Feldspathic Siltstone	1	3.9	0.2%	0.08%
Fused Shale	2	6.8	0.5%	0.2%
Granite	1	8.1	0.2%	0.2%
Gronlid Siltstone	8	16.5	2.0%	0.4%
Jasper	1	1.0	0.2%	0.02%
Knife River Flint	4	4.7	1.0%	0.1%
Limestone	2	4.6	0.5%	0.1%
Obsidian	1	0.01	0.2%	0.0002%
Quartz	15	143.0	3.7%	3.2%
Quartzite	77	1704.8	19.2%	38.9%
Sandstone	5	121.9	1.2%	2.7%
Schist	2	84.8	0.5%	1.9%
Silicified Peat	9	19.9	2.2%	0.5%
Silicified Siltstone Pebbles	33	74.0	8.2%	1.6%
Silicified Wood	14	24.3	3.5%	0.5%
Siltstone	4	46.1	1.0%	1.0%
Swan River Chert	115	523.2	28.8%	11.9%
Total	**399**	**4378.0**	**99.2%**	**99.4%**

The suggestion is that the numbers reflected by the flakes are a result of a high frequency of early reduction flakes. As a result, the flake assemblage consists of a very high quantity of large primary flakes that are heavier on average than the shatter.

A second question that needs to be considered is why there would be such a preponderance of these larger heavier flakes over later reduction secondary and tertiary flakes. A likely answer to this is the size effect, which is explained as the segregation of objects by size due to tillage episodes, resulting in larger objects being found more often during the initial collection of a site (Jermann 1981:115).

Table 4.4 Lithic Material Types of Shatter.

Material	Frequency	Weight (g)	% Frequency	% Weight
Basalt	17	96.5	1.4%	2.4%
Chert	159	501.4	13.4%	12.9%
Brown Chalcedony	6	2.1	0.5%	0.05%
Chalcedony	8	50.9	0.6%	1.3%
Fused Shale	8	25.1	0.6%	0.6%
Gronlid Siltstone	7	7.4	0.5%	0.2%
Knife River Flint	1	1.1	0.08%	0.02%
Quartz	115	557.9	9.7%	14.4%
Quartzite	87	406.6	7.3%	10.5%
Sandstone	1	11.6	0.08%	0.3%
Schist	1	8.8	0.08%	0.2%
Silicified Peat	89	235.7	7.5%	6.0%
Silicified Siltstone Pebbles	50	111.8	4.2%	2.8%
Silicified Wood	274	690.1	23.1%	17.8%
Siltstone	3	29.7	0.25%	0.7%
Swan River Chert	339	1057.2	28.6%	27.3%
Red River Chert	16	47.2	1.3%	1.2%
Jasper	3	1.8	0.25%	0.04%
Mudstone	1	21.2	0.08%	0.5%
Total	**1185**	**3864.1**	**99.5%**	**99.2%**

For the shatter, the exact opposite is true where there are higher frequencies but lower weight percentages than those found for the flakes. One possible explanation for this is that the raw materials being selected for knapping were of poor quality. Therefore, as these items were flaked, flaws within the material would cause them to shatter into numerous small pieces, producing higher quantities of shatter than the desired flake blanks.

4.1.1.2 Cores

Five kinds of cores were recognized in this assemblage: unifacial, bifacial, polymorphic, and bipolar cores, as well as core fragments. A total of 102 cores was identified with a total weight of 17.7kg. Of the entire assemblage, cores make up only 3.2% of the total count and by weight they make up 6.1% of the assemblage. Within this category of artifacts 13 lithic materials were identified (Table 4.5). These included quartzite (28.4%, n=29), SSP (24.5%, n=25), SRC (12.7%, n=13), basalt (10.7%, n=11), quartz (7.8%, n=8), chert (4.9%, n=5), sandstone (2.9%, n=3), dolomite (1.9%, n=2), and feldspathic siltstone (1.9%, n=2). The remaining four lithics-argillite, Gronlid siltstone, agate, and silicified peat–all represented one percent of the total category.

Table 4.5 Lithic Materials for the Cores.

Cores				
Material	**Frequency**	**Weight (g)**	**% Frequency**	**% Weight**
Agate	1	1.4	1.0%	0.007%
Argillite	1	1047.0	1.0%	5.9%
Basalt	11	5617.2	10.7%	31.7%
Chert	5	53.5	4.9%	0.03%
Dolomite	2	6.4	1.9%	0.03%
Feldspathic Siltstone	2	14.8	1.9%	0.08%
Gronlid Siltstone	1	3.7	1.0%	0.02%
Quartz	8	1906.8	7.8%	10.7%
Quartzite	29	6911.0	28.4%	39.0%
Sandstone	3	1176.4	2.9%	6.6%
Silicified Peat	1	3.6	1.0%	0.02%
Silicified Siltstone Pebbles	25	107.2	24.5%	0.6%
Swan River Chert	13	859.0	12.7%	4.8%
Total	**102**	**17708.0**	**99.7%**	**99.5%**

One observation of interest is that when the top eight lithic sources for cores are compared to the top eight lithics for debitage, six coincide. The materials that do not coincide, however, include sandstone, dolomite, and feldspathic siltstone that only totalled seven items.

Unifacial cores are those with only one striking platform (Kooyman 2000:100). Thirteen of these cores were identified, representing 12.7% of the entire core category. Of these thirteen items only five different lithic raw materials were identified (Table 4.6).

Table 4.6 Lithic Materials of Unifacial Cores.

Unifacial Cores		
Material	**Frequency**	**% Frequency**
Argillite	1	7.6%
Basalt	6	46.1%
Quartz	2	15.3%
Quartzite	3	23.1%
Sandstone	1	7.6%
Total	**13**	**99.7%**

Fifteen bifacial cores were identified, representing 14.7% of the cores. Within the bifacial core category six raw materials were identified. The most common was SRC making up nearly half of the entire group at 46.6% (n=7) and quartzite at 26.6% (n=4). The remaining sources including basalt, chert, quartz, and sandstone all tied at 6.6% (n=1) (Table 4.7).

Table 4.7 Lithic Materials of Bifacial Cores.

Bifacial Cores		
Material	**Frequency**	**% Frequency**
Basalt	1	6.6%
Chert	1	6.6%
Quartz	1	6.6%
Quartzite	4	26.6%
Sandstone	1	6.6%
Swan River Chert	7	46.6%
Total	**15**	**99.6%**

The bipolar core group makes up the highest percentage of the core types at 40.2%, represented by 41 artifacts. By far the most abundant of the nine raw materials identified was SSP making up over half the total of this group at 60.9% (n=25) (Table 4.8). It is particularly interesting that this third type of core made up the highest percentage of all the core types. Other authors have noted the frequent presence of bipolar cores in Old Women's Phase assemblages (Walde et al. 1995:26).

Table 4.8 Lithic Materials of Bipolar Cores.

Bipolar Cores		
Material	**Frequency**	**% Frequency**
Agate	2	4.8%
Chert	2	4.8%
Dolomite	2	4.8%
Feldspathic Siltstone	1	2.4%
Gronlid Siltstone	1	2.4%
Quartz	2	4.8%
Quartzite	5	12.1%
Silicified Peat	1	2.4%
Silicified Siltstone Pebbles	25	60.9%
Total	**41**	**99.4%**

Polymorphic cores made up the lowest percentage of the entire group, composing only 9.8% of the core assemblage. Five raw materials were identified (Table 4.9).

The core fragments made up the second largest group in this category. It was composed of 23 items representing 22.5% of the entire core assemblage. Among this total were five lithic materials: quartzite, SRC, chert, basalt, and quartz (Table 4.10).

Table 4.9 Lithic Materials of Polymorphic Cores.

Polymorphic Cores		
Material	**Frequency**	**% Frequency**
Basalt	2	20.0%
Quartz	1	10.0%
Quartzite	4	40.0%
Sandstone	1	10.0%
Swan River Chert	2	20.0%
Total	**10**	**100.0%**

Table 4.10 Lithic Materials of Core Fragments.

Core Fragments		
Material	**Frequency**	**% Frequency**
Chert	2	8.6%
Basalt	2	8.6%
Quartz	2	8.6%
Quartzite	13	56.5%
Swan River Chert	4	17.3%
Total	**23**	**99.6%**

4.1.1.3 Bifaces: Projectile Points.

Although all of the projectile points were bifacially flaked, these tools have been placed in a separate section. Projectile points help determine what archaeologically defined cultures, phases, or complexes the site is associated with, which in turn can approximately date the site if radiocarbon dating is not possible. Twenty-six projectile points were recovered in surface collecting, 25 of the Prairie Side-Notched type (Figure 4.1, B, H, L, O – AA) and one of the Plains Side-Notched type (Figure 4.1, A). Nine different raw materials are represented (Table 4.11). The ultimate decision of what morphological characteristics would be recorded was based on Nicholson's (1976) approach at the Stott site in Manitoba. The only characteristic that was added to his list was the basal juncture shape. A total list of those characteristics analyzed by the author is provided in Appendix A.

Table 4.11 Lithic Materials of the Projectile Points.

Projectile Points		
Material	**Frequency**	**% Frequency**
Chert	5	19.2%
Fused Shale	1	3.8%
Gronlid Siltstone	1	3.8%
Jasper	1	3.8%
Quartzite	2	7.6%
Silicified Peat	3	11.5%
SSP	4	15.3%
Silicified Wood	2	7.6%
SRC	7	26.9%
Total	**26**	**99.5%**

The choice of what metric attributes to record came from Brumley's (1988:12.8) work on the Old Man River project in Alberta. A metric analysis was conducted on this and all the other tool categories. The measurements taken for all the tool categories can be seen in Appendix A.

4.1.1.4 Other Bifacial Stone Tools

A total of 24 bifacially worked tools was identified representing only 0.75% of the entire collection. These 24 items were made from nine raw materials. The three most common included 10 (41.6%) items of SRC, four (16.6%) silicified wood items and four (16.6%) silicified peat artifacts (Table 4.12). The remaining six raw materials were all represented by only one item each. Three tool types were recognized; 22 knives (Figure 4.2), one chi tho (Figure 4.3), and one pièce esquillèe (Figure 4.4). Non-metric and metric traits are summarized in Table 6 in Appendix A.

Table 4.12 Lithic Materials of Bifacial Tools.

Material	Frequency	Weight (g)	% Frequency	% Weight
Brown Chalcedony	1	1.1	4.1%	0.3%
Chert	1	6.3	4.1%	2.2%
Quartz	1	1.4	4.1%	0.5%
Quartzite	1	11.9	4.1%	4.2%
Schist	1	149.7	4.1%	53.6%
Silicified Peat	4	32.5	16.6%	11.6%
SSP	1	0.4	4.1%	0.1%
Silcified Wood	4	24.2	16.6%	8.6%
SRC	10	51.7	41.6%	18.5%
Total	**24**	**279.2**	**99.4%**	**99.6%**

In total there were five different knife shapes. The first is rectangular, represented by eight items (36.4%) (Figure 4.2, B, E, I, J, K, L, M, T) followed by seven rhomboidal leaf (31.8%) (Figure 4.2, D, F, G, P, Q, S, U), four ovoid (18.2%) (Figure 4.2, A, C, H, N), two triangular (9.1%) (Figure 4.2, R, V), and one cresentic (4.5%) (Figure 4.2, O). The majority of these tools (59.1%) were incompletely bifacially retouched on one or both surfaces, leaving behind some of the original cortex. No evidence of hafting could be discerned on any of these specimens. However, it was noted that 56.5% of the knives had received some form of intentional backing so they could be held without the possibility of injury (Kooyman 2000:95). The remaining were not backed; however, in the majority of these cases the edges were already dull.

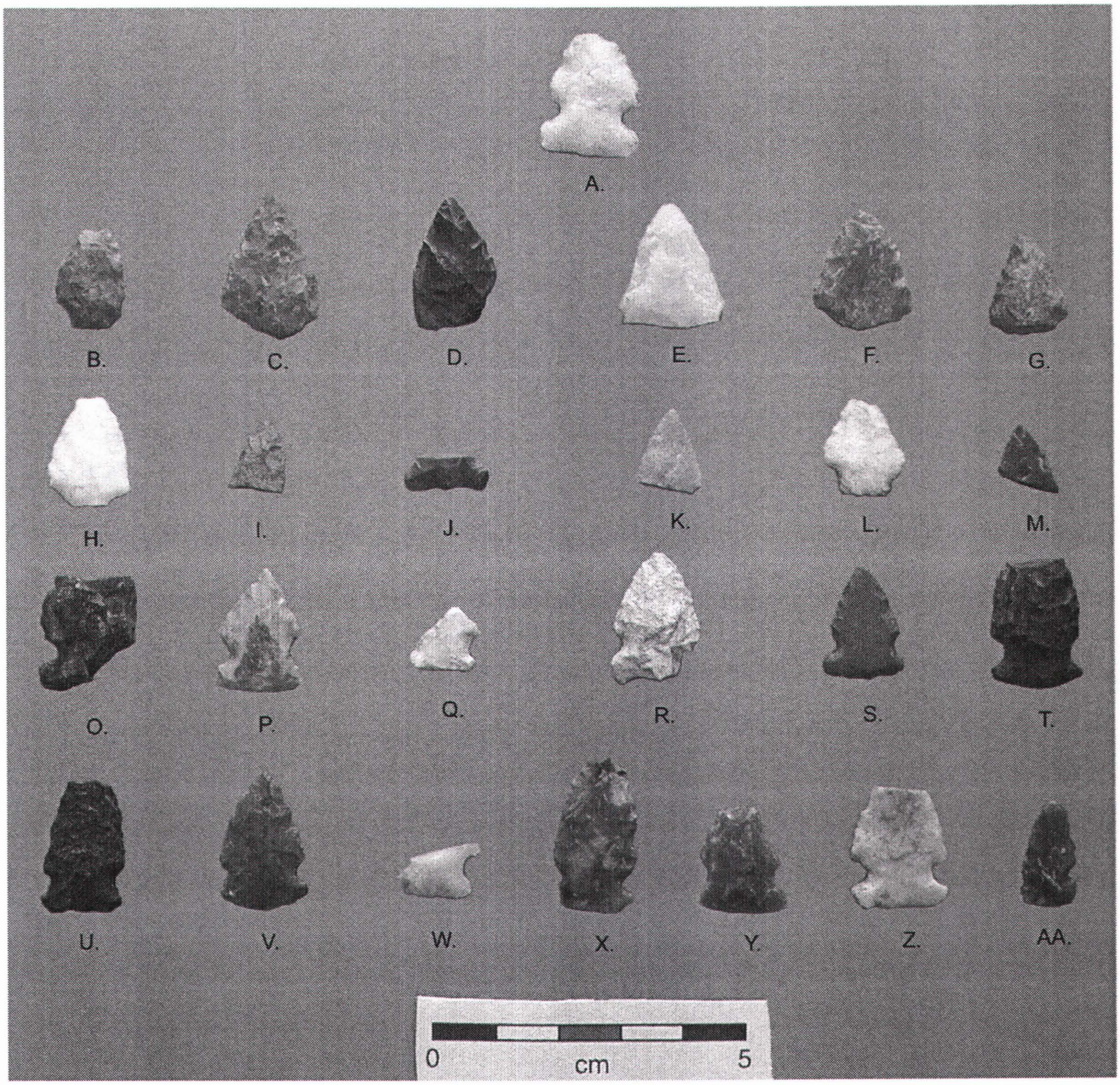

Figure 4.1 Projectile Points of the Surface Collection: Prairie Side-Notched – B, H, L, O – AA; Plains Side-Notched – A.

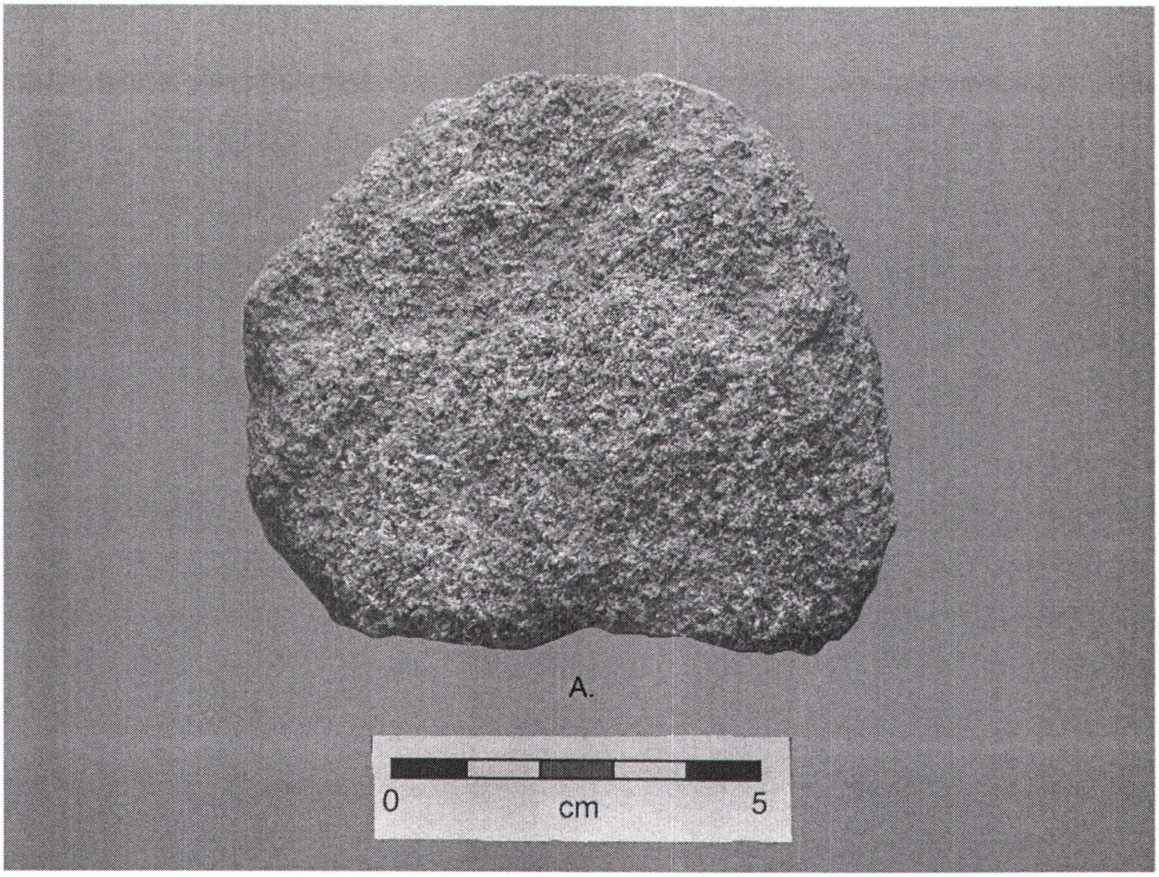

Figure 4.3 Chi Tho from Surface Collection.

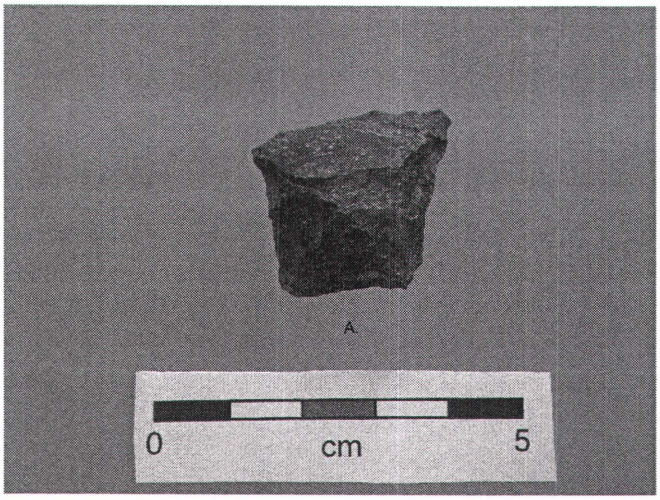

Figure 4.4 Pièce Esquillèe from the Surface Collection.

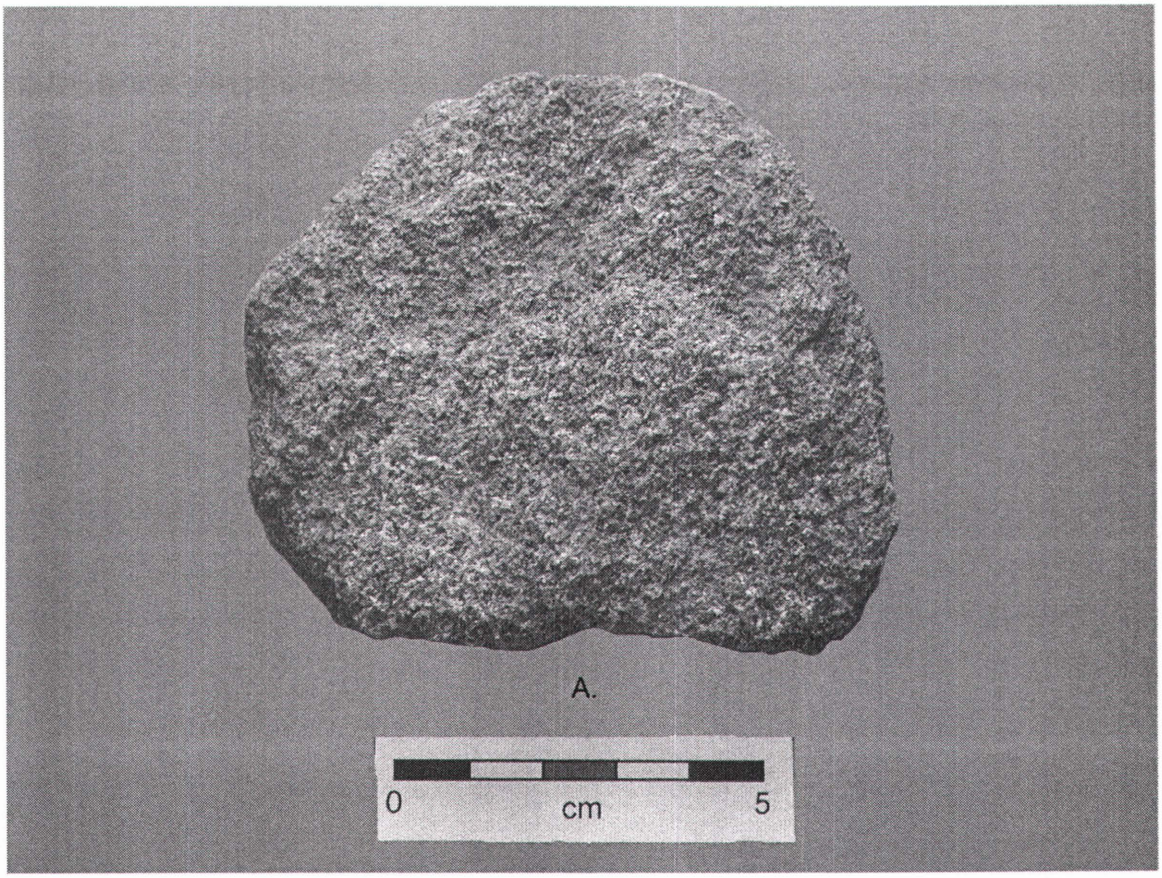

Figure 4.3 Chi Tho from Surface Collection.

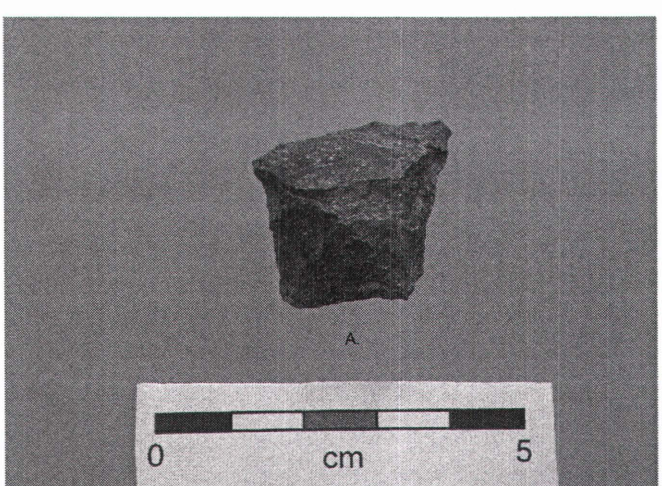

Figure 4.4 Pièce Esquillèe from the Surface Collection.

The chi tho is a tool used for hide preparation. These tools are commonly identified in more northerly sites; however, they do appear occasionally in southern assemblages (e.g. Dyck and Morlan 1995). Quite often, when identified at southern this tool is referred to as a "teshoa" (e.g. Eyman 1968). This tool (Figure 4.3) is made from schist and has an overall ovoid shape. Bifacial flaking is found on the margins of the tool except for the proximal edge.

The pièce esquillèe (Figure 4.4) is made from silicified wood. It has an overall trapezoidal shape with asymmetric longitudinal and transverse cross sections. On this tool both lateral edges had been worked bifacially to create the working edges, although one edge shows more battering than actual flaking.

4.1.1.5 Unifacial Tools

A total of 46 unifaces split into three tool categories was recognized. These were scrapers, spokeshaves, and gravers. The scraper tool group was subdivided into endscrapers, sidescrapers, and scraper preforms. A total of 10 lithic materials were used to make the tools (Table 4.13). The most prominent was SSP represented by 14 items (30.4%), silicified wood and chert both represented by nine items (19.5%), SRC by four (8.6%), and KRF by three (6.5%). The remaining lithics were only represented by one or two specimens. Of special note within this group of tools was the only formed tool made from obsidian. Several descriptive attributes were employed in the analysis of these tools. If an attribute was incomplete, it was still analyzed if there was enough of the attribute left to get an idea of its shape. The morphological and metric attributes that were analyzed are summarized in a Table 10 in Appendix A

Table 4.13 Lithic Materials for the Unifacial Tools.

Unifaces				
Material	**Frequency**	**Weight (g)**	**% Frequency**	**% Weight**
Chalcedony	1	1.4	2.1%	0.7%
Chert	9	60.6	19.5%	31.1%
Fused Shale	1	1.9	2.1%	1.0%
Knife River Flint	3	5.2	6.5%	2.7%
Obsidian	1	3.3	2.1%	1.7%
Quartzite	2	13.6	4.3%	7.0%
Silicified Peat	2	13.3	4.3%	6.8%
Silicified Siltstone Pebbles	14	50.2	30.4%	25.8%
Silicified Wood	9	23.8	19.5%	12.2%
Swan River Chert	4	21.4	8.6%	11.0%
Total	**46**	**194.7**	**9940.0%**	**100.0%**

In total, 43 scrapers were identified. These tools were used for scraping, in particular, the scraping of hides. Of these, forty were endscrapers, representing 93% of the entire scraper category (Figure 4.5; 4.6). Ten different raw materials composed the 40 tools in this subgroup (Table 4.14). The most prominent was SSP (n=13), followed by chert (n=7), silicified wood (n=7), SRC (n=4), and KRF (n=3). The remaining raw materials were represented by only one or two items each, including the one formed obsidian tool. The endscrapers occur in five shapes. The most common shapes are triangular or oval (35%, n=14). (Triangular: Figure 4.5, A, C, E, I, L, M, Q, S, V, W, Y; Figure 4.6, C, F, J; Oval: Figure 4.5, F, H, N, O, P, T, U; Figure 4.6, A, B, D, H, I, K, M). The remaining three shapes are rectangular (10%, n=4) (Figure 4.5, D, J, R, X; Figure 4.6, N), irregular (7.5%, n=3) (Figure 4.5, B, G, K; Figure 4.6, E, G, O), and

Table 4.14 Lithic Materials of the Endscrapers.

Endscrapers		
Material	**Frequency**	**% Frequency**
Chalcedony	1	2.5%
Chert	7	17.5%
Fused Shale	1	2.5%
Knife River Flint	3	7.5%
Obsidian	1	2.5%
Quartzite	1	2.5%
Silicified Siltstone Pebbles	13	32.5%
Silicified Peat	2	5%
Silicified Wood	7	17.5%
Swan River Chert	4	10%
Total	**40**	**100.0%**

square (2.5%, n=1) (Figure 4.6, L). The distal edge shape is either convex (92.5%, n=37) or straight (7.5%, n=3). Finally, 35% (n=14) of these tools had been completely flaked on the dorsal surface. One unique tool with a side notch was identified (Figure 4.6, O).

Sidescrapers have one or both lateral edges shaped into the working edge. Only two of these tools were identified, both made from chert. One sidescraper is rectangular (Figure 4.7, A), the other is ovoid (Figure 4.7, B). Neither of these tools has complete retouch on the dorsal surface.

A single scraper preform was made from silicified wood (Figure 4.7, B). This tool has limited unifacial retouch on the left lateral edge. It has a triangular shape; however, the proximal end is missing.

Two gravers were identified, one made from chert (Figure 4.8, B), the other from silicified wood (Figure 4.8, A). Both of these tools have a pointed distal end. One of these has only one edge of the point worked unifacially, however, the second graver has both edges of the point worked.

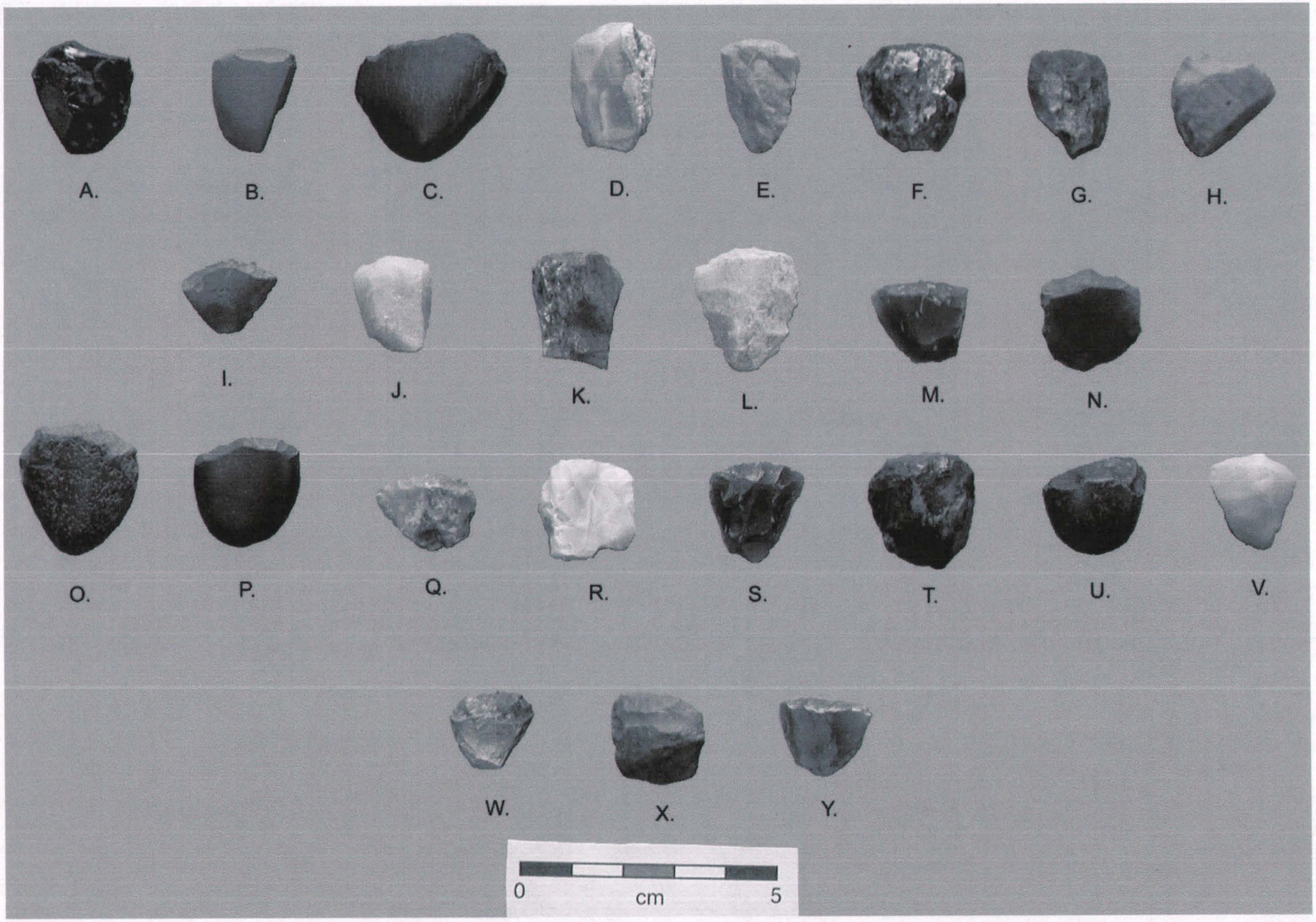

Figure 4.5 Endscrapers from the Surface Collection.

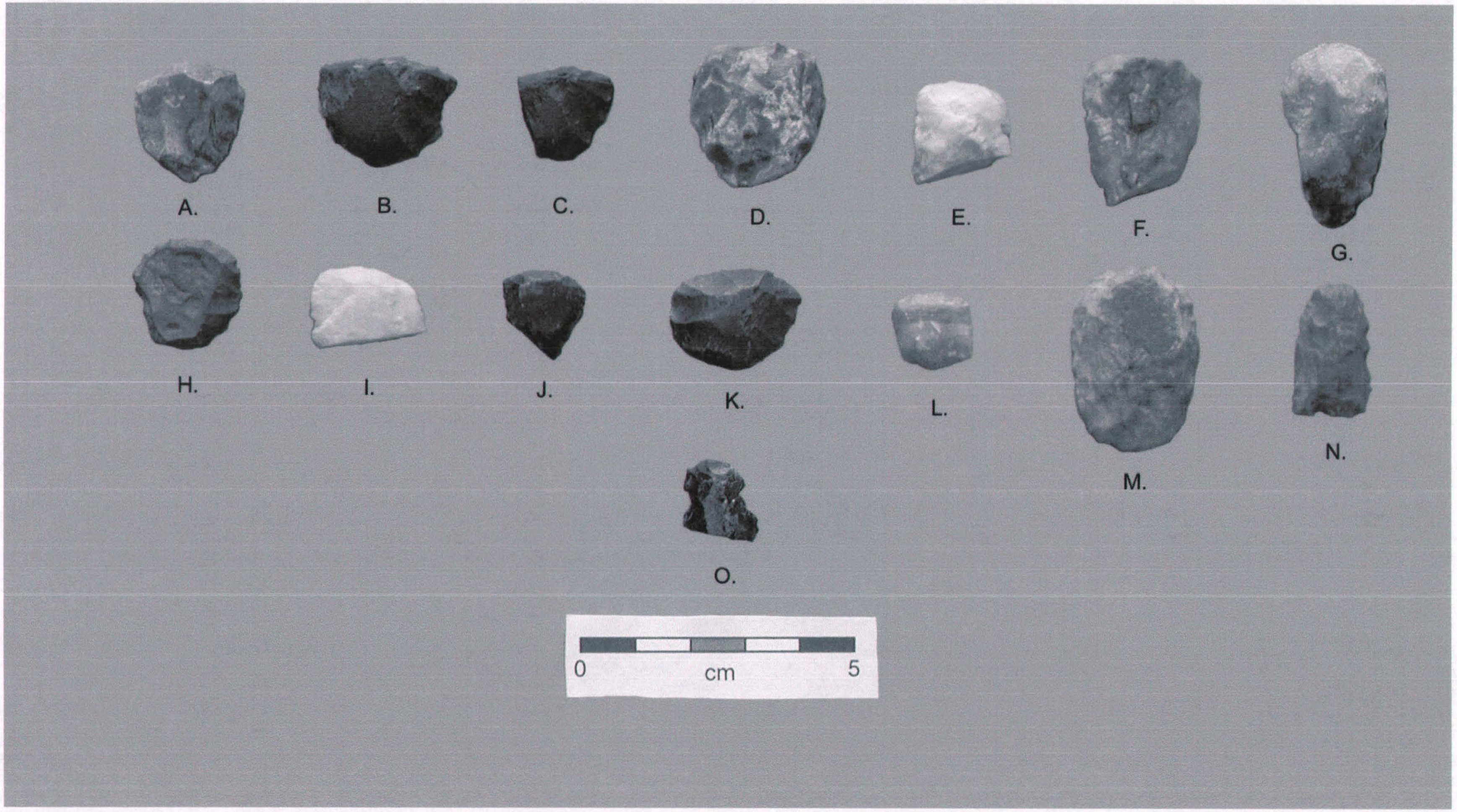

Figure 4.6 Endscrapers from the Surface Collection.

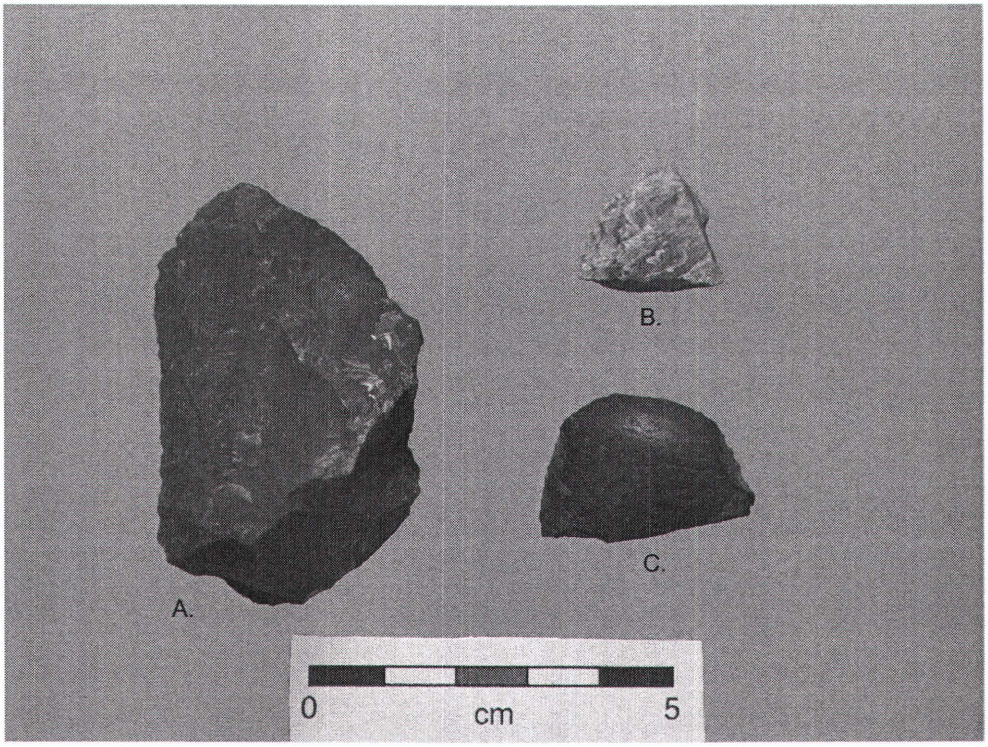

Figure 4.7 Sidescrapers (A and C) and Scraper Preform (B).

A single spokeshave (Figure 4.9) has an irregular overall shape, with the left lateral edge (as illustrated) shaped into the concave working edge. It was made of SSP.

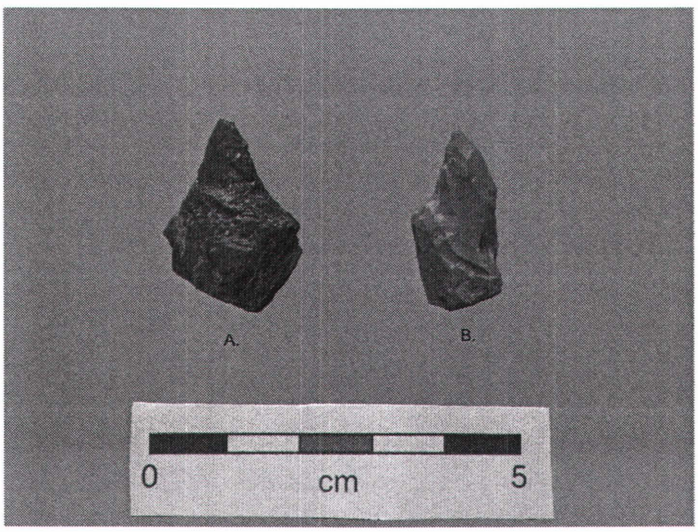

Figure 4.8 Gravers from the Surface Collection.

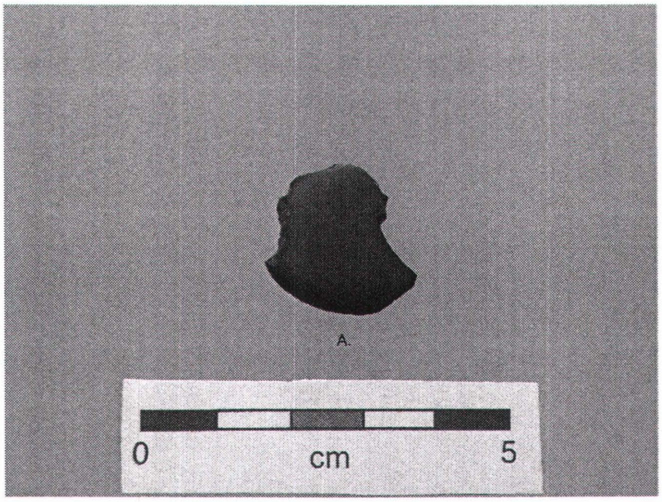

Figure 4.9 Spokeshave from Surface Collection.

4.1.1.6 Retouched and Utilized Tools

Fifty retouched or utilized flakes, representing 1.6% of the entire lithic assemblage, were identified. These items were made from 14 different raw materials (Table 4.15). The most common materials used are silicified wood (28.0%, n=14), SSP (16.0%, n=8), SRC (14.0%, n=7), and chert (12.0%, n=6). The remaining raw materials are represented by one to three items each. Only a non-metric descriptive analysis was completed for the tools in this category. The most important traits that were described were whether the tool was retouched or utilized, if it was retouched, what kind of retouch was present (i.e. unifacial or bifacial), and finally, where this working edge was located. Three different retouched flake groups were created on the basis of the kind of retouch: 1) unifacially retouched artifacts, 2) bifacially retouched artifacts, and 3) bifacially/unifacially retouched artifacts. The remaining tools showed use wear.

The unifacially retouched tools made up over half of this entire category. It was represented by 28 artifacts. Ten different raw materials were present in this

Table 4.15 Lithic Materials of the Retouched and Utilized Flakes.

Retouched and Utilized Flakes		
Material	**Frequency**	**% Frequency**
Chalcedony	1	2.0%
Chert	6	12.0%
Basalt	2	4.0%
Feldspathic Siltstone	1	2.0%
Gronlid Siltstone	1	2.0%
Jasper	1	2.0%
Quartz	1	2.0%
Quartzite	3	6.0%
Sandstone	2	4.0%
Schist	1	2.0%
Silicified Peat	2	4.0%
Silicified Siltstone Pebbles	8	16.0%
Silicified Wood	14	28.0%
Swan River Chert	7	14.0%
Total	**50**	**100.0%**

group (Table 4.16). The most common was SSP (25.0%, n=7).

Bifacially retouched artifacts, totaled 16. Nine raw materials were used in their construction, the two most common being silicified wood (43.7%, n=7) and

Table 4.16 Lithic Materials of the Unifacially Retouched Flakes.

Unifacially Retouched Flakes		
Material	**Frequency**	**% Frequency**
Basalt	1	3.6%
Chert	5	17.9%
Feldspathic Siltstone	1	3.6%
Gronlid Siltstone	1	3.6%
Jasper	1	3.6%
Quartzite	2	7.1%
Sandstone	1	3.6%
Silicified Siltstone Pebbles	7	25.0%
Silcified Wood	5	17.9%
Swan River Chert	4	14.3%
Total	**28**	**100.0%**

silicified peat (12.5%, n=2). The remainder are represented by only one artifact each (Table 4.17).

Table 4.17 Lithic Materials of the Bifacially Retouched Flakes.

Bifacially Retouched Flakes		
Material	Frequency	% Frequency
Basalt	1	6.2%
Chert	1	6.2%
Quartz	1	6.2%
Sandstone	1	6.2%
Schist	1	6.2%
Silicified Peat	2	12.5%
Silicified Siltstone Pebbles	1	6.2%
Silicified Wood	7	43.7%
Swan River Chert	1	6.2%
Total	**16**	**99.6%**

Three bifacial/unifacial retouched artifacts were identified. Two raw materials are represented: silicified wood (n=2) and SRC (n=1).

Only three items are utilized with use-wear evident. Each of these is made from a different raw material: chalcedony, quartzite, and SRC.

4.1.2 The Non-Chipped Lithic Assemblage

The non-chipped lithic assemblage is composed of four different categories of artifacts: fire cracked rock (FCR), manuports, ochre, and heavy stone tools.

4.1.2.1 Fire Cracked Rock

Fire cracked rocks are the result of the use of rocks in a variety of tasks. These included such things as boiling and roasting meat or plant foods, fire bounding, boiling liquids, and steam generation (Petralgia 2002:241-242). There were 1280 pieces of FCR weighing a total of 247.9kg. As such, this represents 40.2% of the entire collection by count, and by weight it makes up 86.1% of the complete assemblage. There are 20 different raw materials used for FCR and one indeterminate lithic type (Table 4.18). The most important raw materials are granite (66.8%, n=854) and sandstone (16.3%, n=209). Weight follows a similar pattern with granite dominating the category at 74.4%, followed by sandstone (9.8%).

4.1.2.2 Manuports

Manuports are unique items which, though unmodified through human activity, exhibit features that could have piqued the interest of people and been brought to the site by them. At the same time, however, they could also represent items that were present in the glacial till. Even though that could be a possibility, these items were still cataloged and analyzed. In total, 57 manuports were identified. This represents only 1.8% of the entire lithic assemblage. These 57 items were assigned to one of four groups: fossil bearing manuports, unique erosional manuports, unique raw material manuports, and coarse rock. Under the first grouping, four items were identified. These fossil bearing rocks included two different lithic types, limestone and mudstone. In the second group, only one item of granite was cataloged. The next category is made up of one artifact of ironstone. The final manuport category, the coarse rock, is composed of the remaining 51 items. In all, 13 raw materials are represented (Table 4.19). Many of these raw materials are rather generic like granite (n=4), diorite (n=1), limestone (n=11), or mudstone (n=1). Others could easily represent nodules that never got worked, such as SRC (n=1), quartzite (n=4), jasper (n=1), and chert (n=5).

4.1.2.3 Ochre

None of the ochre specimens show modification; however, they do

Table 4.18 Lithic Materials of the Fire Cracked Rock.

Material	Frequency	Weight (g)	% Frequency	% Weight
Amphibole Schist	2	440.9	0.2%	0.2%
Andesite	2	327.5	0.2%	0.1%
Basalt	37	7189.7	2.9%	2.9%
Breccia	1	386.5	0.08%	0.2%
Diorite	36	9935.3	2.8%	4.0%
Dolomite	1	86.5	0.08%	0.03%
Gneiss	3	2153.3	0.2%	0.9%
Granite	854	184075.2	66.8%	74.4%
Limestone	6	509.7	0.5%	0.2%
Mica Schist	43	6385.2	3.4%	2.6%
Mudstone	6	1786.0	0.5%	0.7%
Potassium Feldspar	2	54.1	0.2%	0.02%
Quartz	9	906.0	0.7%	0.4%
Quartzite	25	4805.9	2.0%	1.9%
Sandstone	209	24335.0	16.3%	9.8%
Schist	21	1978.2	1.6%	0.8%
Shale	6	368.1	0.5%	0.2%
Siltstone	4	139.8	0.3%	0.06%
Slate	7	524.4	0.6%	0.2%
Swan River Chert	4	1145.8	0.3%	0.5%
Unidentified	1	24.3	0.08%	0.01%
Total	**1279**	**247557.4**	**100.00%**	**100.00%**

Table 4.19 Lithic Materials of Coarse Rock.

Material	Frequency	Weight (g)	% Frequency	% Weight
Basalt	3	287.8	5.8%	6.3%
Chert	5	72.9	9.8%	1.6%
Diorite	1	204.2	1.9%	4.5%
Granite	4	829.3	7.8%	18.3%
Jasper	1	1.5	1.9%	0.03%
Limestone	11	978.4	21.5%	21.6%
Mica Schist	1	0.7	1.9%	0.01%
Mudstone	1	58.1	1.9%	1.2%
Quartz	16	281.5	31.3%	6.2%
Quartzite	4	1204.3	7.8%	26.6%
Sandstone	2	503.0	3.9%	11.1%
Swan River Chert	1	77.8	1.9%	1.7%
Total	**51**	**4513.1**	**99.3%**	**99.4%**

represent minerals that could have been brought to the site with the intent to make ochre pigment from them. These represented only 0.09% of the entire lithic assemblage. These items included three pieces of yellow limonite weighing a total of 29.2 grams and one piece of an unidentified powdery green material weighing 2.1 grams.

4.1.2.4 Heavy Stone Tools

In total, 14 heavy stone tools were noted and are made from one of six different raw materials (Table 4.20).

Table 4.20 Lithic Materials of Heavy Stone Tools.

Material	Frequency	Weight (g)	% Frequency	% Weight
Basalt	4	4467.8	28.6%	59.8%
Schist	1	458.7	7.1%	6.1%
Granite	3	1351.4	21.4%	18.1%
Quartzite	4	940.8	28.6%	12.6%
Siltstone	2	257.5	14.3%	3.4%
Total	**14**	**7476.2**	**100.0%**	**100.0%**

These tools were divided into seven groups. These artifacts came in two overall shapes. The most common is oval (50%, n=7), followed by four (28.6%) triangular; the shape of the remaining tools (n=3, 21.4%) could not be determined due to breakage. The largest group was the hammer/anvil stones. This group is made up of seven artifacts. Pecking marks on the edges and surfaces of these tools showed use as hammers to hit objects but also as anvils. Potential uses of these tools include splitting pebbles, hard hammer flake removal from cores, or splitting bones for marrow and bone grease extraction. The next group of tools is composed of three hammerstones that did not exhibit any use as anvil stones. The shape of all three tools is indeterminate as all of them are broken. A single anvil stone was identified. The remaining four categories of tools were represented by only one artifact each. These are hammerstone/choppers, chopper/anvils, choppers, and a unifacial core/hammerstone/anvil. All except one of the choppers exhibited bifacially flaked edges; the final had a unifacially flaked edge. Although some of these tools are broken, when possible a metric analysis was conducted. These attributes are summarized in a table in Appendix A.

4.2 The Excavated Lithic Assemblage.

The fieldwork conducted during the summer of 2001 produced 773 lithic artifacts. As with the surface collected lithics, these materials have been divided into two major groupings: 1) chipped lithics and 2) unchipped lithics. The unchipped group contains only fire cracked rock. Within the chipped stone group, six categories have been recognized: 1) Debitage, 2) Cores, 3) Projectile Points, 4) Other Bifacial Tools, 5) Unifacial Tools, and 6) Retouched and Utilized Artifacts.

4.2.1 The Chipped Lithic Assemblage.

There is a total of 385 chipped artifacts, weighing 1.1kg. This chipped artifact assemblage is made from a total of 24 different raw materials and one unidentified material (Table 4.21). Some of the more important lithic materials for these artifacts include SRC (23.9%, n=91), silicified wood (17.1%, n=65), quartzite (10.8%, n=41), silicified peat (10.0%, n=38), and chert (8.4%, n=32). It is quite apparent, therefore, that the use of local raw materials was favored over exotic materials as was the situation for the surface collected assemblage.

However, just like the surface collected lithics, an exotic did appear in the excavated material – Knife River flint (see Section 4.3 for further information). Another similarity between these two lithic assemblages is the significant number of artifacts of silicified wood.

4.2.1.1 Debitage

As with the surface collection, two types of debitage were recognized, flakes and shatter. A total of 355 pieces of debitage was identified representing 46% of the excavated lithics. Seventeen different lithic materials have been identified within this category (Table 4.22). Some of the more common materials are SRC (23.7%, n=83), silicified wood (17.7%, n=62), quartzite (10.9%, n=38), silicified peat (9.4%, n=33), and chert (8.3%, n=29). The three most common lithics for the shatter is nearly perfectly mimicked by the flakes. For the shatter these material types are silicified wood (19.3%, n=59), SRC (18.6%, n=57), and quartzite and silicified peat (each at 10.8%, or n=33) (Table 4.23). The flakes are represented by SRC (59.1%, n=26), quartzite (11.4%, n=5), and silicified wood (6.8%, n=3) (Table 4.24). When the frequency of these two debitage types is examined, the total number of shatter outnumbers the flakes by a ratio of nearly 6.6 to 1. Based on these frequency and weight totals, it would appear that once again the situation is similar to that of the surface recoveries. For example, there were very low numbers of flakes, but these items do make up a substantial amount of the weight for this category. On the other hand there is a very high number of shatter, but unlike the surface collection, these weighed slightly more than the total number of flakes. Nevertheless, it would appear based on these

Table 4.21 Lithic Materials of the Excavated Chipped Lithic Assemblage.

Material	Frequency	Weight (g)	% Frequency	% Weight
Agate	1	2.2	0.3%	0.2%
Basalt	6	19.3	1.6%	1.7%
Red River Chert	2	5.0	0.5%	0.5%
Chalcedony	7	5.7	1.8%	0.5%
Chert	32	43.6	8.4%	3.9%
Feldspathic Siltstone	2	11.0	0.5%	1.0%
Gronlid Siltstone	2	3.5	0.5%	0.3%
Jasper	9	14.0	2.4%	1.3%
Knife River Flint	3	1.1	0.8%	0.1%
Quartz	14	59.3	3.7%	5.4%
Quartzite	41	305.4	10.8%	27.6%
Silcified Peat	38	25.7	10.0%	2.3%
Silicified Siltstone Pebbles	14	36.3	3.7%	3.3%
Silicified Sandstone	1	6.8	0.3%	0.6%
Silcified Wood	65	115.7	17.1%	10.4%
Slate	10	34.7	2.6%	3.1%
Swan River Chert	91	280.0	23.9%	25.3%
Unidentified	42	148.4	11.1%	13.4%
Total	**380**	**1107.7**	**100.0%**	**100.0%**

Table 4.22 Lithic Materials of Excavated Debitage.

Material	Frequency	Weight (g)	% Frequency	% Weight
Basalt	6	19.3	1.7%	2.3%
Red River Chert	2	5.0	0.6%	0.6%
Chalcedony	6	3.4	1.7%	0.4%
Chert	29	39.2	8.3%	4.8%
Feldspathic Siltstone	2	11.0	0.6%	1.3%
Gronlid Siltstone	2	3.5	0.6%	0.4%
Jasper	7	11.6	2.0%	1.4%
Knife River Flint	3	1.1	0.9%	0.1%
Quartz	14	59.3	4.0%	7.2%
Quartzite	38	190.3	10.9%	23.1%
Silicified Peat	33	22.3	9.4%	2.7%
Silicified Siltstone Pebbles	12	28.3	3.4%	3.4%
Silicified Wood	62	107.3	17.7%	13.0%
Slate	8	9.0	2.3%	1.1%
Swan River Chert	83	222.4	23.7%	27.0%
Indeterminate	43	65.5	12.3%	8.0%
Total	**355**	**823.5**	**100.0%**	**98.4%**

Table 4.23 Lithic Materials of Excavated Shatter.

Material	Frequency	Weight (g)	% Frequency	% Weight
Basalt	6	19.3	2.0%	4.3%
Red River Chert	2	5.0	0.7%	1.1%
Chalcedony	4	0.8	1.3%	0.2%
Chert	28	38.0	9.2%	8.4%
Feldspathic Siltstone	2	11.0	0.7%	2.4%
Gronlid Siltstone	1	0.6	0.3%	0.1%
Jasper	6	8.9	2.0%	2.0%
Knife River Flint	2	0.2	0.7%	0.04%
Quartz	13	52.6	4.2%	11.6%
Quartzite	33	51.7	10.8%	11.4%
Silicified Peat	33	22.3	10.8%	4.9%
Silicified Siltstone Pebbles	10	20.9	3.3%	4.6%
Silicified Wood	59	61.7	19.3%	13.6%
Slate	8	9.0	2.6%	2.0%
Swan River Chert	57	92.5	18.6%	20.5%
Indeterminate	42	57.7	13.7%	12.8%
Total	**306**	**452.2**	**100.0%**	**100.0%**

numbers, that the total frequency and weight of the flakes represent early stage flake reduction.

Table 4.24 Lithic Materials of Excavated Flakes.

Material	Frequency	Weight (g)	% Frequency	% Weight
Chalcedony	2	2.6	4.5%	0.8%
Chert	1	1.2	2.3%	0.3%
Gronlid Siltstone	1	2.9	2.3%	0.8%
Jasper	1	2.7	2.3%	0.8%
Knife River Flint	1	0.9	2.3%	0.3%
Quartz	1	6.7	2.3%	1.9%
Quartzite	5	138.6	11.4%	40.1%
Silicified Siltstone Pebbles	2	7.4	4.5%	2.1%
Silicified Wood	3	45.6	6.8%	13.2%
Swan River Chert	26	129.9	59.1%	37.6%
Indeterminate	1	6.8	2.3%	2.0%
Total	**44**	**345.3**	**100.0%**	**99.9%**

The shatter, due to its very high frequency, could once again represent the poor nature of the lithics being flaked, with the undesired result of more shatter than flake blanks being produced from the cores.

4.2.1.2 Cores

Only three cores were recognized in the course of excavations. These are of quartzite, SRC, and one unidentified igneous material. The quartzite core is polymorphic, the SRC core bifacial, and the third core unifacial. One strange thing to note is the complete absence of bipolar cores, which are usually common in Old Women's Phase assemblages.

4.2.1.3 Bifaces: Projectile Points

A total of eight projectile points were recovered (Figure 4.10). Seven of these were found during the excavations, and one was found during surface reconnaissance. These points were made from three different materials: silicified peat (n=5), SRC (n=2), and silicified wood (n=1) (Table 4.25).

Table 4.25 Lithic Materials of the Excavated Projectile Points.

Material	Frequency	Weight (g)	% Frequency	% Weight
Silicified Peat	5	3.4	62.5%	56.7%
Silicified Wood	1	1.5	12.5%	25.0%
Swan River Chert	2	1.1	25.0%	18.3%
Total	**8**	**6**	**100.0%**	**100.0%**

Five of the points were found within the top 4cm of the occupation layer. Furthermore, all five of these points were found in the two eastern quadrants of the excavation unit.

Five of the eight points have been assigned to the Prairie Side-Notched type (Figure 4.10, A, C, D, F, G). The typology of the remaining three points could not be determined due to their incomplete state. Of the five points that could be identified, two had an asymmetrical outline; the remaining three were too incomplete to determine their symmetry. When the base to shoulder width and the notch width to basal edge height indices were calculated for these points, they showed that the base width was less than the shoulder width, with a resulting index of 124.8. Furthermore, both the left and right notches had a width greater than the basal edge height.

The only characteristic of these points that did not align with the suggested generalizations for this type was the convex basal shape. The same feature was also noted with the surface collected projectile points. This may simply have been preference by this group of individuals. Nevertheless, this is a characteristic that could help when attempting to identify this point style at other archaeological sites. The remaining feature that is not a typical characteristic of the Prairie Side-Notched type, is the single deeply rounded notch (Figure 4.10, G).

4.2.1.4 Unifacial Tools

Five unifacial artifacts were noted (Figure 4.11). Four of these came out of the excavated units, and one was found during surface reconnaissance. All five of these artifacts are scrapers. Three of these tools, including the one found on the surface, are endscrapers. The remaining two tools are sidescrapers. Three of these tools were found within the top 3cm of the occupation layer in the

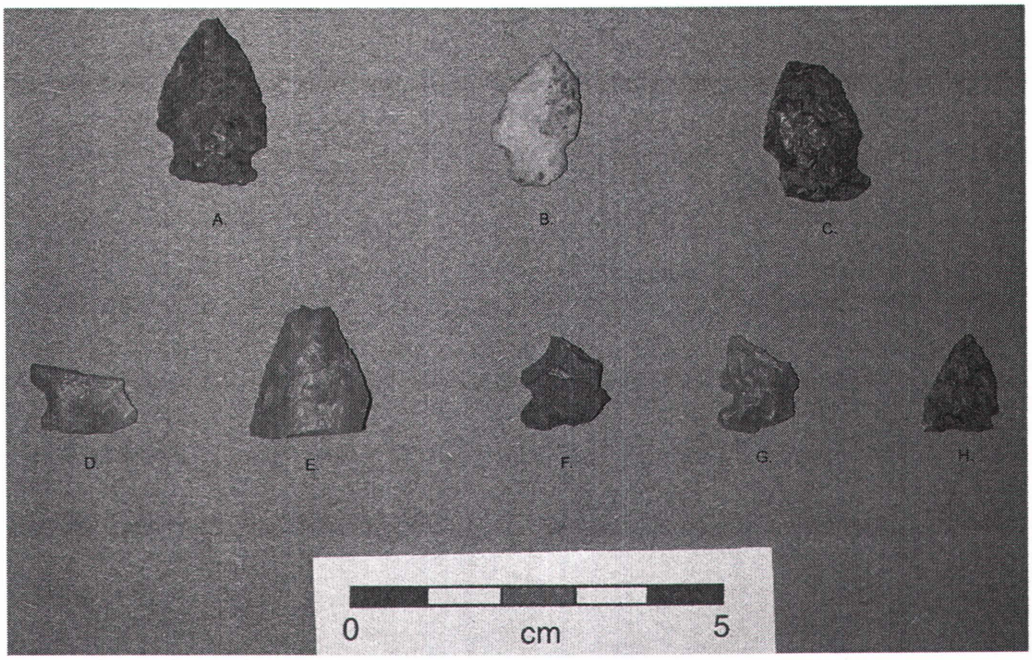

Figure 4.10 Projectile Points from Excavation – Prairie Side-Notched: A, C, D, F, and G.

excavation unit. The final item was located 2cm above the occupation layer. All of these, however, were found in the two western quadrants. These five artifacts were each made from a different material: chert, jasper, SSP, chalcedony, and SRC.

The descriptive analysis showed that rectangular and trapezoidal shapes are common within both subgroups. For the endscraper subgroup, two are rectangular (Figure 4.11, C, D), and the third is trapezoidal (Figure 4.11, E). Within the sidescraper subgroup, one is rectangular (Figure 4.11, B), the other trapezoidal (Figure 4.11, A). The majority of unifaces from both subgroups had been incompletely worked on the dorsal surface. However, two artifacts had been completely retouched. One unique characteristic is the presence of side-notching exhibited on one

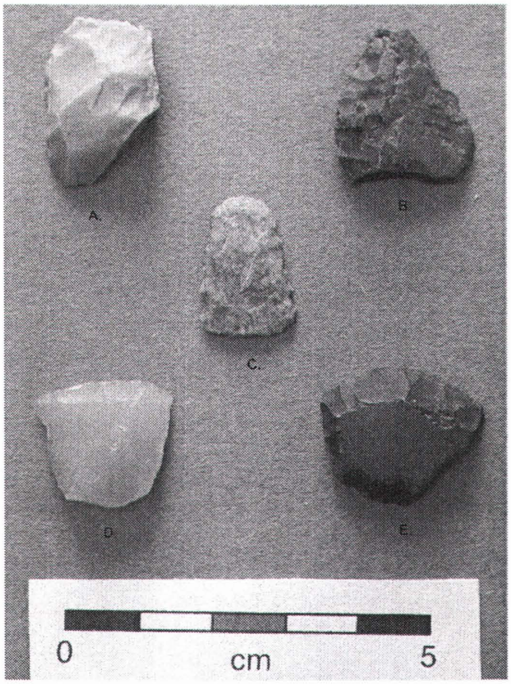

Figure 4.11 Unifaces from Excavation – Sidescrapers: A and B; Endscrapers: C to E.

endscraper to aid in its hafting (Figure 4.11, C). This same characteristic was also noted on an endscraper from the surface collection.

4.2.1.5 Other Bifacial Tools

A total of four knives was found in the course of excavations (Figure 4.12). Two of these came from the southwest quadrant, in the occupation layer 11cm to 13cm depth below surface. The other two artifacts were found during surface reconnaissance. All four of these tools are assigned to the knife group; three are made from SRC, the final from chert. Each of these tools had a different overall shape: rectangular, rhomboidal leaf, triangular, and crescentic. It should be noted, though, that the item with the crescentic shape is broken, and thus this might not have been its original shape. In the cases where analysis was possible, these tools had either a convex or straight working edge.

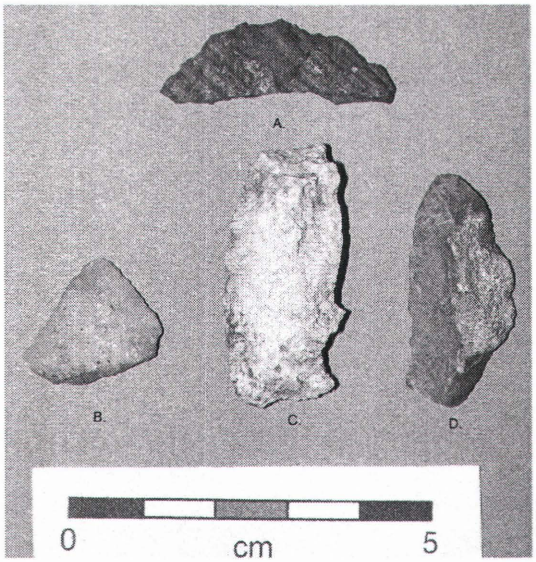

Figure 4.12 Knives from the Excavation.

The majority of these are incompletely worked on both surfaces, having only the working edges flaked. No form of hafting was present, and none of these artifacts had any backing.

4.2.1.6 Retouched and Utilized Tools

A total of ten retouched flakes was recovered, eight from the excavations and two from surface reconnaissance. These expedient tools were made from eight different raw materials, the two most important being quartzite (n=2) and silicified wood (n=2) (Table 4.26).

These ten items were sorted into four groups. Two artifacts were assigned to the bifacial/unifacial retouched group. Four were placed in the bifacially retouched group. The unifacially retouched group contained three items. The utilized group contained the remaining artifact.

Table 4.26 Lithic Materials of the Excavated Retouched and Utilized Flakes.

Retouched and Utilized Flakes		
Material	**Frequency**	**% Frequency**
Agate	1	10.0%
Chert	1	10.0%
Jasper	1	10.0%
Quartzite	2	20.0%
Silicified Siltstone Pebbles	1	10.0%
Silicified Sandstone	1	10.0%
Silicified Wood	2	20.0%
Swan River Chert	1	10.0%
Total	**10**	**100.0%**

4.2.2 The Non-Chipped Lithic Assemblage

The non-chipped lithic assemblage recovered during fieldwork comprised only FCR. Three hundred and eighty-eight pieces of FCR were identified, weighing 10.8kg. The most frequently used lithics included granite (n=59), sandstone (n=14), and quartzite (n=5) (Table 4.27). The remainder made up very small percentages of the total, ranging from 0.3% to 0.8%. Like that noted for the surface-collected FCR, sandstone is again the second most prominently used lithic.

Table 4.27 Lithic Materials for the Excavated FCR.

Material	Frequency	Weight (g)	% Frequency	% Weight
Basalt	2	263.6	0.5%	2.4%
Diorite	1	746.7	0.3%	6.9%
Granite	59	6879.2	15.0%	63.5%
Limestone	2	17.4	0.5%	0.2%
Mica Schist	2	129.0	0.5%	1.2%
Quartzite	5	331.1	1.3%	3.1%
Sandstone	14	1770.7	3.6%	16.3%
Schist	1	34.2	0.3%	0.3%
Shale	3	79.5	0.8%	0.7%
Slate	2	25.7	0.5%	0.2%
Unidentified	302	553.9	76.8%	5.1%
Total	**393**	**10831.0**	**100.0%**	**100.0%**

4.3 Discussion

When the material types for the collected debitage were analyzed two lithics, obsidian and Knife River Flint (KRF), were noted as exotic materials that do not have sources within Saskatchewan. Obsidian composed only about 0.06% (n=2) of the entire lithic assemblage. This material type has several known sources identified through neutron activation analysis (Wright and Chaya 1985: 237; Frison et al. 1968:209) and X-ray fluorescence analysis (Hughes and Nelson 1987:313). These source areas include several in Yellowstone National Park, such as Obsidian Cliff, Willow Park, and Norris Geyser Basin (Frison et al. 1968: 214, 215). Other potential sources are Bear Gulch, Oneida, and Camas-Dry Creek in the state of Idaho (Wright et al. 1990:70; Hughes and Nelson 1987:313; Frison et al. 1968:215). In 1981, during the Nipiwan Reservoir Heritage Study, two obsidian flakes were located at the Bushfield East site (FhNa-13) in levels associated with the Pehonan Complex dated to ca. 600 - 250 BP (Meyer and Russell 1987:17). Dr. Erle Nelson of Simon Fraser University analyzed these flakes so they could be sourced. The results indicated that these pieces originated from one of the sources located in the Yellowstone National Park (Meyer et al. 1990:73). Although this is not direct evidence that the obsidian located at the Sherwin Campbell site also originated from somewhere within the Yellowstone National Park, it does offer the possibility, one that would be useful to confirm in the future.

KRF made up only 0.2% (n=8) of the entire lithic assemblage. The KRF quarries are located in the Dunn and Mercer Counties, North Dakota (Gregg

1987:367-377). There are really only two scenarios that can be used to account for the presence of these exotic materials at the Sherwin Campbell site. The first would involve some form of trade network. This would involve this group in Saskatchewan, either through a set or chance meeting, encountering and exchanging goods with a group that had access to these materials. The second scenario is that the site occupants purposely traveled to these areas during their seasonal rounds in order to procure these materials for their own use.

Regarding the analysis of the surface collected projectile points, it is important to discuss the different typologies of Late Period points. Richard S. MacNeish was one of the first archaeologists to separate late points into different types. This work was based on the analysis of 116 projectile points from sites excavated in southeastern Manitoba in the early 1950's (MacNeish 1958:93). Two of the point types that he defined were Prairie Side-Notched and Plains Side-Notched. A subsequent attempt at classifying late side-notched projectile points was that of Richard Forbis. At the Old Women's Buffalo Jump he (1960:85) proposed a projectile point chronology for the last 2000 years. Through the use of several metric attributes, particularly those that seemed to most clearly differentiate point variations, he (1960:94) proposed seven different types: Washita, Pekisko, Paskapoo, Nanton, Lewis, Irvine, and High River. The characteristics that helped discriminate point types from one another included the base width to body width index. This index determines if the base is wider than the body. Within the projectile point chronology offered by the site, later points showed bases that became increasingly wider than the body (Forbis 1960:87).

The second characteristic that he found useful was the height of the basal edge. Again, this measurement seemed to increase with time (Forbis 1960:90). He also calculated the basal shape index that indicated an increase in basal concavity over time. Forbis concluded that the best chronological indicator of change was the basal edge height to notch width index. With this index, if the number calculated was greater than 100 it indicated that the basal edge height was greater than the notch width. If the result was less than 100 it indicated the opposite (Forbis 1960:90).

Subsequently Kehoe (1966) published "The Small Side-Notched System of the Northern Plains". In this article, he suggested that the "Late Plains projectile point types may be more fruitfully viewed as a group of ideal features bound by their common function" (Kehoe 1966:828). As a result, using significant features that showed change over time, he created several varieties within the Prairie Side-Notched and Plains Side-Notched types previously defined by MacNeish. Under the Prairie Side-Notched type he created seven different varieties, many of which were developed from the work that Forbis had conducted with the projectile points from the Old Women's Buffalo Jump. To develop these many varieties Kehoe recorded several metrics, and employed a base width/body width index, average height of lateral basal edges, index of base shape, notch to mouth width index, and basal edge height to notch width index. The different varieties developed for the Prairie Side-Notched type were:

1) Swift Current Fish-Tail – 1220±80 BP (S-149) at the Gull Lake site (Kehoe 1973).

2) Shaunovan Truncated Base – 1220±80 BP (S-149) at the Gull Lake site (Kehoe 1973)

3) Irvine – 750-1350 BP (Forbis 1960).

4) High River Small Corner-Notched – 600 -1350 BP (Forbis 1960), younger than 1220±80 BP (S-149) at the Gull Lake site (Kehoe 1973).

5) Lewis Narrow Rounded Base – 350 -1350 BP (Forbis 1960), younger than 1220±80 BP (S-149) at the Gull Lake site (Kehoe 1973).

6) Tompkins Side/Corner-Notched – 1150 BP at the Boarding School site (Kehoe 1967).

7) Nanton Wide Rounded Base – 250 - 1350 BP (Forbis 1960).

For the Plains Side-Notched type he described another seven varieties. These were:

1) Paskapoo Square Ground Base – 360±75 BP (M-1066) at the Boarding School site (Kehoe 1967).

2) Pekisko Concave Base V-Notched – 750 BP to Protohistoric (Forbis 1960).

3) Emigrant Basal Notched – Protohistoric in southern Montana (Kehoe 1966).

4) Billing's Double Spur Basal Notched – A variety not found in Alberta or Saskatchewan (Kehoe 1966).

5) Buffalo Gap Single Spur – Unknown age.

6) Cut-Bank Jaw Notched – Unknown age.

7) Washita Triangular – 450 BP (Forbis 1960), 250 BP at the Boarding School site (Kehoe 1967).

Since the creation of the Late Side-Notched type system, northern plains archaeologists have handled it in different ways. For example, as noted by Peck and Ives (2001:164), several authors such as Rushowick (1975:6), Reeves (1978:166), Dyck (1983:126-139), Wilson (1984:12, 21), Linnamae (1988:109), and Walker (1988:78) have maintained the use of the two type system without the use of varieties. Others, such as Brumley and Dau (1988:48), have merged the two type classification schemes and rejected the use of varieties entirely. As well, Quigg (1974:101-110), Adams (1975:157), Nicholson (1976:57), and Ball (1987:38) have inserted additions to the classification system based on their own research. Finally, Whelan (1976:15) and Brink et. al. (1985:105-136) have found aspects of the present classification scheme unacceptable and have proposed their own systems (Peck and Ives 2001:164).

Peck and Ives have proposed a new classification scheme based on attributes such as basal edge shape, notch form, basal form, basal height, notch height, proximal basal angle, distal basal angle, and shoulder angle (Peck and Ives 2001:167-168). According to them, the previous classification schemes have been ineffective at partitioning late side-notched projectile points. They conclude that the idea of recognizing two different types for the entire area of the Canadian Plains is inappropriate because points found in Alberta and western Saskatchewan show no change in typology and exhibit continuous attribute frequency trends through time (Peck and Ives 2001:174). They concluded that continued use of the Prairie and Plains types has obscured a distributional pattern in Late Period points. Instead, they have assigned points that persist from 1200BP to 650BP to the Cayley Series (Peck and Ives 2001:184). In the eastern portion (mainly the Saskatchewan plains) of their study area, they propose that Cayley Series projectile points exist up to 650 BP, at which time they are replaced with a new style of projectile points which they call the Mortlach Group (Peck and Ives 2001:184).

The classification of the points from the Sherwin Campbell site has been done using the traditional system, i.e., Prairie Side-Notched and Plains Side-Notched, as the author felt that this method of classification is the most recognized amongst archaeologists. In order to determine which type the points from this site fit into, it is important to look at the attributes various archaeologists have used to differentiate Prairie from Plains Side-Notched (Forbis 1960; Foster 1960; Kehoe 1966, 1973; Linnamae et al. 1988; MacNeish 1958; Nicholson 1976; Peck and Hudecek-Cuffe 2003). These characteristics for the Prairie Side-Notched type are summarized in Table 4.28.

When compared to this list, 16 of the 26 points best match up with those attributes characteristic of the Prairie Side-Notched type. For example, the flaking for these points was found to be mediocre, although many of them were completely flaked over both surfaces. Of the sample, 50% (n=8) exhibit a symmetrical outline, 37.5% (n=6) has an asymmetrical outline, and 12.5% (n=2) were indeterminate. When analyzing the lateral edges, 59.4% (n=19) were straight, 31.3% (n=10) were convex and the remaining 9.4% (n=3) could not be analyzed for this feature. Five different shoulder shapes were noted. Fifity-nine point four percent (n=19) were obtuse angle sharp, 28.1%

(n=9) were obtuse angle round, 6.3% (n=2) were acute angle round, and 3.1% (n=1) were acute angle sharp; the remaining 3.1% (n=1) could not be classified.

Table 4.28 Prairie Side-Notched Point Characteristics.

Prairie Side-Notched Point Characteristics
1) Overall flaking was found to be mediocre at best often leaving behind some of the original blank surface un-retouched.
2) General lack of symmetry.
3) Lateral edge shapes are typically straight or convex.
4) Shoulder angles are more commonly obtuse rather than acute or right angles, and more commonly sharp rather than rounded angles
5) Notches are closer to the base and sometimes are so close to the base that they can be mistaken for corner-notches.
6) Notch shape is shallow, broad, and 'U' or 'V' shaped.
7) Basal edge shape is most commonly parallel, convex, or contracting to the proximal end.
8) The shape of the base is most likely to be straight or concave, with few convex shapes.
9) The width of the base is likely to be narrower than the width of the shoulder. The notch width is likely to be greater than the height of the basal edge.

The notch shapes were 68.8% (n=23) round and shallow, 15.6% (n=5) broad and angular, 12.5% (n=4) deeply rounded, and 3.1% (n=1) angular rounded. Basal edge shapes were 37.5% (n=6) convex, 18.8% (n=3) straight contracting to the proximal, and 12.5% (n=2) straight parallel; the remaining 31.3% (n=5) were indeterminate. The bases were represented by all three shapes: straight 31.3% (n=5), convex 43.8% (n=7), and concave 6.3% (n=1), and the remaining 18.8% (n=3) could not be analyzed.

For the most part the Sherwin Campbell points conform to the characteristics of the Prairie Side-Notched type. However, they also show non-typical attributes in that they are often flaked completely over both surfaces, the majority are symmetrical, and many bases are convex.

One Plains Side-Notched point was recovered. Once again several authors have analyzed this point type and noted those attributes that are characteristic of it (Forbis 1960; Kehoe 1966 and 1973; Linnamae et al. 1988; MacNeish 1958; Nicholson 1976; Peck and Hudecek-Cuffe 2003). These characteristics are listed in Table 4.29.

Table 4.29 Plains Side-Notched Point Characteristics.

Plains Side-Notched Point Characteristics
1) Symmetry is common.
2) Almost always completely bifacially flaked.
3) Lateral edges of the body are typically straight or convex.
4) Notches are deep and narrow with an acute 'U' or rectangular shape. These notches are found higher from the base leaving larger Basal Edges.
5) Basal edge shapes are straight and contracting to the proximal, with a few being convex or straight parallel.
6) The basal juncture angles are usually a 90° angle.
7) Shape of the base is either straight or convex.
8) Basal edge height is greater than notch width.
9) Basal width is greater than the width at the shoulder.

The point assigned to this type fits well with the above criteria. Although the tip is missing, the overall impression is the point had a triangular shape. The body is symmetrical and the entire dorsal and ventral surfaces have been flaked. The left lateral edge of the body is convex, the right is straight. Both notches have a deep 'U' shape. The notches are higher from the base leaving larger basal edges. The basal edges are straight, contracting to the proximal. The basal junctures, however, are both obtuse rounded angles, which differs from the mere typical acute square shape. Finally, the base is straight.

Several measurements were taken on the projectile points (Appendix A). It was noted by Kehoe (1973) and Forbis (1960) that these measurements are not as indicative of the projectile point type as are the indices, especially the shoulder to basal width index and the notch width to basal edge height index (Forbis 1960:87; Kehoe 1973:70-71). The first index reflects the width of the base relative to the shoulder. A result greater than 100 indicates that the shoulder is wider than the base (Kehoe 1973:70-71; Forbis 1960:87). Sherwin Campbell Prairie Side-Notched points is 103, indicating that the shoulder is wider than the base. This is a Prairie Side-Notched point characteristic. For the single Plains point, the index is 93.8 indicating that the base is wider than the shoulder width. This, too, is a characteristic common to this type of point.

The second index indicates notch width relative to the height of the basal edge. An index less than 100 indicates a notch width greater than basal height (Kehoe 1973:72-73; Forbis 1960:90). When this index was calculated for the Prairie Side-Notched points the results were as expected, the left notch at 80.6 and the right notch 83.3, i.e., notch width is greater than the basal edge height. For the single Plains Side-Notched point the opposite occurred - the index for the left notch was 156.3 and for the right 121.1, indicating the basal edge height was greater than the notch width. On average the Prairie Side-Notched points were longer than the Plains Side-Notched points, but the Plains Side-Notched point had a larger stem length, body width, stem width, body thickness, and stem thickness than the Prairie points (Appendix A).

Turning to the collected FCR, Brink and Dawe (1989) noted at the Head-Smashed-In archaeological site in Alberta that preferential choices were made regarding materials that were used for FCR. These choices included either using the sandstone from the nearby cliff face, or bringing in non-local materials like granite, quartzite, dolomite, and limestone (Brink and Dawe 1989:68). Even though it meant more transport effort, larger quantities of non-local materials were being used. Furthermore, these non-local materials were used multiple times to the point where they could not be salvaged for further use. In order to determine why these non-local materials were preferred over the more accessible sandstone, these researchers conducted experiments on the sandstone (Brink and Dawe 1989:67-69; Brink et al. 1985:242-243). They were able to determine that sandstone has several faults. These factors included such things as:

1) Sandstone was capable of warming up more quickly than the non-local lithic sources, but also dispensed that heat quicker. This would mean that the sandstone needed to be heated up more frequently, which consumed more fuel for the heating process than did the non-local materials.
2) Sandstone, due to its more porous nature, absorbed water from the boiling pit so water had to be added more often to complete the desired task. Furthermore, due to this water absorption it took longer to reheat these stones, so once again more fuel was needed to complete this task.
3) Sandstone would often leave behind grit in the cooking vessel and food.
4) Sandstone, when it broke due to temperature stress would often do so in a more violent fashion than the non-local materials (Brink and Dawe 2001:92-93)

For the above reasons, the sandstone was not a preferred material for use as FCR. The question that needs to be answered then, is why there is a substantial percentage of it at the Sherwin Campbell site, particularly when the preferred sources for FCR, like granite, diorite, and quartzite, would require little effort to find and use? At the Head-Smashed-In site it appears that the sandstone was not used to heat water but rather to line roasting pits (Brink and Dawe 1989:75; Brink and Dawe 2001:99). It appears that sandstone was preferred for this activity because it has a flatter shape that allows the pieces to interlock, creating a flat bed for the cooking of meat. Although the Sherwin Campbell site has not been excavated, the abundance of sandstone FCR at this site could be explained as a result of its use in roasting pits. However, the sandstone pieces at the Sherwin Campbell site come in a variety of shapes, some of which would not be used in a roasting pit.

4.4 Summary

To reiterate the findings for the entire lithic analysis, a grand total of 4033 lithic artifacts were analyzed. Of this total there were 1939 pieces of debitage, 105 cores, 34 projectile points, 28 other bifaces, 51 unifaces, 15 heavy stone tools, 60 retouched/utilized flakes, 57 manuports, 3 pieces of ochre, and 1741 pieces of FCR. Based on this analysis several interesting characteristics of this site were discovered. First, in regards to the choices of lithic materials there was a heavier reliance on the use of local raw materials, such as SRC, silicified wood, and SSP. However, exotic materials, though more rarely identified, were present in the forms of either obsidian or KRF. Second, based on the analysis of the debitage the author was able to demonstrate that there was a greater quantity of primary reduction flakes over later stage debitage forms. Whether this is simply indicative of site activities or to some other factor such as the size effect could not be determined. Third, though it was demonstrated only from the surface recoveries, there was a reliance on the use of bipolar cores. Fourth, the projectile points were either Prairie or Plains Side-Notched projectile point types (though there was a greater quantity of Prairie points). Finally, there were two endscrapers identified with side-notches, an attribute not commonly observed on this type of tool.

Chapter 5. Faunal Analysis

5.1 The Faunal Assemblage from the Surface Collection

A total of 13,885 faunal specimens were identified during the process of cataloging the Sherwin Campbell assemblage, weighing a total of 45.5kg. Before discussing the assemblage, a few points need to be addressed. The analysis proceeded by identifying the element, siding the specimen, and identifying the species. Condition was noted as burned versus unburned and immature versus mature. A metric analysis was conducted on the articular ends of specific bison elements and on the metaconid cusp heights on the lower first molar teeth of bison in the hopes of determining the sex and age of the animals of this site. The presence of butchering marks was also noted.

Difficulties in recording data were encountered because of the poor state of preservation of the bone, due to intense weathering and deterioration of the bone. For example, of the 13,885 faunal artifacts cataloged, only 1992 could be identified anatomically, 510 could be assigned to species (of which 508 represented bison), and only 37 had obvious evidence of cutmarks on the surface. Only 375 burned bone elements and one piece of burned enamel weighing a total of 231.45g, were observed. The remainder was unburned. Twenty-seven bone and five tooth fragments were immature; the remainder all represented mature animals.

Plains Bison *(Bison bison bison)*:

According to Banfield (1987:405-408), modern bison are gregarious animals that travel in cohesive herds of four to twenty animals. Some biologists believe that these smaller herds represent family bands. During certain times of the year, like the rut, these bands can coalesce and form herds numbering in the thousands. Bison are known to migrate considerable distances throughout the year in order to find food (Banfield 1987:405-408). They are diurnal, feeding from dawn to nightfall. On average, a male bull will attain its adult size in about six years; the cows reach their adult size in only four years (Banfield 1987:405-408). They inhabit a variety of areas including the open plains, aspen groves, river valleys, and even coniferous forests (Banfield 1987:405-408). The animals rut from early June to late September with a peak in mid-August. Gestation takes 270 to 300 days with the birth of calves taking place from mid-April to early June (Banfield 1987:405-408), peaking in May. It has been estimated that before the arrival of the Europeans, these herds numbered between 40 to 60 million, but by the early 1880's they were hunted to near extinction (Banfield 1987:405-408).

At the Sherwin Campbell site, the author recognized a total of 508 specimens weighing 15.6kg representing bison. Of this total there were 424 identifiable bone elements and 84 identifiable tooth fragments. Twelve elements exhibited a billowed surface indicating they were immature. When looking at the tooth fragments only three items had features that identified them as immature.

The metaconid height of the first lower molar was measured to determine the age of the animals, but in most cases they were too incomplete to make an age designation. Of the 84 tooth fragments identified, only four lower first molars were complete enough to take this measurement. This resulted in such a small sample that the results would not have been significant. As a result, in order to assess seasonality, the author had to rely on estimating approximate ages from the fusion rate of epiphyses. In order to do this, all of the immature portions were compared to young animal specimens with known ages ranging from birth to 12 months. Of the total amount only one item, a distal humerus epiphysis, could be aged to between one and three weeks. The remainder were all at least one year in age but were likely older.

Duffield (1973) has provided data regarding epiphyseal fusion times in the development of bison. Using these epiphyseal fusion schedules, the three immature distal radii are from animals six years in age, and the distal metacarpal, metatarsal, calcaneus, and proximal femur are four to five years in age (Duffield 1973:133). These ages have to be treated with caution as Duffield did not have a representative sample of aged male and female specimens. For example, one comparative skeleton that was examined to age these elements was a five-year-old female that did have fused distal radii at this age. Nevertheless, the one definitively aged Sherwin Campbell specimen, with an estimated age between one and three weeks, suggests that the site may have been occupied sometime between early May and Late June. However, it should be noted that since this is based on only one specimen this interpretation remains tentative.

Measurements of the end of long bones were also taken to determine the sex of these animals. This involved taking breadth and depth measurements on complete articular ends of different long bones (Frison and Todd 1987:372-388).

As a result of the poor state of preservation of many bones, however, only three humerii, three tibiae, and three radii were complete enough to complete the depth and breadth measurements. As a result, the author deemed that the sample was too small to allow for this type of analysis.

Several different statistical calculations were applied to this sample of bison elements. The calculations for these statistics can be seen in Tables 18 to 20 within Appendix A; however, the results will be summarized here. The first calculation was the NISP or the number of identified specimens. The 508 identified specimens had the five highest totals coming from the talus (n=87), mandible (n=44), cranium (n=35), humerus (n=32), and second phalange (n=31).

The MNE or minimum number of elements was also calculated. For this calculation, different landmark features were selected for each element. The presence of these landmarks was counted in order to determine how many of that particular element was present while taking into account the high degree of fragmentation and the side of the element. The highest side total from all the tallied landmarks indicates the MNI represented by that element. When all the MNI totals had been calculated for each element the highest MNI number generated became the MNI for that animal group.

The MAU or minimum number of anatomical units was calculated to determine the minimum number of animal units required to account for the specimens in the assemblage (Lyman 1996:105). In order to calculate this, the MNE totals for the landmarks of different elements are divided by the number of times that particular landmark appears in the skeleton. This result is the MAU, often expressed as %MAU, which is determined by dividing the MAU by the highest MAU result for the entire skeleton then multiplying this result by 100. This percentage reveals which portions have larger or smaller quantities represented at the site.

For the Sherwin Campbell site, based on the astragalus tarsal there were at least 39 bison represented within the faunal assemblage. Based on the numbers for particular bison elements and their utility indices (%MAU), it appears that differential preservation is being reflected over any particular butchering pattern. For example, the %MAU totals for those bison elements that were highly represented at this site included the tarsals, carpals, phalanges, metapodials, teeth, and petrous portions of the temporal. However, all of these elements should have low utility percentages as they produce small quantities of grease, marrow, and meat (i.e. they should be undesired elements for butchering, and therefore should be lacking in numbers). They are, however, very dense elements capable of being readily preserved in most conditions. Based on these facts, it appears that these tallies are reflective of differential preservation, with dense pieces being preserved and thus being represented by high tallies.

The high frequency of these elements could indicate that the kill site was near the processing area. One possible candidate for this kill site is the Lamarsh Bison Drive site located approximately 806m northeast of the Sherwin Campbell site. This site was recorded by Marjerrison in 1988 and consists of a bone bed at the base of a steep slope; however, the cultural affiliation of this site is unknown.

The remaining higher frequency elements include many forelimb elements like the humerii and radii. They also show high %MAU totals, which would be expected for these elements based on the amount of meat, grease, and marrow they produce. It appears that people were selecting these portions and bringing them back to this site for butchering. When the hindlimb was evaluated, one element, the femur, was under-represented. This element has a high utility value and as such should be represented by high totals at the site. Since this is not the case, either these elements were butchered directly at the kill site or they were processed so thoroughly here at this site that too little of these elements remained to be identified.

The totals and MAU percentages for immature bison elements are very similar to what is reflected by the mature bison. The teeth have very high percentages suggesting differential preservation, and specimens like the radius and humerus have both higher tallies and percentages suggesting that they were desirable for butchering.

Nuttall's Cottontail *(Syvilagus nuttalii)*:

Only a single proximal femur fragment represented this species in the Sherwin Campbell assemblage. The Nuttall's cottontail is distributed throughout a vast area of North America including the southern Prairie Provinces in Canada. It prefers arid sagebrush plains and can often be found in coulees and river bottoms feeding in the evenings (Banfield 1987:79). Its living habits and reproductive cycle have not been studied thoroughly, but is believed to be similar to the eastern cottontail. The eastern cottontails are usually solitary animals, but do tolerate the presence of other individuals. Its usual home range is between two to three hectares (five to eight acres), but this can increase during the breeding season. It is a crepuscular and nocturnally active animal (Banfield 1987:79).

Domestic Pig (*Sus scrofa*):

The identification of the domestic pig was based on an upper first incisor. Like the rabbit there was no sign of burning, immaturity, or butchering associated with this item. It seems quite clear that this specimen does not represent a portion of the archaeological faunal assemblage. The author has no clear idea as to how this tooth arrived at the site, other than the fact that this land has been used to house grazing livestock.

Indeterminate Ungulate:

Within this category there were 1026 items weighing a total of 2612.2g. From this total, four metapodial fragments were noted as being immature. The only other immature specimens within this category were two tooth fragments. Another characteristic of this assemblage was that no bone exhibited signs of burning. Finally, two elements were identified with cutmarks on them. These were a proximal metatarsal and a spinous process from an indeterminate vertebra.

Statistical calculations showed a total NISP of 1026 items, mostly composed of some 916 enamel fragments. Other items with higher NISP totals included unidentified metapodials and metacarpals. The MNI calculations, based on the metacarpals, indicated a minimum total of four individuals. Within this category nearly every single represented element with a high tally, also had a high %MAU. In most of these cases these were elements that one would expect to have a low utility value. For example, these included carpals, tarsals, metapodials, phalanges, and teeth. As a result, as stated for previous categories, this does not appear to represent a particular butchering pattern with these items being desired, but rather differential preservation with these denser elements being better preserved.

<u>Other Large Mammals:</u>

A total of 118 items, weighing 1.7kg, were placed into the large mammal category. These items represent animals weighing between 100 to 700kg. All were bone except for one tooth fragment, and all were unburned. Only three immature elements were noted – two unfused femoral heads and a distal tibia. One spinous process of a thoracic vertebra had cutmarks on it.

Statistical calculations were conducted for this category of faunal remains for both the mature and immature elements. NISP calculations identified a total of 118 items, with the more prominent elements including the tibia, astragalus, and cranium. The MNI calculations for the immature elements indicated that at least one individual was at the site based on counts of the femur and tibia. The mature items indicated that at least eight individuals belonging in this category were at this site based on the high prevalence of the astragulus. A very similar situation for the elements of this category, is also apparent when the %MAU calculations were analyzed. Once again, denser elements with low utility indices are represented at the top of both the tally and %MAU lists in the form of the astragulus and fused central/fourth tarsal. Also found at the top of the list are the upper forelimb elements, which also have high %MAU totals. All of these percentages are mimicking the same situations that were previously mentioned under the bison.

Medium Mammals:

A medium mammal is defined as weighing between 5 and 99kg. Examples of animals that would be contained within this category would include the badger, coyote, or wolf. Only five elements were identified in this category, weighing a total of 16.6g. All five of these elements were from mature animals, and had no sign of burning or butchering. The NISP count total was five, represented by two rib fragments, an ulnar carpal, a piece of innominate, and a portion of a scapula. When the MNI calculations were determined it showed that at least one individual is represented in this category. Due to the small number of elements within this group, the %MAU calculations do not reflect any particular butchering pattern.

Unidentified Faunal Remains:

The remaining faunal remains found at the Sherwin Campbell site were unidentifiable. This category contained the highest number of faunal portions, numbering some 12,226 items weighing 25.6kg. Eight pieces of immature bone, weighing 66.6g, and 375 burned bone pieces weighing 231.25g were noted. Only 333 items could be identified to element, with most being enamel fragments.

When the MNI totals were calculated, due to the high fragmentation, only one individual could be confidently represented within this group based on the one radius portion that was identified. A total of 31 bone pieces were identified with cutmarks.

5.2 The Bone Tool

One bone tool was identified in this assemblage (Figure 5.1). This tool was made on a long bone shaft fragment. At one end there is a fresh break, likely a result of the agricultural activities that took place on this land before the collection was made. The other end is smooth, polished, and blunt with one obvious chip removed from it. Cutmarks are also present on the battered end. One edge was smoothed and polished. Kehoe (1973) has described similar bone tools which he refers to as flakers.

Figure 5.1 Bone Tool Fragment.

Kehoe (1973:126) states that "Flakers are distinguished by stubby round ends having a nibbled appearance or by prepared, polished blunted ends; bone chips may be missing because of their use in flint knapping". He also described similar bone tools from the Boarding School bison kill in Montana. On two specimens "...the butt end is scored and ringed all around by transverse cuts made with a sharp stone flake. The tip is hacked to a blunt point along the lateral edges. The smoothly rounded points are probably too blunt to be awls. They are highly polished, and show evidence of use as flakers in the form of chipping" (Kehoe 1967:62). A third flaker was described as "...rounded on all edges with a well worked but rounded tip" (Kehoe 1967:62). This tip had been "...battered but highly rounded and polished." (Kehoe 1967:62).

5.3 The Excavated Faunal Assemblage.

A total of 5848 faunal artifacts were discovered during the process of excavating the 1x1m unit, test pit excavation, and reconnaissance. One hundred and sixty-six of these items were identified as bison, one as muskrat, one as indeterminate canid, 334 as ungulate, and 5346 as unidentifiable to species or category. Within this assemblage 1,085 bone pieces weighing a total of 363g were burnt. Only 20 pieces – 16 bone and four tooth fragments – showed traits that suggested immaturity. Finally, 39 pieces, weighing 366.9g, exhibited cutmarks.

Plains Bison (*Bison bison bison*):

Bison dominated this sample with 166 items, weighing 2.8kg. The majority is bone, with only 32 tooth fragments represented. The following characteristics were noted. First, of the total amount of bone identified, only one piece was immature. This was an unfused distal epiphysis of a metacarpal. This specimen could have belonged to an animal anywhere between one and four years in age. Because of the small sample size of immature teeth, an age determination using lower molar metaconid height measurements was not possible. Of the 166 specimens, only one bone fragment exhibited signs of burning. One of the bison mandibles (Figure 5.2, 5.3, and 5.4) exhibited an inflammatory lesion, diagnosed as severe gingivitis with alveolar resorption particularly on the buccal aspect, that exposed the roots of M1 (E. G. Walker personal communication, 2003). This lesion is seen as an increase in the width of the mandibular corpus and the appearance of porous and sclerotic bone at the alveolar margin (E. G. Walker personal communication, 2003). Finally, the presence of cutmarks was noted on nine specimens weighing a total of 127.6g

The NISP was calculated as 166. The elements with the higher counts included the mandible, radius, cranium, and humerus. Based on the high representation of upper 1st molars, it could be shown that at least four bison are represented. The element and %MAU tallies offer a similar situation to the surface collection namely, the elements with the higher tallies and %MAU totals are those that would be readily preserved, but have low utility value. These elements include carpals, phalanges, metapodials, cranial, and mandibular elements. The fact that these portions would be brought back to a processing site can be explained only if the kill site were nearby.

The tallies of exploited elements indicate some similarities between the excavated and collected areas. For example, both have high tallies and %MAU proportions of the forelimbs suggesting the butchering and processing of

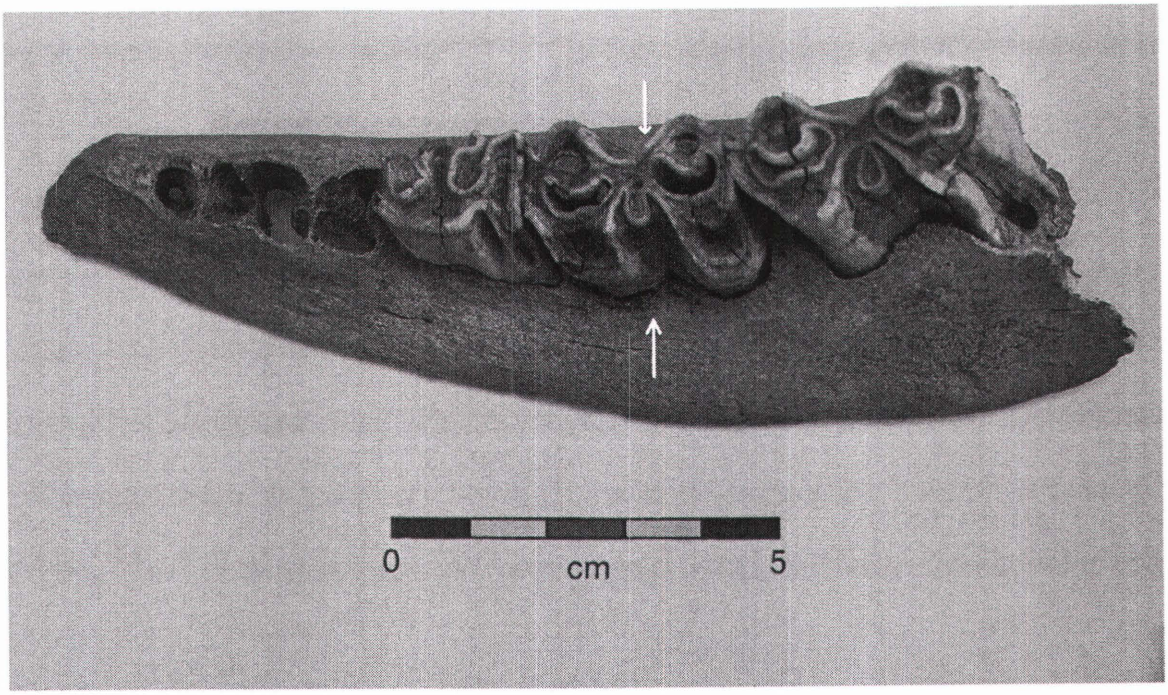

Figure 5.2 Mandible with Inflammatory Lesion.

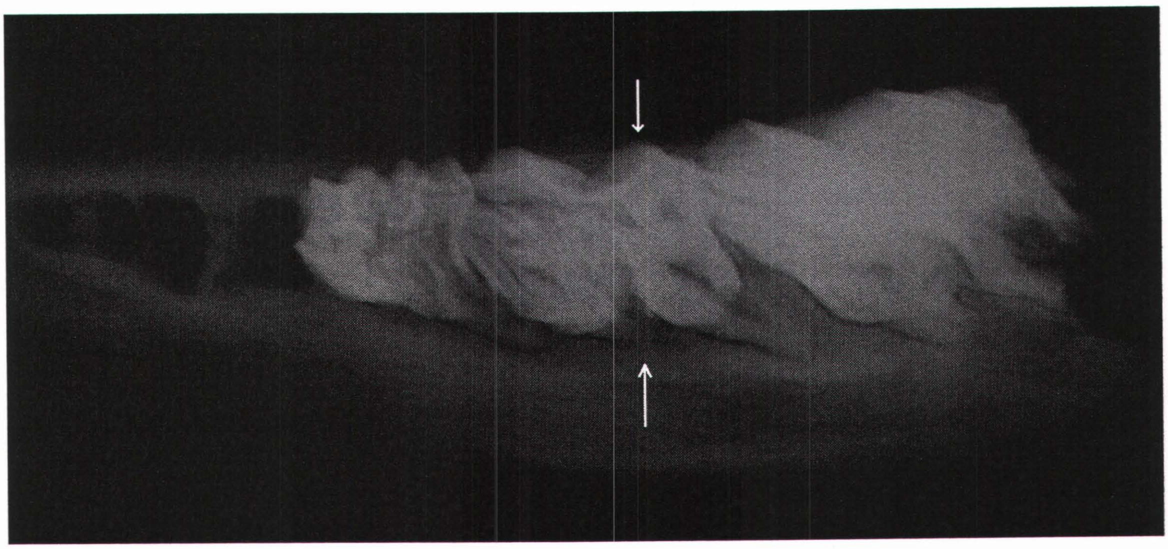

Figure 5.3 Radiograph (Top View) of Mandible with Lesion.

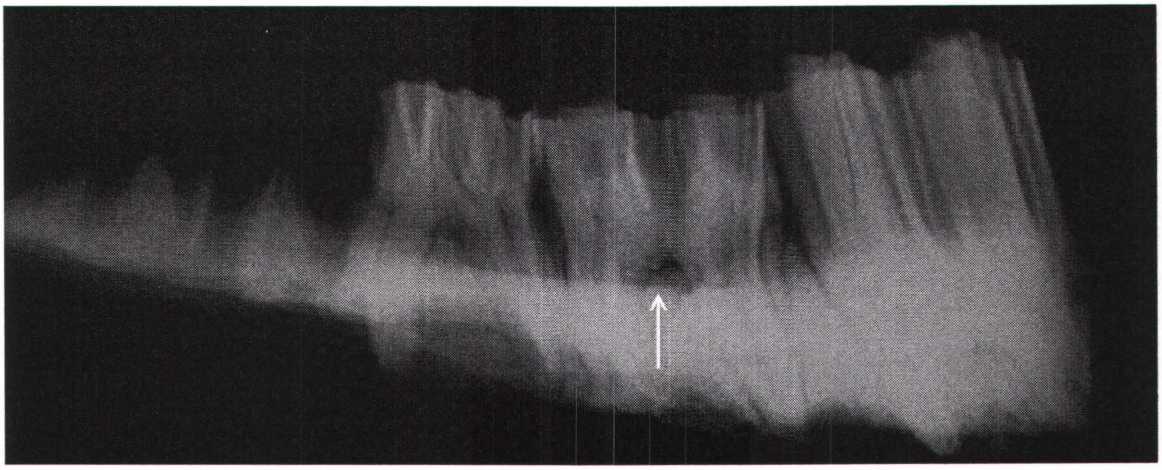

Figure 5.4 Radiograph (buccal aspect) of Mandible with Lesion.

these high utility elements. However, the hindlimbs are represented by elements from only the tibia down to the phalanges present. The femur is absent in the excavated area and almost non-existent in the collected area. As this high utility element should be present at a processing site, either the hindlimb was processed at the kill area, or it was so heavily processed at the site that very little is present in an identifiable form.

Though all of these characteristics are found in both areas, based on these tallies and percentages there are some things that need to be kept in mind. First, the excavated unit represents a very small sample. The possibility exists that where excavations took place just happened to be an area with high proportions of these elements, giving the impression of differential preservation. Second, different taphonomic processes may have taken place at the collection area and the excavated area. These taphonomic processes not only include the agricultural activities but also some environmental ones too, as some elements did lie on the surface for some time before collection.

Muskrat (*Ondatra zibethicus*):

The muskrat is an animal adapted to an aquatic life and is the largest of the North American rats, mice, and lemmings (Banfield 1987:197). It is most active during the night or at dawn and dusk (Banfield 1987:197-200). During this time they can be seen feeding on "...broad-leafed cattail, bulrush, stovepipe reed, sedge, sweet flag, water lily, arrowhead plants..." (Banfield 1987:198), freshwater mussels, frogs, and salamanders (Banfield 1987:197-200). One muskrat specimen, a squamous portion of the temporal region of the skull, was identified. Its size suggests it is an adult male. No burning or cutmarks were noted.

Canis sp.:

Only an upper premolar from an medium sized animal belonging to the family Canidae was identified. These include wolves, the coyote, three species of fox, and the domestic dog. Based on the different hunting and social lifestyles of these animals, three different types of canids can be distinguished. These include those that are solitary like the fox, those with a solitary/social lifestyle which are those animals that live in more or less temporary pairs which have no involvement with other pairs and the social animals like the wolf that live in packs. This family of animals live in a variety of habitats including grasslands, forests, and sagebrush steppe regions (Banfield 1987:286).

Indeterminate Ungulate:

A total of 334 items weighing 1.8kg were identified, with the majority being tooth fragments. Teeth account for 209 of the 334 items, and weighed 141.3g.

Two femora and three tibiae exhibited the characteristics of an immature animal. No signs of burning were observed. Cutmarks were identified on 11 elements weighing a total 179.6g.

The NISP was calculated at 334. Based on the femurs, the MNI is four. The presence of so many femur portions within this category could explain the lack of these same portions within the bison category. As previously mentioned one of the reasons used to explain the lack of femur within the bison category was heavy processing to the degree that identification to species was not possible. It is possible that these ungulate femur portions are those heavily processed portions that could not specifically be identified as bison. The high tallies of certain elements of both the fore and hindlimbs seem to indicate preferential butchering of these portions of the animal because they have high utility indices. However, once again the higher tallies and percentages of both cranial and mandibular elements indicate differential preservation and the proximity of the kill site to the processing area.

Unidentified Faunal Remains:

This category was composed of 5346 specimens weighing 3.9kg. Of these items, 10 could be classified as immature. These items had a total weight of 37.8g. Out of these 10 items, only a femur, atlas, and the head of a rib could be identified; the remaining were indeterminate portions with a billowed surface or fusion lines. Another feature of this assemblage was the high quantity of burned bone. In total 1086 pieces were identified as burned. Nineteen bones had cutmarks, weighing a total of 59.7g.

When the NISP count was tallied for this group, only 83 items were identifiable indicating just how much fragmentation there is in this category. The evidence of both femur and scapula, indicates the presence of at least two individuals. Based on the high degree of fragmentation and the very few identifiable elements, the tallies and MAU percentiles do not readily show any particular butchering or preservation patterns. Some high utility elements with high tallies include the ulna, femur, and scapula. The remaining items with higher tallies, like the petrous portion of the cranium and a metacarpal, include those that should have low utility indices (but do not), again suggesting differential preservation. The remaining elements are all vertebral.

5.4 Discussion and Summary

The faunal remains from the Sherwin Campbell site revealed several important characteristics. First, a number of specimens were identified to a particular species of animal. These included foremost bison, but other species like the Nuttall's cottontail, domestic pig, muskrat, and canid were identified as well. However, it should be noted that the domestic pig, as previously mentioned, was intrusive to the archaeological site. Of these identified specimens only the bison remains had some evidence of butchering in the form of cutmarks indicating their importance as a food resource. The other specimens which were identified to species lacked the evidence required to indicate their exploitation as food, but the possibility can not be excluded as these other animals were represented by very small skeletal portions.

Not only were these remains being exploited as food, but also they were apparently used as a resource to make tools since one flaking tool was identified. The site also revealed that, though butchering of the forelimb took place at the site, for the most part the only pattern identified from these remains was one representing differential preservation. Finally, one pathology was identified on a bison mandible.

Chapter 6. Ceramic Analysis

6.1 Introduction

The Sherwin Campbell site surface collection includes 296 pottery sherds. For the most part the sherds were analyzed based on the University of Saskatchewan Laboratory Manual (Archaeology 250, Laboratory Manual 2000). However, other sources were also consulted, principally manuals by Syms (1986), and Ahler and Swenson (1985). The non-metric and metric attributes that were recorded are presented in Appendix A.

The ceramics of the Old Women's Phase have been studied by several northern plains archaeologists (Gregg 1984; Malainey 1995; Meyer 1988; Peck and Hudecek-Cuffe 2003; Walde et al. 1995). A general description of the traits of these ceramic vessels has been compiled in Table 6.1.

6.2 Overview of the Pottery Collection

The majority (n=136, 45.9%) of these 296 sherds are body sherds. The remainder of the vessel sections are represented by fewer sherds. One hundred and seventy-seven (39.5%) of the sherds could not be assigned to a vessel portion (Table 6.2).

The great majority of these sherds are grit-tempered (Table 6.3). These sherds made up over three-quarters of the assemblage at 77.0% (n=228). This is followed by a smaller number (n=54) of sherds with sand/grit temper while

Table 6.1 Old Women's Phase Ceramic Characteristics.

Old Women's Ceramic Characteristics:
1) Vessel Shape: Globular the majority of the time, but a conoidal shape is possible as well. The base on these vessels is almost always rounded, but flattened bases have been noted.
2) Temper: Grit temper is most common. This grit ranges from fine to large particle sizes. The use of granite and quartzite is common.
3) Paste: Often coarse, poorly consolidated and laminated.
4) Lip Shape: Often flat and beveled to the exterior, or occasionally rounded, or ridged. The lip on is often thickened.
5) Rim Shape: The most common profiles are excurvate and straight. However, some authors have noted more complex S-profiles as well.
6) Neck Characteristics: Often shallow and short; however, they can also be concavely exaggerated to give the mouth of the vessel a flare.
7) Shoulder Characteristics: Can be absent, indistinct, or pronounced. When pronounced, internal or external thickening of the ridge often occurs.
8) Body Characteristics: Often the walls of these vessels are thick. The external surface finishes include vertical cord-roughened, fabric-impressed, plain/smooth, and even check-stamped. Quite often these textures are smoothed afterwards resulting in their partial obliteration.
9) Decoration: Frequently these vessels are undecorated; however, when present these decorations have been described as being variable, even idiosyncratic. Decorations are often present on the lip, rim, neck, or shoulder portions of these vessels. These decorations include cord-wrapped tool impressions, simple tool impressed marks, finger pinching, incising, punctates, or pronounced horizontal ridging above the shoulder called fillets.
10) Construction: Most authors agree that these vessels were made using a paddle and anvil technique, with the paddle wrapped in fabric or cords thus leaving that impression on the exterior. Other authors have suggested the use of bags to help mold the shape of these vessels. Finally, some have also suggested the use of both the bag and the paddle and anvil technique in combination to make these vessels.

the tempering agent could not be determined for 14 sherds.

Table 6.2 Vessel Portion Percentiles.

Vessel Portion	Frequency	% Frequency
Indeterminate	117	39.5%
Lip	2	0.7%
Rim	1	0.3%
Lip/Rim	24	8.1%
Lip/Rim/Neck	1	0.3%
Neck	9	3.0%
Neck/Shoulder	1	0.3%
Shoulder	4	1.4%
Body	136	45.9%
Base	1	0.3%
Total	**296**	**99.8%**

Table 6.3 Sherd Tempering Agent.

Temper Used	Frequency	% Frequency
Grit	228	77.0%
Grit/Sand	54	18.2%
Indeterminate	14	4.7%
Total	**296**	**99.9%**

The surface treatment of the majority of the sherds could not be determined (Table 6.4). The remaining 118 sherds exhibited either a smoothed cord-roughened exterior (n=64), a non-smoothed cord-roughened exterior (n=18), a simple plain/smooth exterior (n=15), a smoothed fabric-impressed exterior (n=11), or a non-smoothed fabric-impressed exterior (n=10) (Table 6.4).

Each sherd type was also analyzed separately from one another. A separate section of this chapter is given over to the rim sherds. Within this section the other vessel portions will be discussed.

Table 6.4 Surface Treatment of the Ceramics.

Exterior Surface Finish		
Type of Surface Finish	**Frequency**	**% Frequency**
Indeterminate	178	60.1%
Smoothed Cord-Roughened	64	21.6%
Cord-Roughened	18	6.1%
Smoothed Fabric-Impressed	11	3.7%
Fabric-Impressed	10	3.4%
Plain/Smooth	15	5.1%
Total	**296**	**100.0%**

6.3 Rim Sherds and Represented Vessels

The surface collection includes 25 lip/rim sherds and lip sherds. Nineteen vessels were recognized in the surface collection sample, and one additional vessel in the excavated sample, for a total of 20 vessels.

Vessel 1 is identified by a single lip/rim sherd. It is grit tempered and has a plain/smooth exterior surface finish. Decorations are present on only the exterior corner of the lip in the form of three oblique CWT impressions (Table 6.5) (Figure 6.1).

Vessel 2 is represented by a single lip/rim sherd. This sherd has been tempered with grit and sand. On its exterior surface it has a smoothed cord-roughened texture. Decorations are found on both the inner and outer corner of the lip and extend down onto the rim. On the outer surface there are five vertical CWT impressions; the same is also found on the inner surface. The smoothing on the outside and the brushing on the inside were both done after these decorations had been created, resulting in their being partially obscured (Table 6.5) (Figure 6.2).

Table 6.5 Selected Attributes of Vessels 1 to 3.

	Vessel #1	Vessel #2	Vessel #3
Vessel Portion:	Lip and Rim	Lip and Rim	Lip, Rim, and Neck
Temper:	Grit	Grit and Sand	Grit and Sand
Paste:	Laminated	Moderately consolodated	Laminated
Exterior Surface Finish:	Plain/Smooth	Smoothed Cord-Roughened	Smoothed Cord-Roughened
Interior Surface Finish:	Plain/Smooth with some exfoliation	Brushed Smooth	Plain/Smooth
Rim Profile:	Straight	Straight	Excurvate
Lip Profile:	T-Shaped with a bead to the outside and a flattened brim	Square	Slightly Rounded
Lip Decoration/Location:	Three oblique CWT Impressions on the outer corner of the lip	Vertical CWT Impressions on the inner and outer corners of the lip	Two oblique CWT Impressions on brim and outer corner of the lip
Rim Decoration/Location:	None	Vertical CWT Impressions on lip extend down onto Rim.	None
Cooking Residue:	None	None	None
Metrics (mm):			
Lip Thickness:	16.9	10.4	10.7
Rim Thickness (2.5mm below lip):	N/A	8	10.5
Neck Thickness:	N/A	N/A	10.9

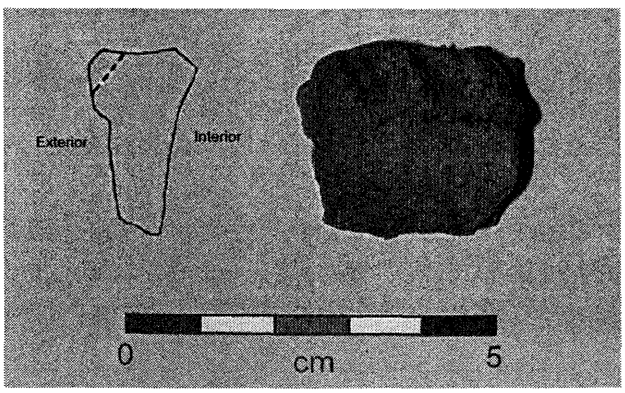

Figure 6.1 Vessel 1.

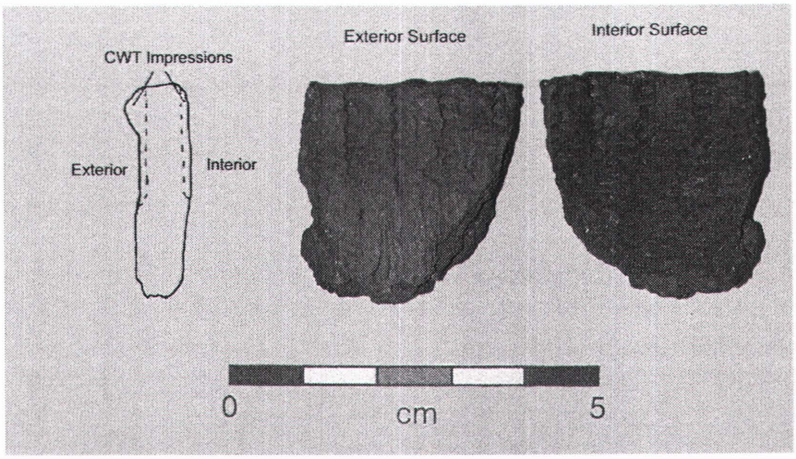

Figure 6.2 Vessel 2.

Vessel 3 is represented by a lip, rim, and neck section. Like the previous vessel it has been tempered with grit and sand. On its exterior there is a smoothed cord-roughened texture. Decoration is present on the brim and outer corner of the lip, and is composed of two oblique CWT impressions (Table 6.5) (Figure 6.3).

Vessel 4 is represented by a single lip/rim sherd. This vessel has been grit-tempered. On its exterior surface there is a smoothed fabric impression. Decoration is present on the outer corner of the lip in the form of three tool impressions (Table 6.6) (Figure 6.4).

Vessel 5 is represented by a single lip/rim sherd. Like most of the sherds within this collection it has been grit-tempered. Smoothed fabric impressions make up the exterior surface finish. The only decorations identified are located on the lip. These take the form of two oblique CWT impressions located on the outer corner of the lip (Table 6.6) (Figure 6.5).

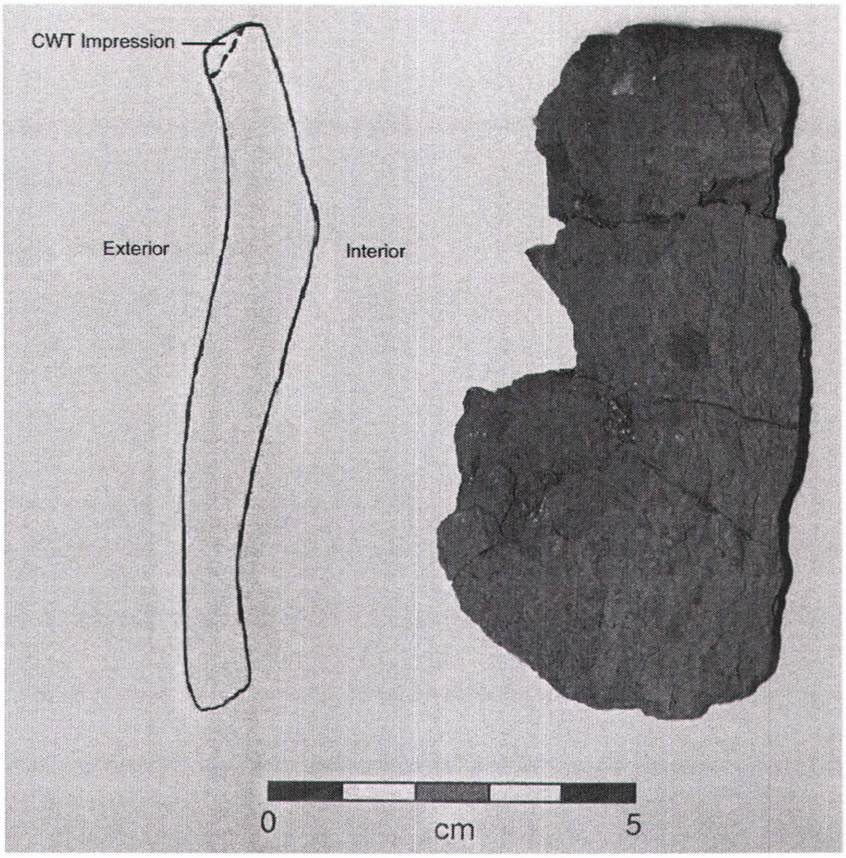

Figure 6.3 Vessel 3.

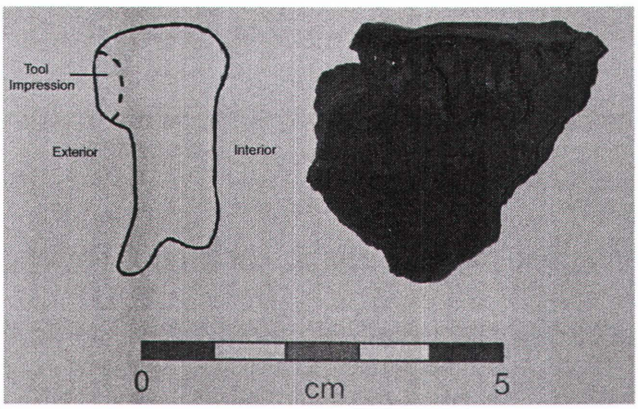

Figure 6.4 Vessel 4.

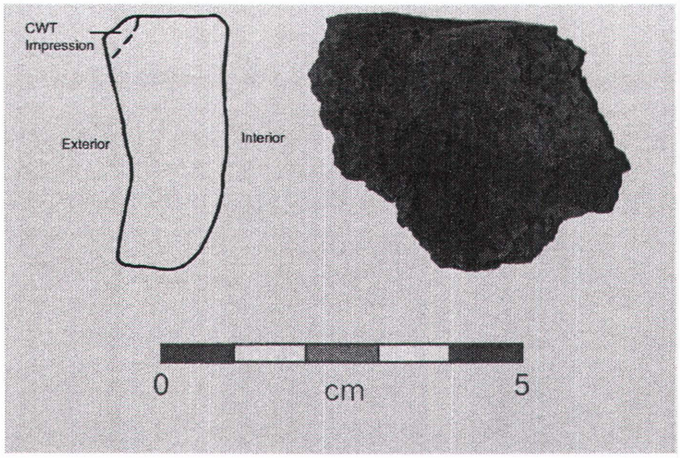

Figure 6.5 Vessel 5.

Table 6.6 Selected Attributes of Vessels 4 to 6.

	Vessel #4	Vessel #5	Vessel #6
Vessel Portion:	Lip and Rim	Lip and Rim	Lip and Rim
Temper:	Grit	Grit	Grit and Sand
Paste:	Laminated	Moderately consolidated	Laminated
Exterior Surface Finish:	Smoothed Fabric-Impressed	Smoothed Fabric-Impressed	Smoothed Coarse Weave Fabric-Impressions
Interior Surface Finish:	Plain/Smooth	Plain/Smooth	Plain/Smooth
Rim Profile:	Excurvate	Excurvate	Excurvate
Lip Profile:	Flat brim, beaded to the outside	L-Shaped to the exterior	L-Shaped to the exterior
Lip Decoration/Location:	Three Tool Impressions on the outer corner of the lip	Two oblique CWT Impressions on the outer corner of the lip	None
Rim Decoration/Location:	None	None	None
Cooking Residue:	None	Present on interior of sherd and onto brim	None
Metrics (mm):			
Lip Thickness:	17.4	16.4	19.2
Rim Thickness (2.5cm below lip):	10.5	10.7	14.4
Neck Thickness:	N/A	N/A	N/A

Vessel 6 has been tempered with grit and sand. The exterior surface of this vessel bears a coarsely woven fabric impression that was smoothed. This vessel is undecorated (Table 6.6) (Figure 6.6).

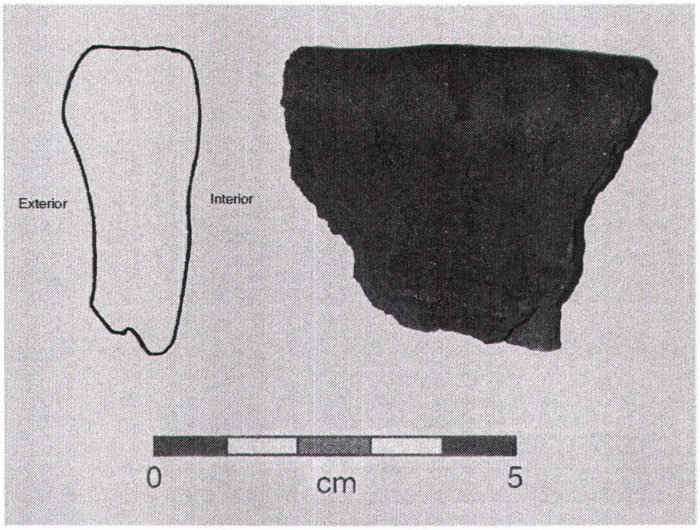

Figure 6.6 Vessel 6.

Vessel 7 has a smoothed cord-roughened exterior. The smoothed cord-roughened exterior surface impression continues onto the brim (Table 6.7) (Figure 6.7).

Vessel 8 is represented by a lip/rim sherd. The temper consists of both grit and sand. Smoothing has obliterated the exterior surface finish of this vessel, which appears to extend onto the brim. For decoration, three oblique incisions have been cut into the outer corner of the lip (Table 6.7) (Figure 6.8).

Vessel 9 has been grit-tempered. The exterior of the sherd is smoothed cord-roughened with a smoothed interior. The decoration consists of irregularly spaced oblique tool impressions on the brim, one by itself, then two side by side (Table 6.7) (Figure 6.9).

Table 6.7 Selected Attributes for Vessels 7 to 9.

	Vessel #7	Vessel #8	Vessel #9
Vessel Portion:	Lip and Rim	Lip and Rim	Lip and Rim
Temper:	Grit	Grit and Sand	Grit
Paste:	Laminated	Moderately consolidated	Laminated
Exterior Surface Finish:	Smoothed Cord-Roughened	Indeterminate due to high amounts of smoothing	Smoothed Cord-Roughened
Interior Surface Finish:	Plain/Smooth with some exfoliation	Plain/Smooth	Smooth
Rim Profile:	Excurvate	Indeterminate	Indeterminate
Lip Profile:	Out-slanted	Beveled to the Interior	Out-slanted with a bead to the outside
Lip Decoration/Location:	Smoothed Cord-Roughened exterior continues up onto brim	Three Oblique Incisions cut into the outer corner of the lip. Continuation of indeterminate exterior surface finish onto brim	Oblique Tool Impressions located on the brim
Rim Decoration/Location:	None	None	None
Cooking Residue:	None	Present on interior surface	None
Metrics (mm):			
Lip Thickness:	16	18.2	21.9
Rim Thickness (2.5cm below lip):	N/A	13.3	11.7
Neck Thickness:	N/A	N/A	N/A

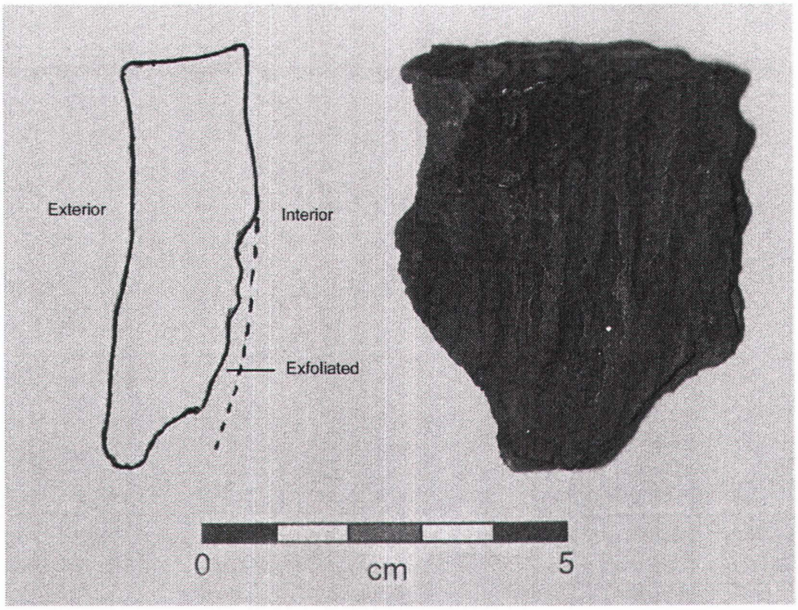

Figure 6.7 Vessel 7.

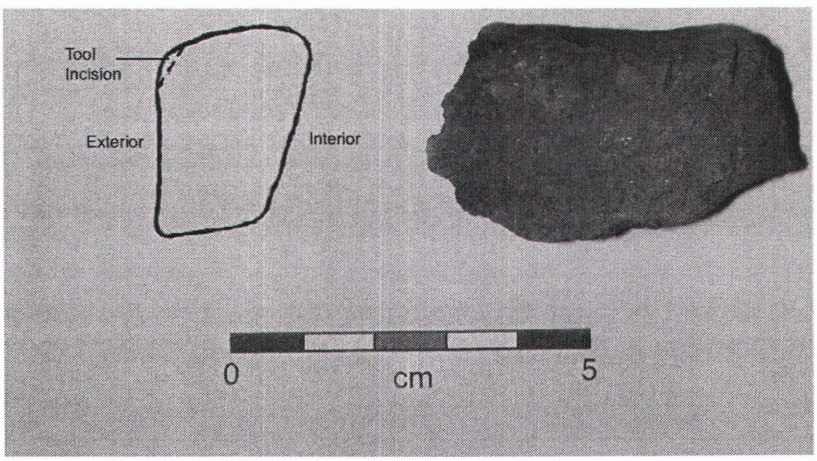

Figure 6.8 Vessel 8.

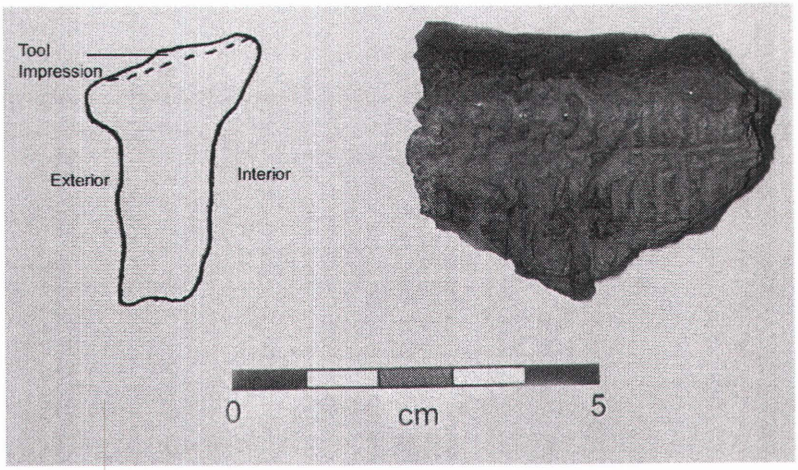

Figure 6.9 Vessel 9.

Vessel 10, represented by two lip/rim sherds, is grit- tempered. The exterior surface finish can be seen on only one sherd; this consists of smoothed fabric impressions. The second sherd has a highly exfoliated exterior surface so no finish could be determined. On neither of the sherds is decoration visible (Table 6.8) (Figure 6.10).

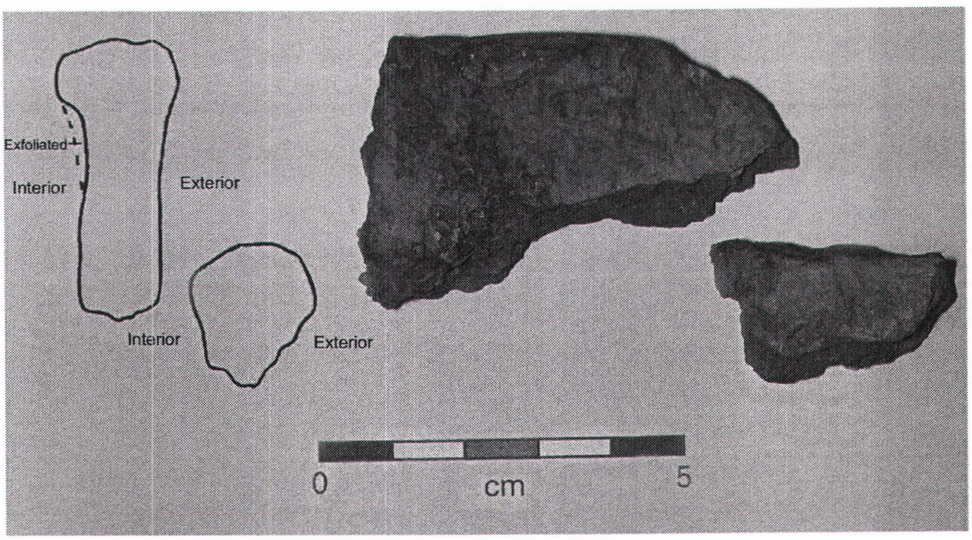

Figure 6.10 Vessel 10.

Vessel 11 is represented by a lip/rim sherd that has been grit-tempered (Figure 6.12). The exterior surface finish is so obliterated by smoothing that it could not be determined. No apparent decoration was noted on the rim, but on the lip there appear to be fabric impressions (Table 6.8) (Figure 6.11).

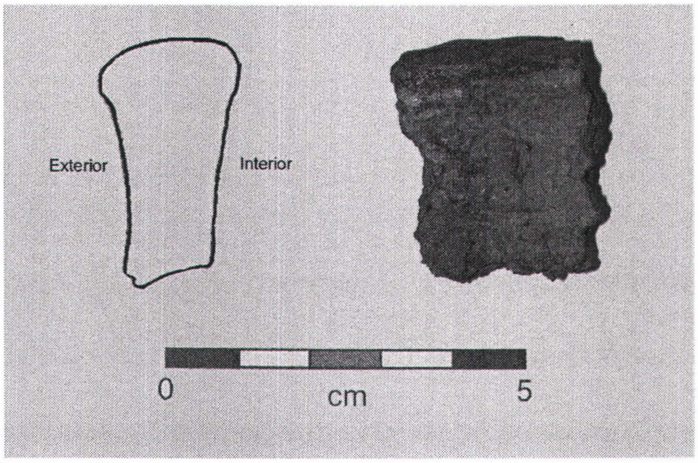

Figure 6.11 Vessel 11.

Vessel 12, also represented by a single lip/rim sherd, is grit-tempered. The exterior of the sherd is highly obscured but a faint impression of cord-roughening is apparent. The lip profile has an exaggerated L-shape to the interior, with a rounded brim (Table 6.8) (Figure 6.12).

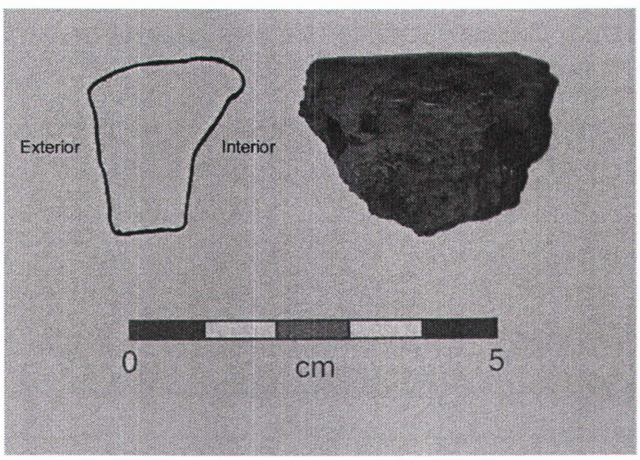

Figure 6.12 Vessel 12.

Table 6.8 Selected Attributes for Vessels 10 to 12.

	Vessel #10	Vessel #11	Vessel #12
Vessel Portion:	Two Lip and Rim Sherds	Lip and Rim	Lip and Rim
Temper:	Grit in both cases	Grit	Grit
Paste:	Laminated for both	Moderately consolidated	Laminated
Exterior Surface Finish:	Cat#4019: Smoothed Fabric-Impressed Cat#4020: Indeterminate	Indeterminate due to smoothing	Cord-Roughened
Interior Surface Finish:	Cat#4019: Plain/Smooth with exfoliation Cat#4020: Plain/Smooth	Plain/Smooth	Smoothed
Rim Profile:	Cat#4019: Straight Cat#4020: Indeterminate	Straight	Straight
Lip Profile:	L-Shaped to the exterior in both cases	T-Shaped with an out-slant and a slightly rounded brim	Exaggerated L-Shape to the interior with a rounded brim
Lip Decoration/Location:	Cat#4019: Continuation of exterior surface finish onto brim Cat#4020: None	Possible appearance of Fabric Impressions on brim	None
Rim Decoration/Location:	None	None	None
Cooking Residue:	None	None	Present on interior surface
<u>Metrics (mm):</u>			
Lip Thickness:	Cat#4019: 16.4 Cat#4020: 18.6	18.9	19.8
Rim Thickness (2.5cm below lip):	Cat#4019: 11.4 Cat#4020: N/A	12.8	9.5
Neck Thickness:	N/A	N/A	N/A

Vessel 13, represented by a lip/rim sherd, is grit-tempered. It has a smoothed, indeterminate exterior surface finish. The only decoration appears on the brim of the lip. Here, some form of oblique impression was noted, which most likely represents the exterior surface finish continuing up to this location (Table 6.9) (Figure 6.13).

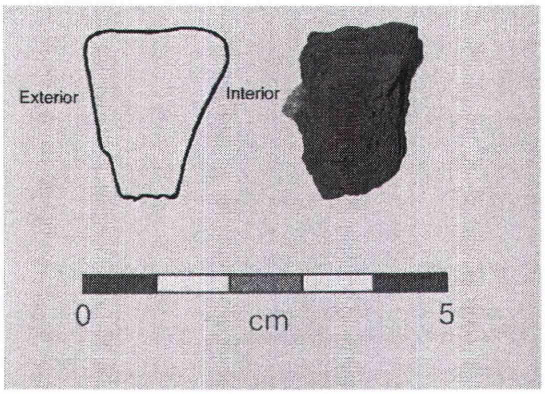

Figure 6.13 Vessel 13.

Vessel 14 is represented by three sherds that have all of the lip, but only small amounts of the rim. All have been tempered with grit and sand. The exterior has been exfoliated in two cases but on the third sherd was a smoothed cord-roughened exterior surface finish. No decoration is apparent on any of the sherds (Table 6.9) (Figure 6.14).

Vessel 15, represented by a lip/rim sherd, is grit and sand tempered. On its exterior surface it has a smoothed cord-roughened impression. No decoration is present on this sherd (Table 6.9) (Figure 6.15).

Vessel 16 is represented by a single lip/rim sherd that is grit-tempered. On its exterior there is a highly obliterated cord-roughened impression. These exterior surface impressions appear to have continued up onto the brim as

Table 6.9 Selected Attributes for Vessels 13 to 15.

	Vessel #13	Vessel #14	Vessel #15
Vessel Portion:	Lip and Rim	Three Lip and Rim Sherds	Lip and Rim
Temper:	Grit	Grit and Sand	Grit
Paste:	Laminated	Moderately consolidated	Laminated
Exterior Surface Finish:	Smoothed Indeterminate	Cat#3978 Smoothed Cord-roughened	Smoothed Cord-roughened
Interior Surface Finish:	Plain/Smooth	Cat#3978 Plain/Smooth Cat#3982 Plain/Smooth Cat#3983 Indeterminate	Plain/Smooth
Rim Profile:	Indeterminate	Indeterminate	Excurvate
Lip Profile:	L-Shaped to interior	Out-slant	Slight T-Shape
Lip Decoration/Location:	Indeterminate oblique impression on brim	None	None
Rim Decoration/Location:	None	None	None
Cooking Residue:	None	None	None
Metrics (mm):			
Lip Thickness:	19.1	Cat#3978 12.9 Cat#3982 12.4 Cat#3983 N/A	15.6
Rim Thickness (2.5cm below lip):	N/A	N/A for both	12.2
Neck Thickness:	N/A	N/A	N/A

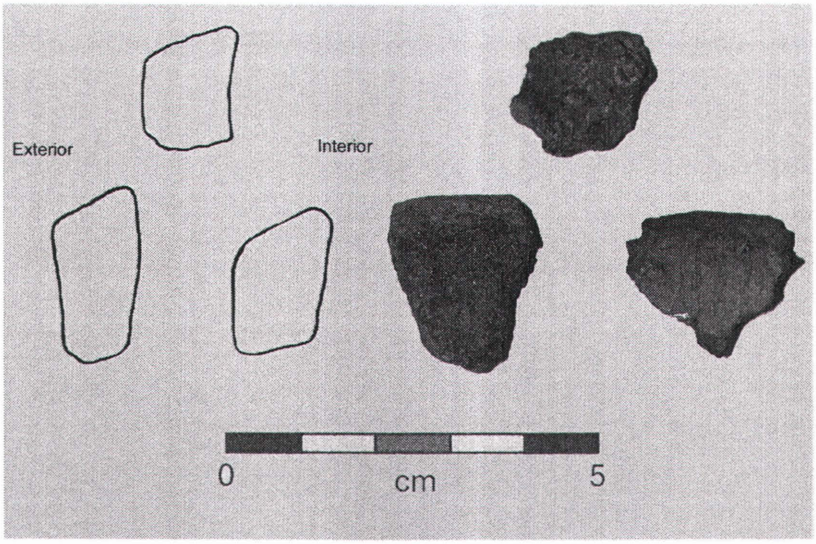

Figure 6.14 Vessel 14.

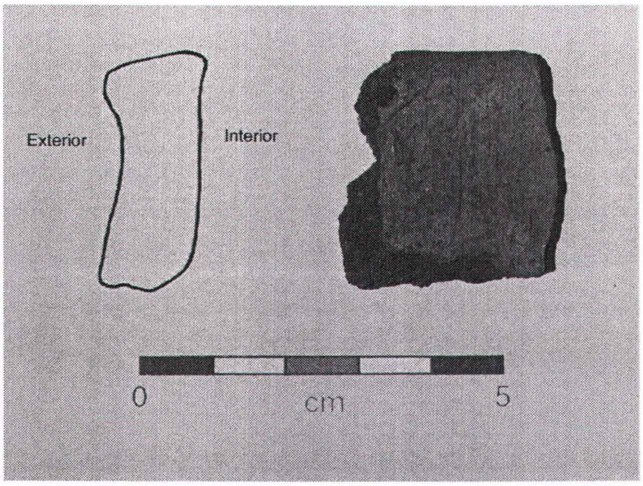

Figure 6.15 Vessel 15.

faint impressions are apparent there as well (Table 6.10) (Figure 6.16).

Vessel 17, represented by a single lip/rim sherd, has been grit-tempered. The exterior surface finish is indeterminate. The lip profile of this vessel is rounded; the rim profile could not be determined. This sherd has no form of

Table 6.10 Selected Attributes for Vessels 16 to 19.

	Vessel #16	Vessel #17	Vessel #18	Vessel #19
Vessel Portion:	Lip and Rim	Lip and Rim	Two Lip and Rim Sherds	Lip and Rim
Temper:	Grit	Grit	Grit for both	Grit
Paste:	Laminated	Laminated	Moderately consolidated for both	Laminated
Exterior Surface Finish:	Smoothed Cord-roughened	Indeterminate	Plain/Smooth	Indeterminate
Interior Surface Finish:	Smoothed	Plain/Smooth	Plain/Smooth	Plain/Smooth
Rim Profile:	Straight	Indeterminate	Indeterminate for both	Indeterminate
Lip Profile:	Square	Rounded	Cat#3365 Slightly rounded Cat#1199 Square	Beveled to the interior
Lip Decoration/Location:	Five oblique impressions on brim	None	None	None
Rim Decoration/Location:	None	None	None	None
Cooking Residue:	None	None	None	None
<u>Metrics (mm):</u>				
Lip Thickness:	7.8	7.9	Cat#3365 8.5 Cat#1199 8.8	15.4
Rim Thickness (2.5cm below lip):	N/A	N/A	N/A for both	9.2
Neck Thickness:	N/A	N/A	N/A	N/A

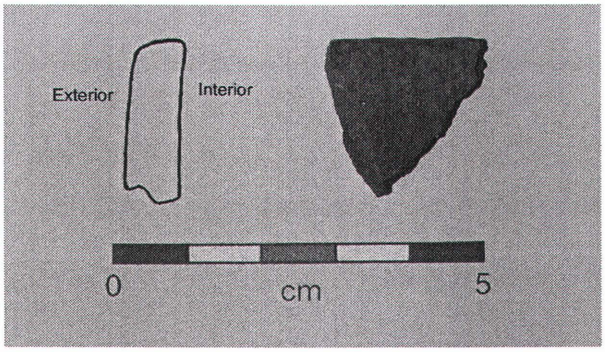

Figure 6.16 Vessel 16.

decoration (Table 6.10) (Figure 6.17).

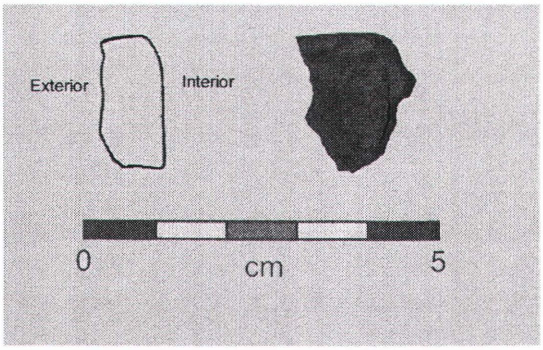

Figure 6.17 Vessel 17.

Vessel 18 is represented by two lip/rim sherds. Both of these sherds are grit-tempered, both have a plain/smooth exterior surface finish, and neither has decoration of any kind. The only distinction between these two sherds is the lip profile. In the first case a slightly rounded profile is exhibited, while the second sherd has a square profile (Table 6.10) (Figure 6.18).

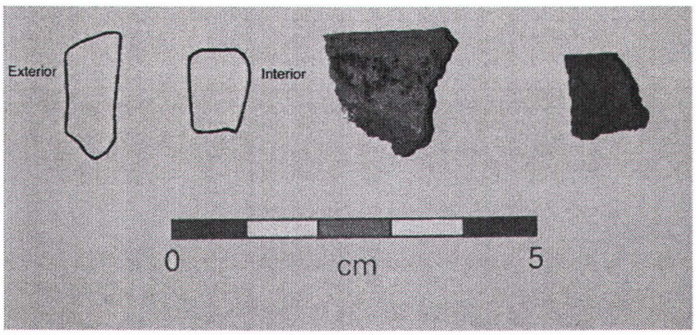

Figure 6.18 Vessel 18.

Vessel 19 is represented by a single lip/rim sherd which has been grit-tempered. The exterior surface finish can not be determined. No decoration of any kind is present on the lip or rim (Table 6.10) (Figure 6.19).

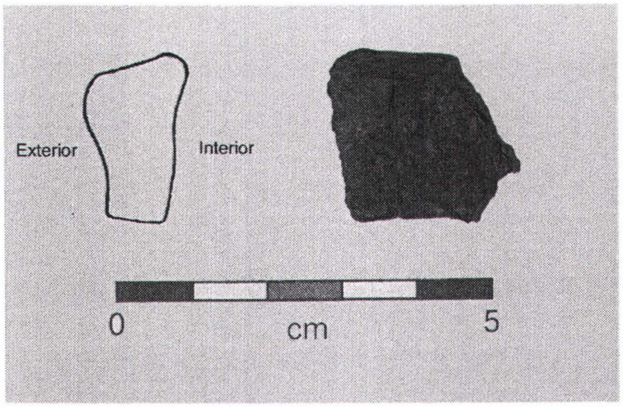

Figure 6.19 Vessel 19.

Five other sherds, a rim sherd and four lip sherds, were too fragmented to identify them as separate vessels or to relate them to one of the existing vessels. The rim sherd is missing the lip due to breakage and exfoliation. It is grit-tempered with a plain/smooth exterior and interior surface finish. The rim profile is excurvate and has a thickness of 8.0mm. No decoration is visible. The first lip sherd has been grit-tempered. Its exterior exhibits an indeterminate surface finish; its interior is plain/smooth. The lip profile is square and the lip thickness is 14.7mm. The only form of decoration is the continuation of the exterior surface finish up onto the lip. The second lip sherd is tempered by grit and sand, but due to exfoliation nothing else could be determined for it. The third lip sherd is grit-tempered. The exterior surface is plain/smooth; its interior is exfoliated. No rim profile could be determined, but the lip is rounded in profile. No decorations are visible. Only the lip thickness, 12.3mm, could be determined. The final lip sherd is also grit-tempered, but the surface finish could not be determined. Both the lip and the rim profiles were indeterminate; however, the brim is decorated with an oblique CWT impression.

6.4 Body Sherds

The majority of these sherds are grit-tempered (70.6%, n=96) and the remaining sherds are either grit/sand tempered (28.7%, n=39) or indeterminate (0.7%, n=1) (Table 6.11). Smoothed cord-roughened sherds comprise over a third of the collection (n=52). The remainder are either cord-roughened (n=9), or smoothed fabric-impressed (n=6). The interiors of six of these sherds exhibit burnt cooking residue. Finally, one body sherd exhibits a possible chevron motif of cord-wrapped tool (CWT) impressions (Figure 6.20).

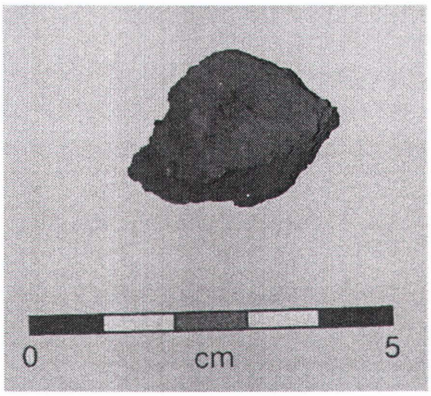

Figure 6.20 Possible Chevron Decoration.

6.5 Shoulder Sherds

Only one of the four shoulder sherds exhibits a prominent ridge with thickening. The remainder lack a prominent shoulder ridge as well as this ridge thickening. Three of these sherds are grit-tempered, the fourth is tempered by a combination of grit and sand. One sherd is cord-roughened, a second plain/smooth, and the remaining two are indeterminate for this trait. None of these sherds have any form of cooking residue. The single neck/shoulder sherd is grit-tempered, has an indeterminate surface finish, no cooking residue, and

Table 6.11 Body Sherd Characteristics.

Body Sherd Characteristics		
Temper Used	**Frequency**	**% Frequency**
Grit	96	70.6%
Grit/Sand	39	28.7%
Indeterminate	1	0.7%
Total	**136**	**100.0%**
Type of Surface Finish		
Indeterminate	51	37.5%
Smoothed Cord-Roughened	52	38.2%
Cord-Roughened	9	6.6%
Smoothed Fabric-Impressed	6	4.4%
Fabric-Impressed	9	6.6%
Plain/Smooth	9	6.6%
Total	**136**	**99.9%**
Decoration		
Cord Wrapped Tool Herringbone Design	1	100.0%
Cooking Residue	6	4.4%

no form of decoration. Furthermore, there is no thickening at the shoulder.

6.6 Neck Sherds

All nine of these sherds have a concave profile. Five of these are grit-tempered; the remaining four have a combination of grit and sand (Table 6.6). Four have a smoothed cord-roughened exterior, three are cord-roughened, and the remaining two are indeterminate. None of these sherds bear any form of cooking residue, and no decoration was noted (Table 6.12).

6.7 Basal Sherd

One sherd came from the base of a vessel. It is grit-tempered with no discernable surface treatment or cooking residue. It is also curved, indicating that the vessel had a rounded base.

Table 6.12 Neck Sherd Characteristics.

Neck Sherd Characteristics		
Temper Used	**Frequency**	**% Frequency**
Grit	5	55.6%
Grit/Sand	4	44.4%
Total	**9**	**100.0%**
Type of Surface Finish		
Cord-Roughened	3	33.3%
Smoothed Cord-Roughened	4	44.4%
Indeterminate	2	22.2%
Total	**9**	**99.9%**

6.8 Indeterminate Sherds

There are 117 indeterminate sherds. Grit temper is the most common, representing 84.6% (n=99) of the total (Table 6.13). Five (4.3%) are grit/sand tempered; the remaining 13 (11.1%) are indeterminate. The surface finishes on these sherds are for the most part not discernable due to the small size of these sherds or to exfoliation (Table 6.13). In the few instances where this could be distinguished, five are cord-roughened, one is smoothed cord-roughened, one is fabric-impressed, and the final one is smoothed fabric-impressed. None of these sherds have any form of cooking residue present; however, one sherd did have a CWT impression.

6.9 The 2001 Ceramic Assemblage.

Seven pottery sherds were found in the course of the 2001 fieldwork (Table 6.14, 6.15, 6.16). Of these seven sherds, five were found during excavation, the other two during surface reconnaissance. Of those found during excavation, three were found in the southern quadrants at depths between 5 to

10cm DBS. The other two were located in the northwest quadrant between 12.5cm to 13.5cm DBS.

One of the latter sherds is a single lip/rim sherd which is designated as Vessel 20 (Figure 6.21). This sherd has a lip thickness of 11.9mm and has been

Table 6.13 Indeterminate Sherd Characteristics.

Indeterminate Sherd Characteristics		
Temper Used	**Frequency**	**% Frequency**
Grit	99	84.6%
Grit/Sand	5	4.3%
Indeterminate	13	11.1%
Total	117	100.0%
Type of Surface Finish		
Indeterminate	109	93.2%
Smoothed Cord-Roughened	1	0.9%
Cord-Roughened	5	4.3%
Smoothed Fabric-Impressed	1	0.9%
Fabric-Impressed	1	0.9%
Total	117	100.0%
Decoration		
Cord Wrapped Tool (CWT)	1	100.0%

Table 6.14 Represented Vessel Portions from the Excavations.

Vessel Portion	Frequency	% Frequency
Indeterminate	4	57.1%
Lip/Rim	1	14.3%
Body	1	14.3%
Base	1	14.3%
Total	**7**	**100.0%**

Table 6.15 Excavated Sherd Tempering Agent.

Temper Used	Frequency	% Frequency
Grit	7	100.0%
Grit/Sand	0	0.0%
Indeterminate	0	0.0%
		0.0%
Total	**7**	**100.0%**

Table 6.16 Surface Treatment on the Excavated Ceramics.

Exterior Surface Finish		
Type of Surface Finish	Frequency	% Frequency
Indeterminate	5	71.4%
Smoothed Cord Roughened	1	14.3%
Cord Roughened	0	0.0%
Smoothed Fabric Impressed	0	0.0%
Fabric Impressed	1	14.3%
Plain/Smooth	0	0.0%
Total	**7**	**100.0%**

grit-tempered. The exterior surface finish of this sherd is indeterminate since it is exfoliated to some degree. The interior surface finish is also indeterminate, but only because this surface is covered in cooking residue. The lip profile is rounded; the rim profile is excurvate. No form of decoration was present on this sherd (Figure 6.21).

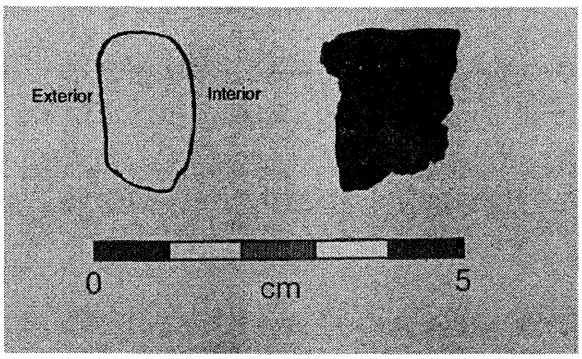

Figure 6.21 Vessel 20.

Only two other sherds could be identified to vessel portion. The first of these is a single basal sherd. This sherd, like all the excavated sherds, is grit-tempered. The exterior surface finish of the sherd is smoothed and burnished. The interior surface is smoothed. This sherd varies from 6.9mm to 10.7mm in thickness. Finally, the curvature of this sherd indicates the vessel it derived from had a rounded base.

The second identified vessel portion is a single body sherd. This sherd is also grit-tempered. On the exterior surface there is a smoothed cord-roughened texture, the interior is plain/smooth. Burnt cooking residue is present on both the interior and exterior surfaces of this sherd.

All the remaining sherds were indeterminate to a specific vessel portion. All of them are grit-tempered. Both the exterior and interior surface of three sherds had no discernable texture. However, in a fourth case a fabric-impressed exterior is evident, but in this case no observation for the interior surface is possible due to exfoliation. Otherwise, no cooking residue or decoration is evident.

6.10 Summary and Discussion

A total of 296 sherds were analyzed. Generally speaking, their attributes compare favorably to those of Old Women's Phase ceramics presented previously (Table 6.1). This includes the coarse, poorly consolidated paste, high reliance on grit as a tempering agent, the great thickness of the vessel walls, and the presence of cord-roughened, fabric-impressed, and plain exterior surface finishes, both smoothed and non-smoothed. As well, all nine neck sherds have a concave profile. Only one of the shoulder sherds is pronounced, with thickening of the ridge. Finally, in the case of the neck/shoulder sherd, the neck is concave, the shoulder is not pronounced and it lacks the thickening of the ridge. Some of the characteristics noted for the vessels have been summarized in Table 6.17, otherwise the lip profiles were commonly square, rounded, L-shaped, or out-slanted. Many of these lips have been thickened and have flattened brims.

Table 6.17 Vessel Characteristic Summarization.

Vessel Characteristic Summarization		
	Frequency	%Frequency
Temper		
Grit	15	75%
Grit/Sand	5	25%
Paste		
Laminated	13	65%
Moderately Consolodated	7	35%
Suface Finish		
Plain/Smooth	4	20%
Cord-Roughened Smoothed	5	25%
Cord-Roughened	1	5%
Fabric Impressed Smoothed	4	20%
Indeterminate	6	30%
Rim Profile		
Straight	6	30%
Excurvate	7	35%
Indeterminate	7	35%
Decoration		
Cord-Wrapped Tool	4	20%
Tool Impressed	4	20%
Incised	1	5%
None	11	55%

Chapter 7. Distribution of Surface Collected Artifacts

7.1 Distribution of the Lithic Assemblage

As stated in Chapter 1, one of the goals of this thesis is to examine the distribution patterns of the cultural materials found during the surface collection. In order to accomplish this, the catalogued data were entered into a GIS program which was used to plot the location of the artifacts, based on their frequency or weight every 5 square meters. The approach is that, even though the site had been disturbed, remnants of original activity areas could still be interpreted from this data.

As a way of introducing this topic, it is important to first discuss the effects of natural and cultural processes on a site. In the case of the Sherwin Campbell site, the only major form of cultural disturbance has been tillage. Tillage is defined as "...the mechanical manipulation of soil for any purpose, but in agriculture, the term is usually restricted to changing soil conditions for crop production" (Lewarch and O'Brien 1981:7). Several experiments have been conducted by archaeologists to examine the characteristics of a site after it has been disturbed by tillage. One experiment was conducted by the Canon Reservoir Human Ecology project in 1978 by Lewarch and O'Brien (1981:7). In this experiment the researchers set up three hypothetical activity areas to represent different archaeological sites, then passed over them with agricultural equipment (Lewarch and O'Brien 1981: 8, 12). They then measured how the artifacts in these different areas had moved after each equipment pass through them, based on a density aggregate analysis using a grid system (not point provenience) (Lewarch and O'Brien 1981:8).

Previously, it had been noted by archaeologists studying disturbed sites that the exposed surface materials represented only a small portion of the total plowzone population. Furthermore, some artifact classes were either over or under represented on the surface relative to the actual frequencies these artifacts represented below ground. (Lewarch and O'Brien 1981:17). Lewarch and O'Brien (1981:17) have demonstrated that there are four properties that act on a variable sized assemblage to cause segregation of certain objects. These are 1) the size of the object, 2) the density of the item, 3) the shape of the item, and 4) the item's resilience (Lewarch and O'Brien 1981:17). The segregation of objects by size, resulting in larger objects being exposed on the surface and collected more often, is what is known as the "Size Effect". Jermann (1981:115) also noted this effect while examining sites in the Lower Columbia River Valley, as did Ammerman and Feldman (1978:736) during their surface collection replication experiments. Similar experiments conducted by Odell and Cowan (1987:463) showed that objects with greater length and width over those with greater thickness and weight were more likely to appear on the surface. Baker (1978) noted that, in a hypothetical situation where artifacts of three different size classes were evenly distributed throughout a site: "The proportionate occurrence of larger objects...from the surface...is greater than the occurrence of those items within the entire site..." (Baker 1978:288, 289). He proposed that the preponderance of larger objects near the surface was the result of scavenging and re-use of these artifacts. In this way if a site were used several times, larger objects might be selected for re-use more often than smaller items. This would result in these items taking longer to get buried, explaining why these objects are more commonly found at or near the surface, resulting in higher numbers during collection. Baker (1978:292) also proposed that smaller objects are more likely to be trampled by humans or animals deeper into the soil matrix, resulting in their lower numbers during collection. Other factors that could influence the size effect included freeze/thaw cycles, rodent activity, and tree root disturbance. Based on these data, Baker (1978:292) argued that past activities are better represented by the smaller objects than larger ones. This suggestion by Baker, that larger objects are more commonly located closer to the surface could explain why at the Sherwin Campbell site, after only a couple of cultivation passes, large quantities of FCR and larger lithic debitage pieces were found. In the experiments conducted by Lewarch and O'Brien (1981:19) it was shown that after 10 to 15 equipment passes, a threshold developed which prevented further segregation by size. It was noted by Odell and Cowan (1987:463) that this size effect threshold took place after only eight equipment passes. One explanation proposed for this is that, during the use of discers, topsoil and objects within it are taken to the bottom of the furrow. It was shown that this incorporation of artifacts is more common with the smaller objects, but over continuous tillage operations these small objects are brought back to the surface, thus reducing the size effect (Lewarch and O'Brien 1981:21).

After looking at the vertical movement of objects, Lewarch and O'Brien then examined the horizontal displacement of artifacts. During their experiment, two types of horizontal movement were observed. The first is longitudinal movement, which displaces objects in a direction that is parallel to the direction the equipment is moving. The second kind of movement is transverse movement, which moves objects in a perpendicular direction to that in which the equipment is traveling (Lewarch and O'Brien 1981:29). The authors demonstrated that longitudinal movement is always greater than transverse movement. This was also noted by Roper (1976:373) during her experiments dealing with the lateral displacement of artifacts due to plowing. Furthermore, with an increase in tillage the longitudinal movement increased (Lewarch and O'Brien 1981:32). All of these results were also observed and documented by Odell and Cowan (1987).

These two groups of authors did disagree, however, on the effect that size of the object had on this movement. Lewarch and O'Brien (1981:36) stated that the larger the object the greater its displacement, not only because it was larger, but also because these larger objects are on the surface more frequently than smaller artifacts. Odell and Cowan (1987:473, 474) on the other hand argued that the size of the object had nothing to do with the amount an artifact was horizontally displaced. A factor noted by Odell and Cowan that would lessen the longitudinal movement of artifacts, is the possibility that the plowing took place in a bi-directional pattern. In this situation, artifacts could be dragged away from their original location on the first tillage pass, but on the second pass coming back in the opposite direction, these same artifacts would be dragged back towards their starting locations (Odell and Cowan 1987:466).

Based on their experiments these archaeologists have suggested different amounts of horizontal movement an artifact could experience due to tillage episodes. For example, according to Lewarch and O'Brien (1981:35), the average longitudinal movement of objects is less than 3m and the transverse movement is less than 40cm. Odell and Cowan noted that after 14 equipment passes the average cumulative displacement of artifacts is just over 2m (Odell and Cowan 1987:481). Roper (1976:374), through the use of a refitting analysis, stated that after 20 to 30 years of ploughing objects had traveled a mean distance of only 1.895m. During an analysis of some mound sites in Turkey, Redman and Watson (1970:280) postulated that after 3000 ploughing episodes the movement of objects is 5m or less.

Based on these various results, Lewarch and O'Brien (1981:40) suggested that using a five meter collection grid would compensate for this horizontal displacement, at a cost of losing some of the structural detail of the original activity areas. Nance and Ball (1981:55) invented the term "design effect", that is, depending on the size of the grid chosen for the collection, artifact cluster size and density would be affected. As a result, they (1981:65) suggest a grid size that is no larger than 5m. Odell and Cowan (1987:241) showed that with the use of a small grid size, spurious concentrations were found that didn't actually represent cultural activities. Their recommendation was to use a 6m square grid system to prevent this from happening.

A further consideration that needs to be taken into account is when the collection takes place. Odell and Cowan stated that over their two year experiment, the best seasons for collections were spring and fall. During these months artifacts are more visible to the human eye, since in the summer, the high degree of sun reflection off of artifacts makes them more difficult to see (Odell and Cowan 1987:466). Furthermore, they, as well as Ammerman and Feldman noted that these seasons were better for collection times due to rainfall, as both sets of authors noted an increase in the number of collected artifacts after rain had occurred (Odell and Cowan 1987:466, 458; Ammerman and Feldman 1978:736).

The Sherwin Campbell site collection employed a 5m grid, thus enhancing the likelihood of reflecting past cultural activities. As well, the site area had only been ploughed for cultivation in the fall of 1988 and the first crop grown in the summer of 1989. Therefore, very few tillage passes had occurred and the displacement of cultural materials would not have been great. Furthermore, though straw from the first crop on the land obscured visibility somewhat, overall the collection was conducted at a time when there was good surface visibility (David Meyer, personal communication 2003). Another reason for using these collection techniques at the Sherwin Campbell site was the fact that they had been tried and proven worthy during the surface recovery of artifacts at the Lozinsky site in 1987 (Malainey 1995:95-96). As a result, all of these factors, particularly the effects of tillage, will be taken into consideration during this analysis.

One final thing to consider before looking at the density contour maps is how they were constructed. For each of the pertinent categories of lithic artifacts a density contour map was constructed to reflect the frequency and weight of the artifacts. At times, however, the weight distribution maps had to be split into two separate maps, one reflecting lower weights the other the higher weights. The reason for this was that if the total weights combined were plotted out, the GIS program would pick up on only a couple of artifacts with extremely high weights. This resulted in a skewed impression of where dense concentrations were located. By splitting the map the program showed where the concentrations were without this problem of skewed concentrations. Finally, when it came to plotting the different tools groups a point provenience system was used instead of a frequency or weight. As a result, in the cases where a unit contained tools, a dot is present in the southwest corner of that particular unit.

7.1.1 Distribution of the Debitage

This first set of density contour maps reflects the locations of debitage based on frequency and weight (Figures 7.1, and 7.2). According to the frequency map, quantities of debitage range throughout most of the collected area. However, there are two areas of denser concentration in the center of the collected area. By weight, there seem to be two larger clusters and three smaller ones located for the most part at the western half of the site. The more centrally located weight concentrations do overlap with the debitage frequency concentrations.

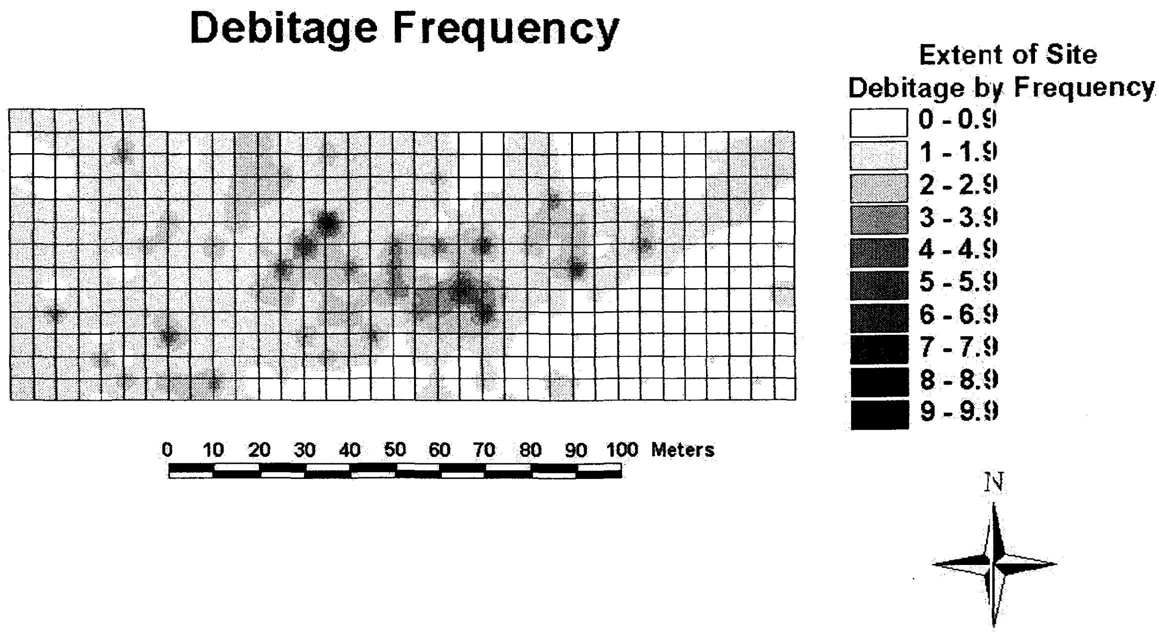

Figure 7.1 Debitage Frequency Distribution Map.

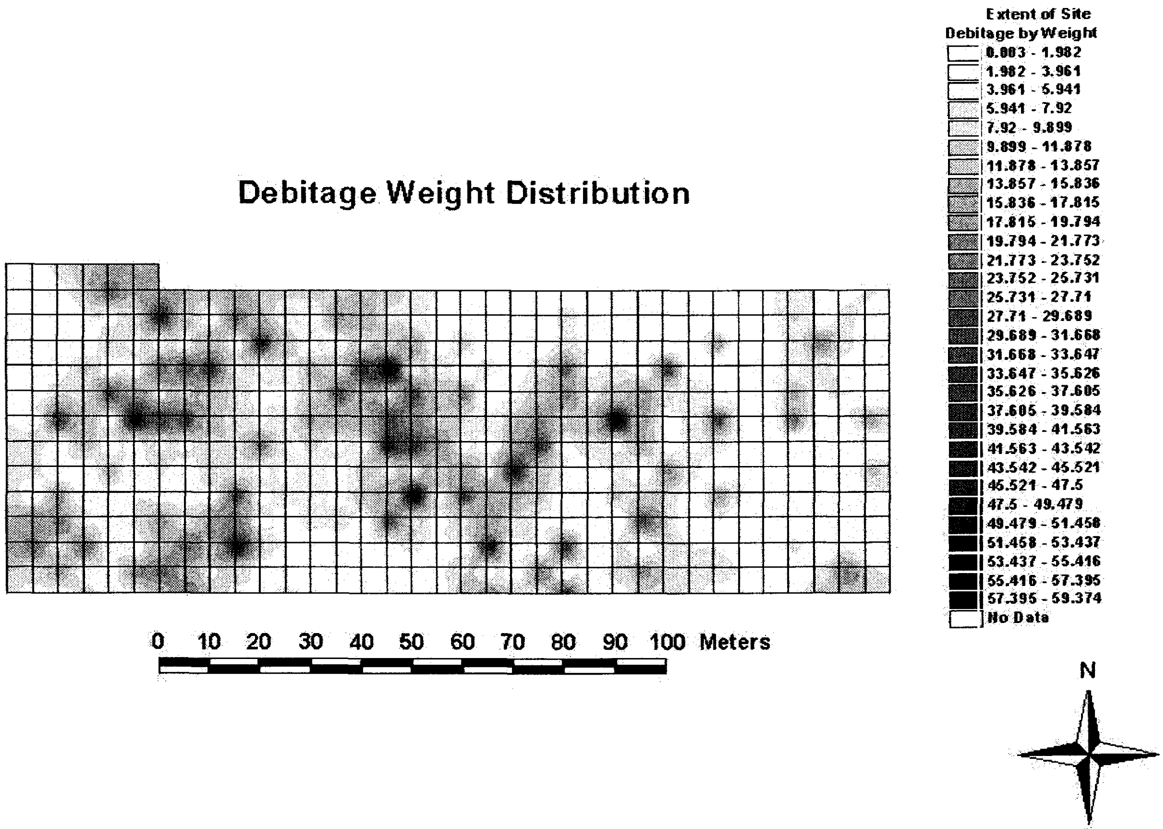

Figure 7.2 Debitage Weight Distribution Map.

7.1.2 Distribution of the Cores

Figures 7.3, 7.4, and 7.5 show where core concentrations were found according to frequency and weight, both above and below 100g. By frequency, there are two heavier concentrations in the western portion of the site. As previously stated these concentrations represent a maximum of only three items. According to weights greater than 100g, there is a heavier band extending across the width of the site near the center of the collected area. Finally, according to densities of cores with weights below 100g, two heavy concentrations and one lighter one were observed.

When the frequency of the cores is compared to the frequency of debitage, the heavier concentrations do not match up at all. However, the core frequency map is slightly skewed as heavy concentrations represent at most three items. As a result, the use of the data for core weight gives a lot more information about the site when compared to the debitage. When the distributions of debitage weight is compared to the distribution of cores by weight, the cores are associated with the debitage concentrations with one exception. The latter is located in the extreme southwest corner of the collected area. Based on this information the locations where cores and debitage are found together could represent areas of early flake reduction and the more isolated debitage concentration could represent later flaking stages. This is something that was also reflected during the debitage analysis, where it appeared that there was a large amount of early stage lithic reduction occurring at this site rather than later lithic reduction stages. Inevitably, though, all stages of lithic reduction would be represented in all of these areas, it just seems that certain areas saw more activity at one end of the spectrum of lithic reduction than the other.

Core Frequency Distribution

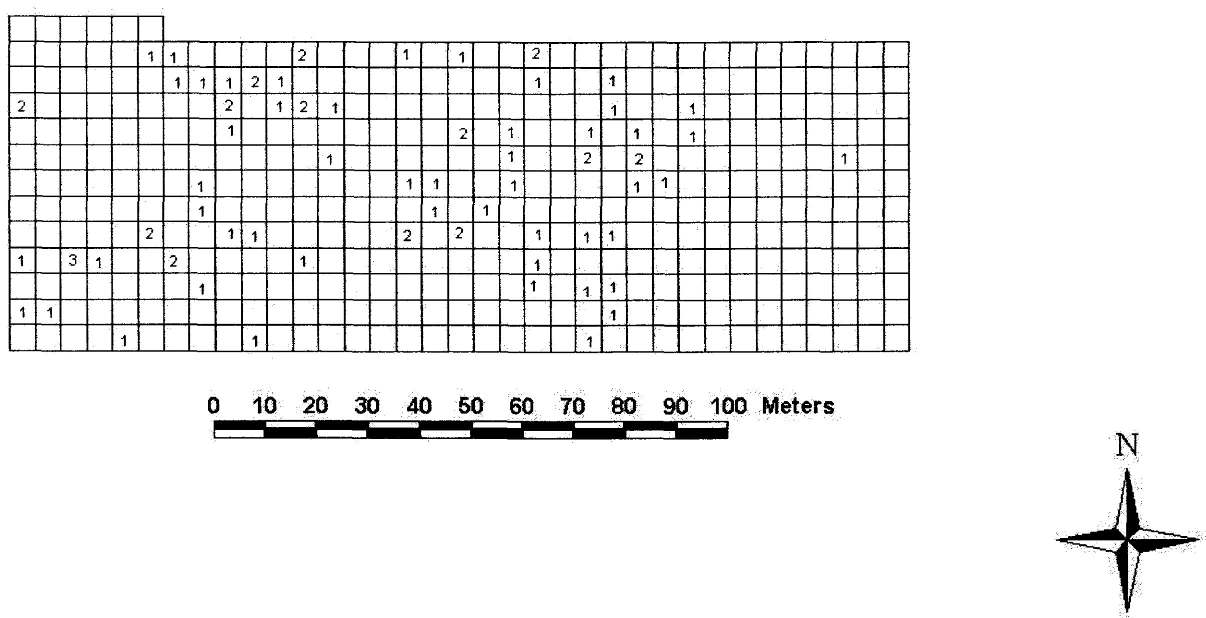

Figure 7.3 Core Frequency Distribution.

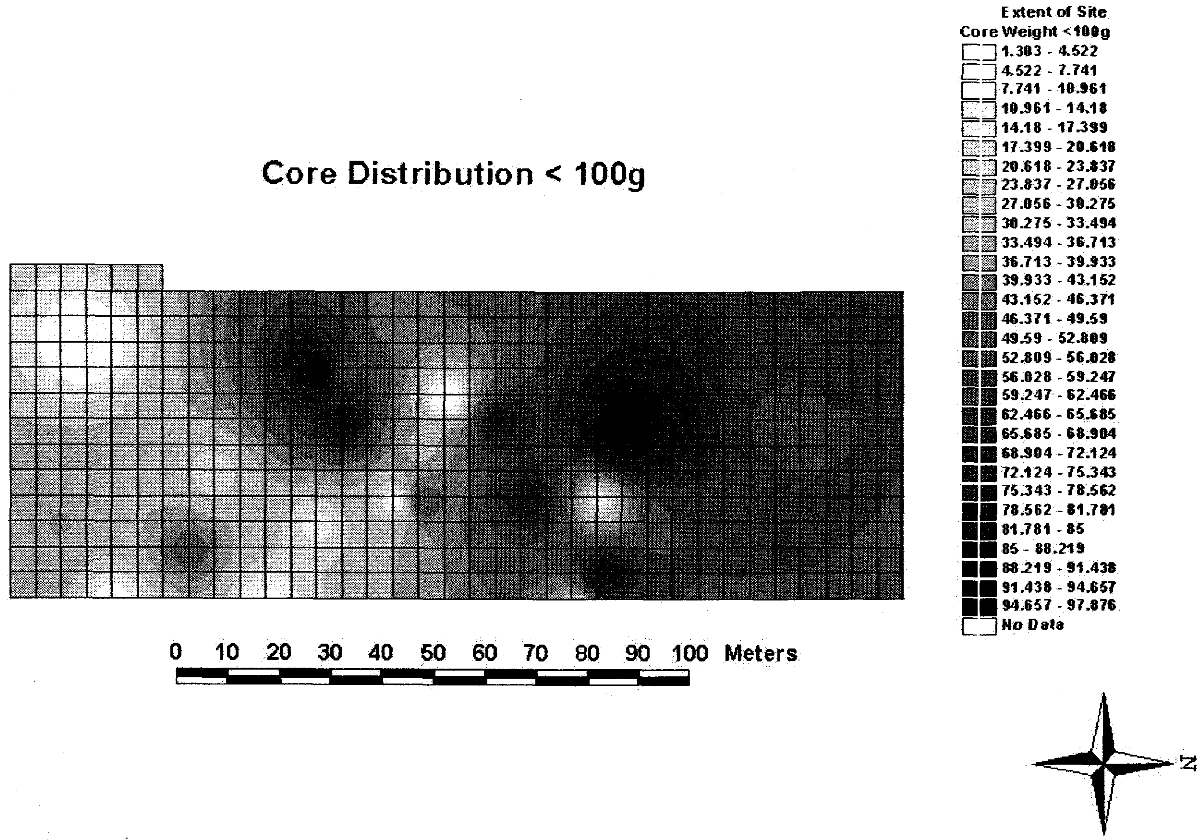

Figure 7.4 Core Weight Distribution <100g.

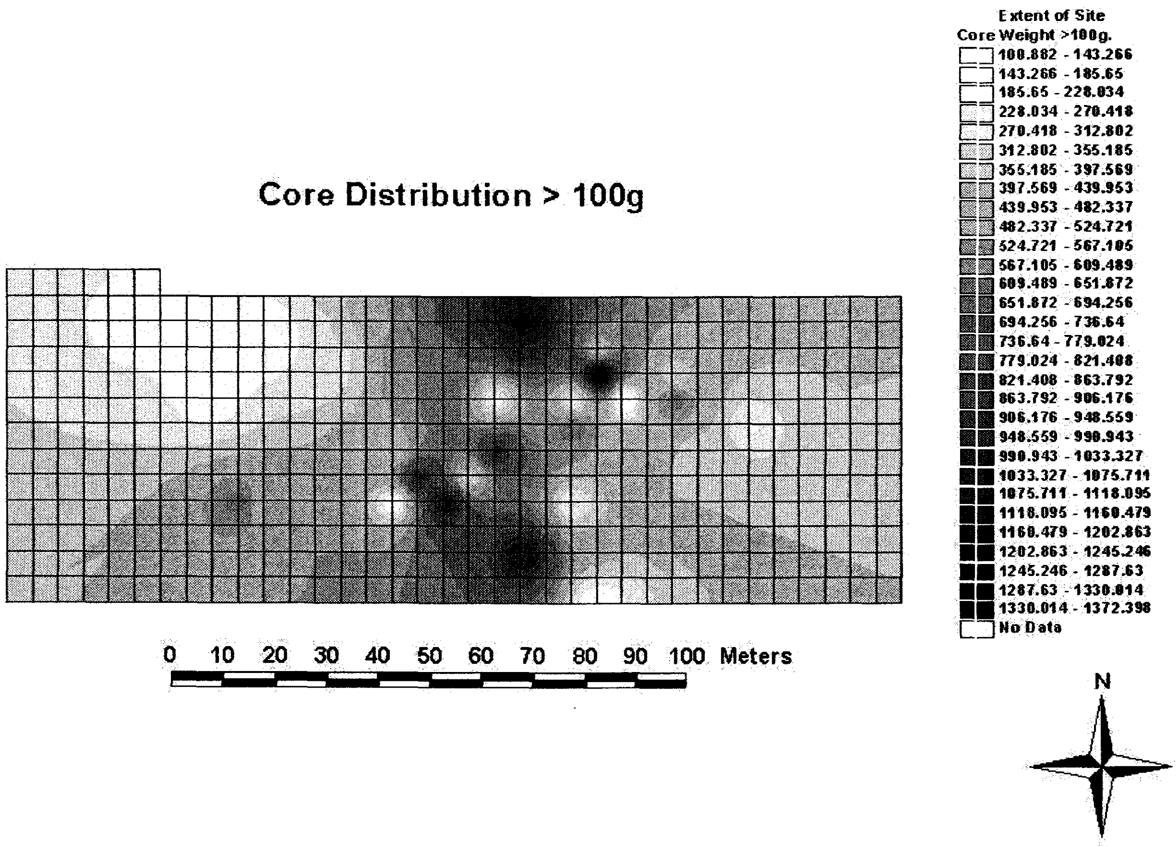

Figure 7.5 Core Weight Distribution Map >100g.

7.1.3 Distribution of FCR

Contour interval maps reflecting the frequency and weight of FCR are presented in Figures 7.6 and 7.7. According to the frequency maps there are four noticeable FCR concentrations, with the largest located at the western end of the site. By weight there are three concentrations located at the west end of the site within close proximity to each other. The largest frequency concentration corresponds closely with the weight concentrations; however, the two centrally located FCR frequency concentrations do not correspond to any weight concentrations. This indicates that this more westerly area is where the majority of the FCR is located.

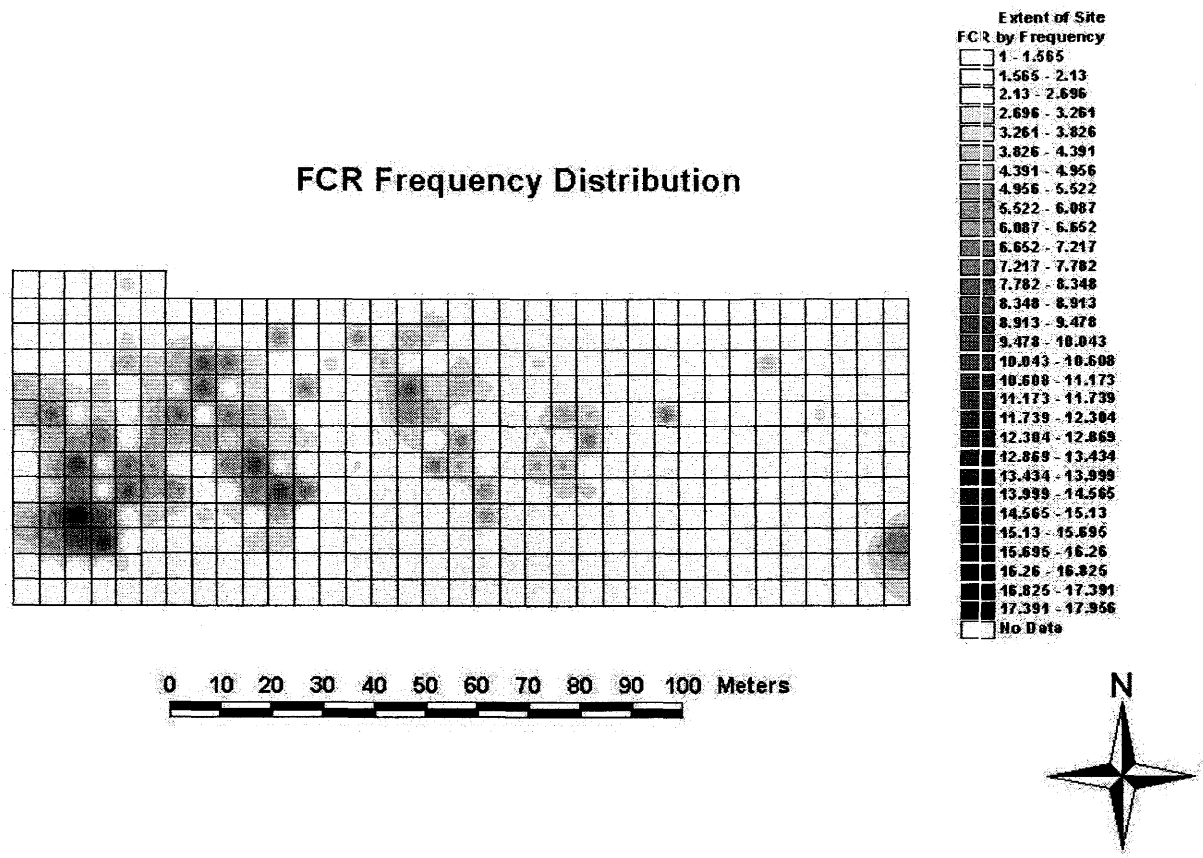

Figure 7.6 FCR Frequency Distribution.

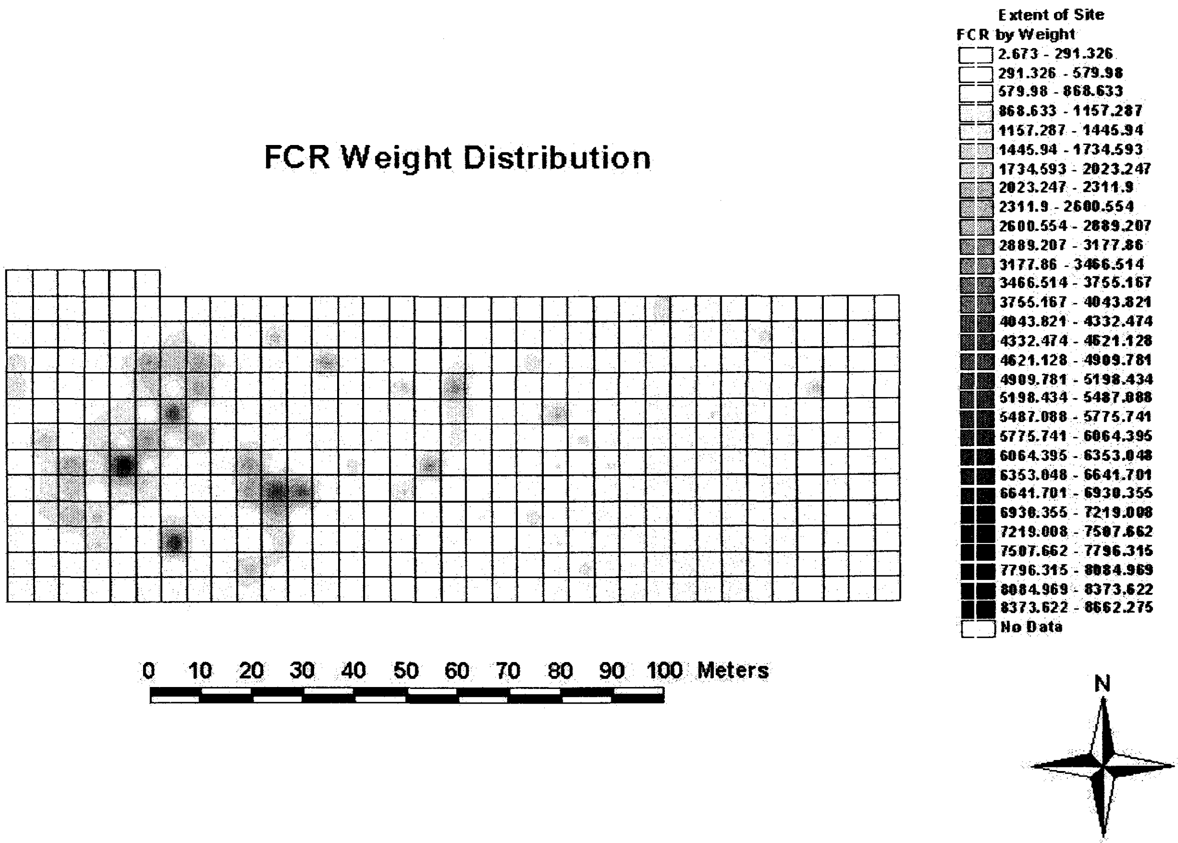

Figure 7.7 FCR Weight Distribution

7.1.4 Distribution of the Tools

The projectile points were scattered throughout the western three-quarters of the collected area (Figure 7.8). When considering at the distribution of the knives it is apparent that they are scattered throughout much of the collected area (Figure 7.8). The single pièces esquillèe is located in the central portion of the site (Figure 7.8). To some extent the distributions of the projectile points and knives do overlap. However there is a greater quantity of projectile points located in the western portion of the collected area, whereas more of the knives are in the central and eastern portions of the site.

Another set of distribution maps was created for the unifaces,and the retouched and utilized flakes (Figure 7.9). Within the uniface category, however, only the scrapers could be mapped as provenience information had been lost for both the gravers and spokeshave. Like the previous map, these tools are found scattered throughout the collected area. When compared to the bifacial tools, again there is overlap. However, it is the author's impression that these tools were used to some extent throughout the site.

The distribution of heavy stone tools is shown in Figure 7.10. Hammer/anvil stones tended to cluster together, indicating their use association with one another. Furthermore, they have a relatively close proximity to debitage, showing their use in the flint knapping process, for example splitting small pebbles. Two of the remaining tool groups-the hammerstones and the single anvil-were all located near debitage concentrations, suggesting their use as flint knapping tools.

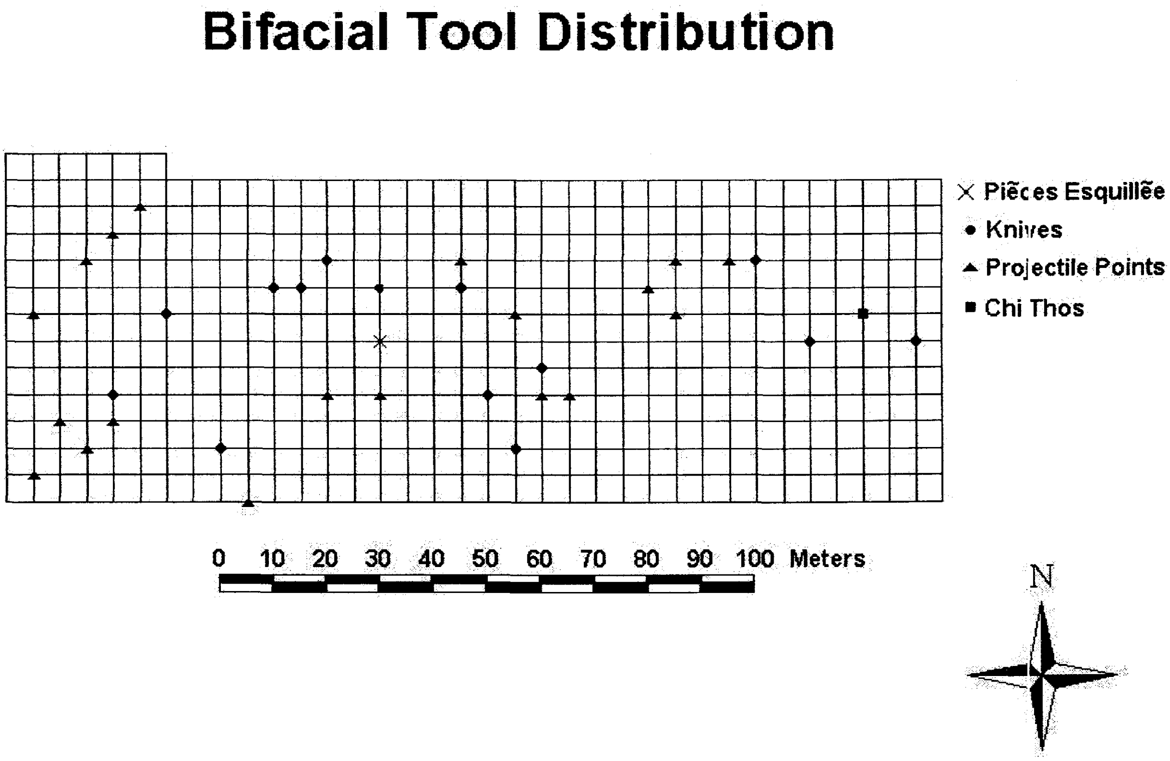

Figure 7.8 Bifacial Tool Distribution.

Unifaces, Retouched, and Utilized Flake Distribution

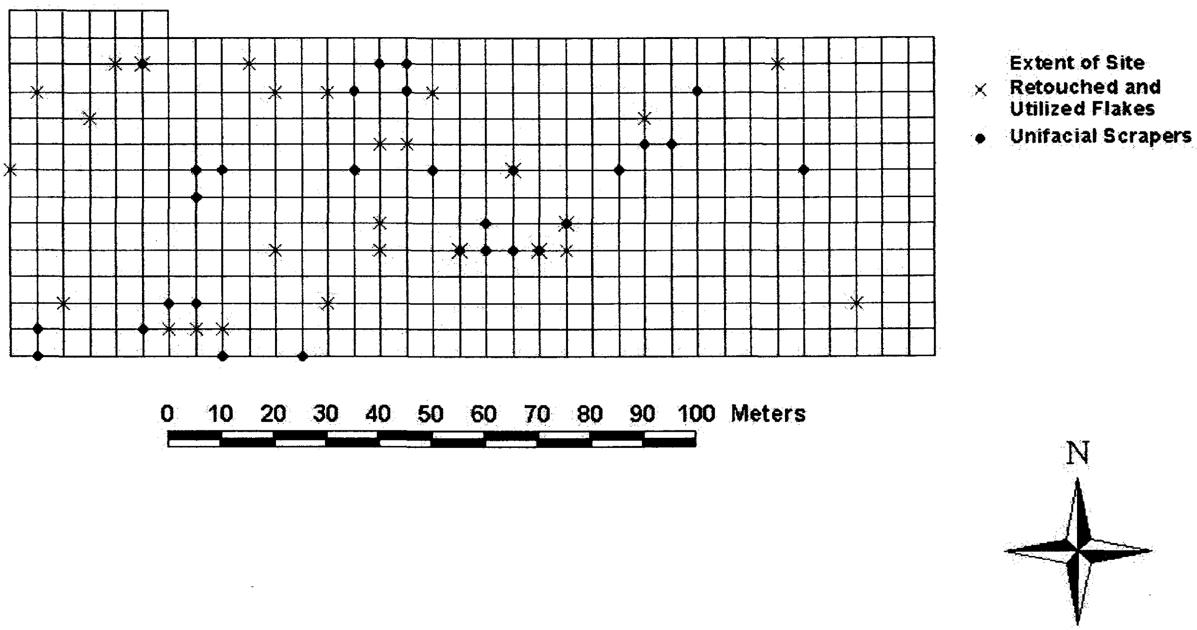

Figure 7.9 Distribution of the Unifaces, Retouched, and Utilized Flakes.

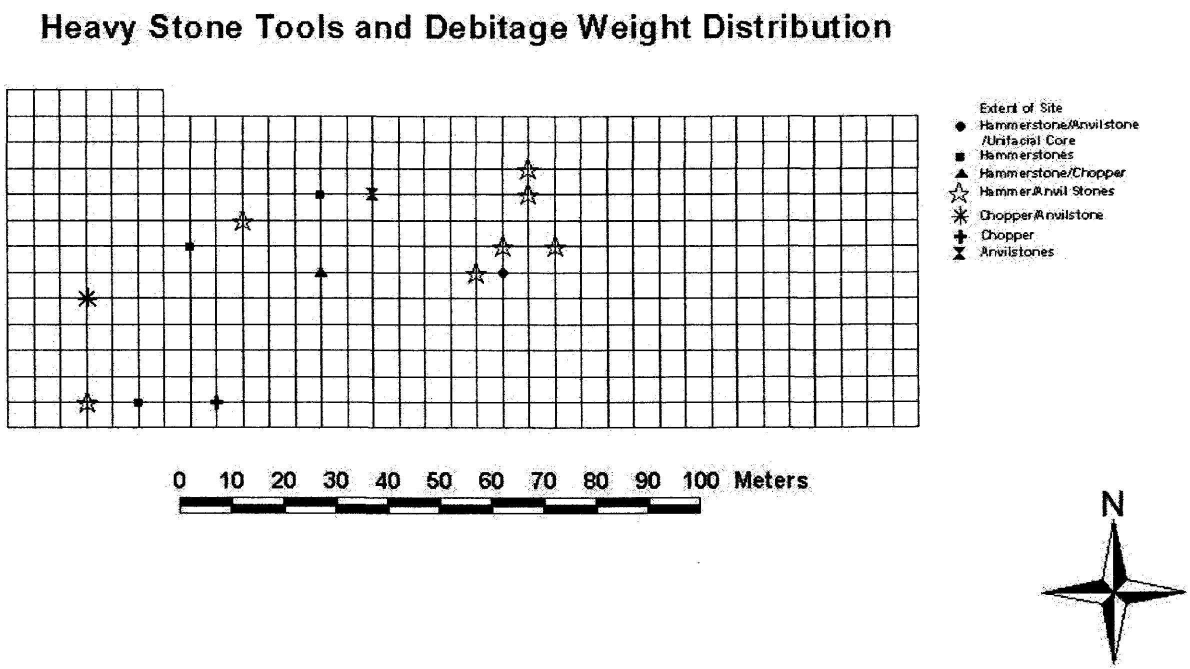

Figure 7.10 Heavy Stone Tools Distribution.

7.2. Ceramic Distribution

The distribution of rimsherds is indicated on Figure 7.11. The locations of only five of the 19 vessels could be mapped; the remainder lacked provenience data. Of these five vessels, one (Vessel 18) was represented by two rim sherds that were separated from each other, thus explaining the presence of a sixth dot. For the most part these rim sherds are located close to concentrations of sherds by weight. However, they are not located near the heaviest concentration of ceramics by weight. Even though this is the case, it still suggests a link between these vessels and the concentration of sherds around them.

Ceramic distribution was analyzed both by frequency (Figure 7.12) and weight (Figure 7.11). The frequency map shows two concentrations located in the center of the collected area. These concentrations can be misleading, though, as they represent clusters of up to only four ceramic sherds. Distribution by weight may be a better indicator of the location of the ceramics. This shows only one concentration in the western portion of the collected area.

7.3 Distribution of the Faunal Assemblage

Several faunal distribution maps were created in an attempt to determine whether activity areas could be identified. Figure 7.13 shows the locations of where bone was concentrated by weight. Figure 7.14 shows the distribution of burned bone by weight . The distribution of burned bone was examined because no hearth features were recorded. It was assumed that burned bone would be discarded in the vicinity of heaths. When the burned bone densities were looked at, five distinct concentrations are apparent. Four of these correspond with the

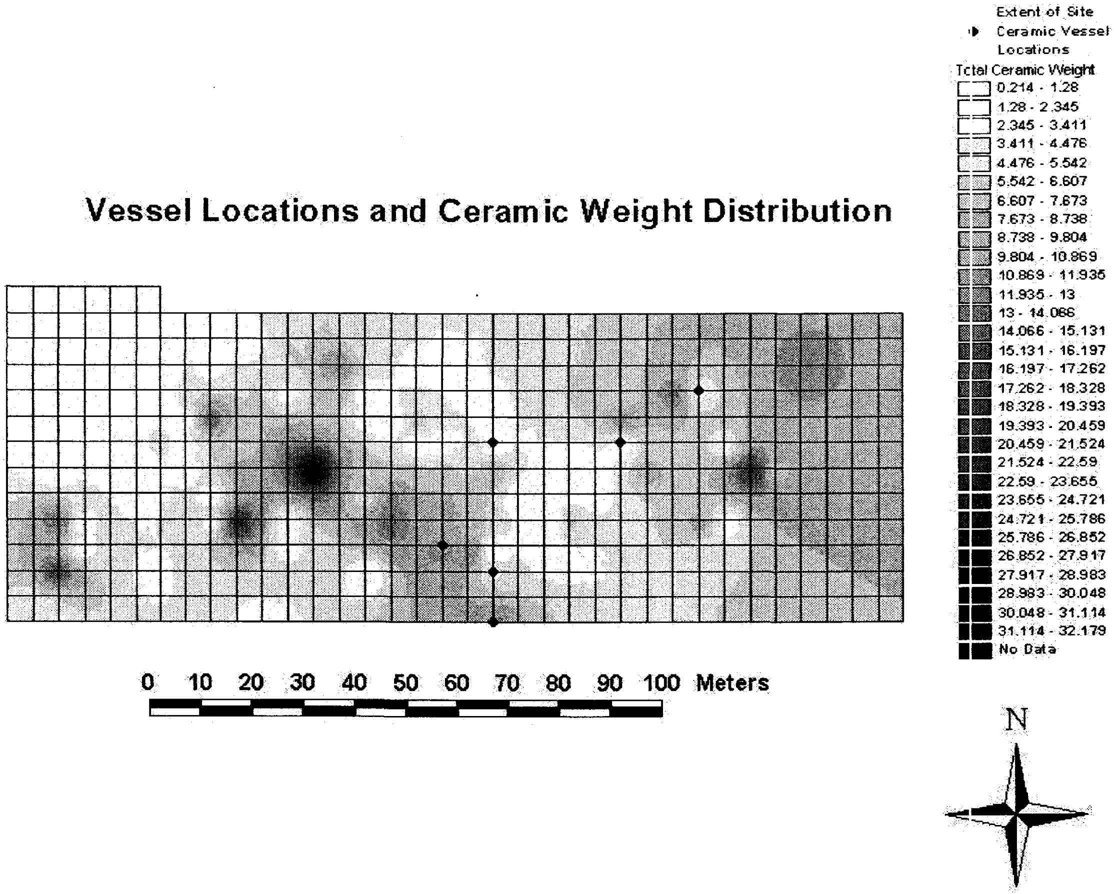

Figure 7.11 Distribution of Rim Sherds.

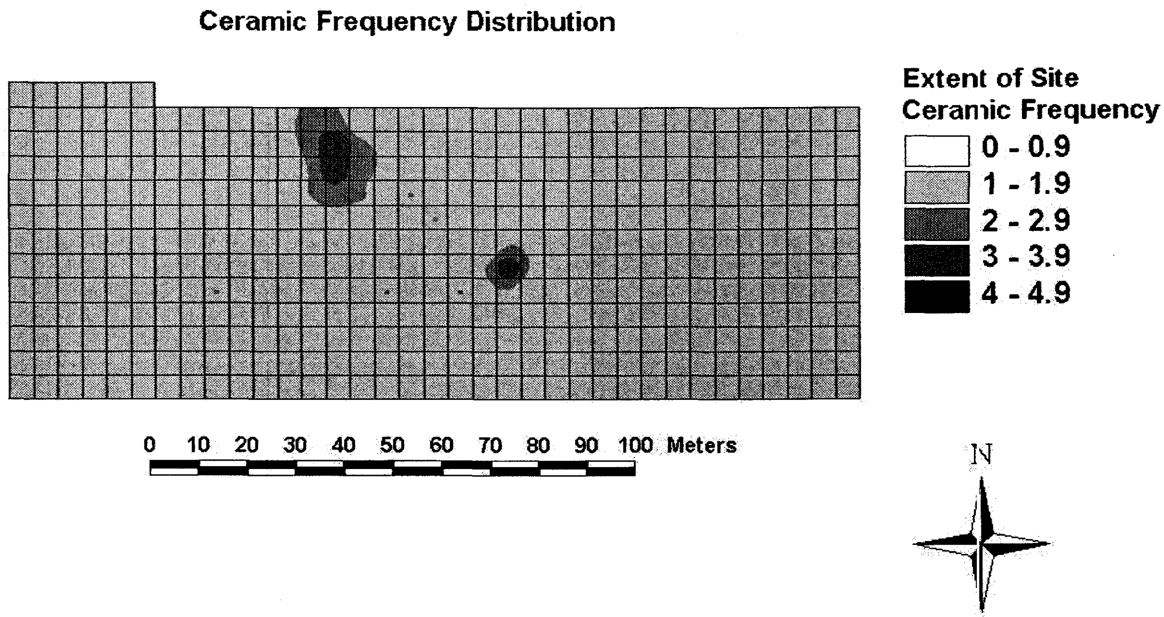

Figure 7.12 Ceramic Frequency Distribution.

more westerly concentration of FCR. Even though the FCR is widely dispersed over a large area this apparent correlation may still represent a cooking or processing area for meat or any number of activities associated with the heating of FCR.

The concentrations of the faunal assemblage were also compared to the locations of the heavy stone tools (Figure 7.10). The hammer/anvil stones are associated with the faunal remains, evidently reflecting their use in breaking bones for marrow or grease extraction. The same pattern was noted for the hammer/anvil/unifacial core tool, the hammerstone/chopper, the chopper and the chopper/anvil.

Since bison played a major role in the diet of the people that occupied this site, three maps were created to determine if specific bison butchering locations existed apart from the other faunal remains. Different skeletal element maps representing either the forelimbs, hindlimbs, or the axial skeleton were created (Figure 7.15, 7.16, and 7.17). The axial bison skeleton exhibits one heavy and two lighter concentrations. The forelimb exhibits one heavy and three lighter concentrations. The hindlimb map exhibits three heavy concentrations and three lighter concentrations. When these maps are compared to each other, the heavy concentrations of these different skeletal portions do not coincide. They are all located in different parts of the collected area. If the bison were brought back to the site and butchered in one area a mixture of all of these elements should be the result. Since they do not, this suggests there were different areas in which different portions of the bison were butchered.

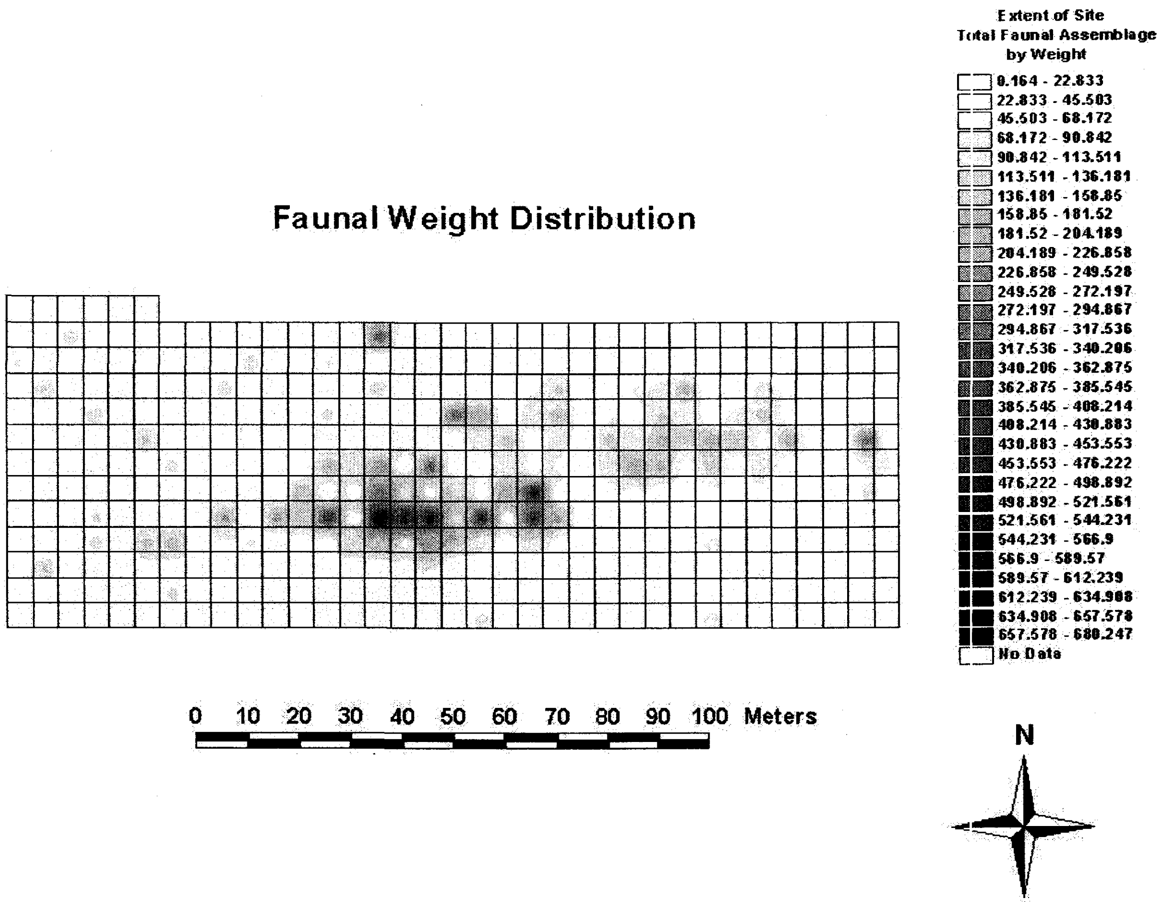

Figure 7.13 Total Faunal Assemblage Weight Distribution.

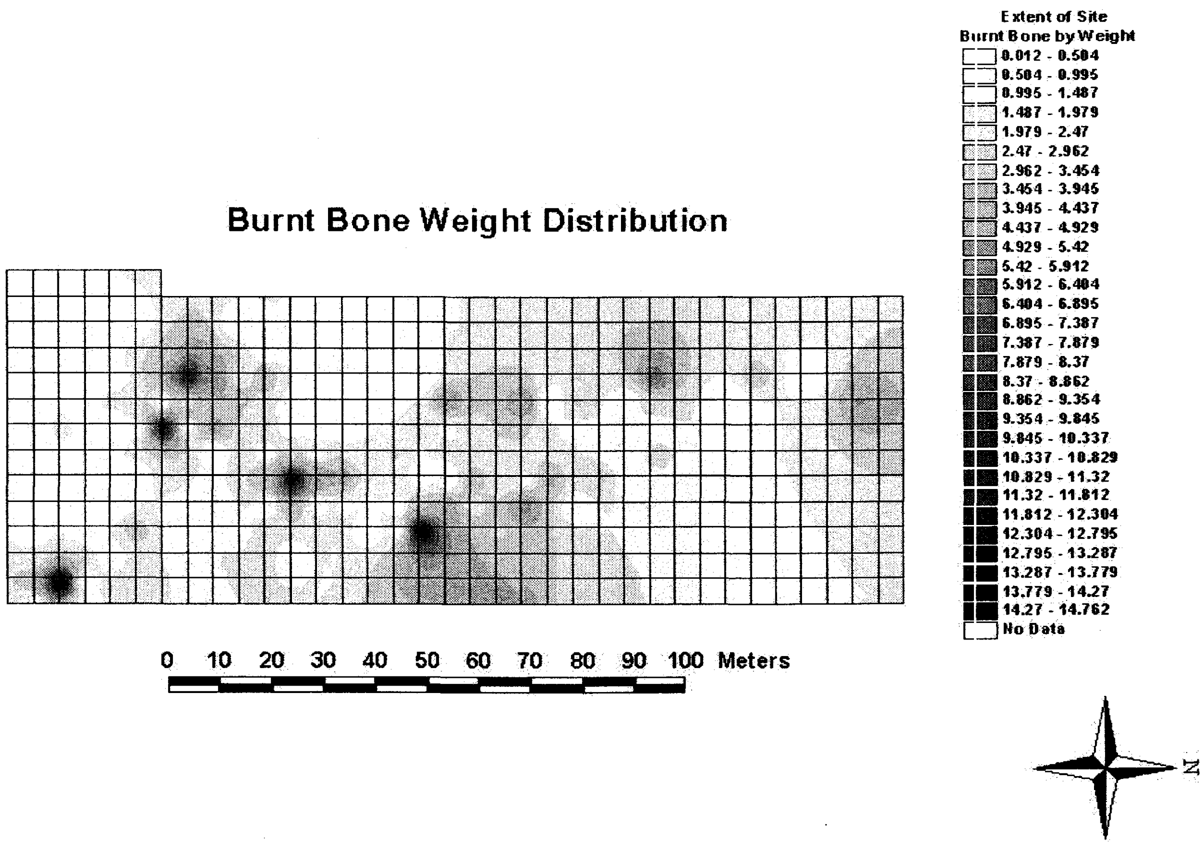

Figure 7.14 Burned Bone Weight Distribution.

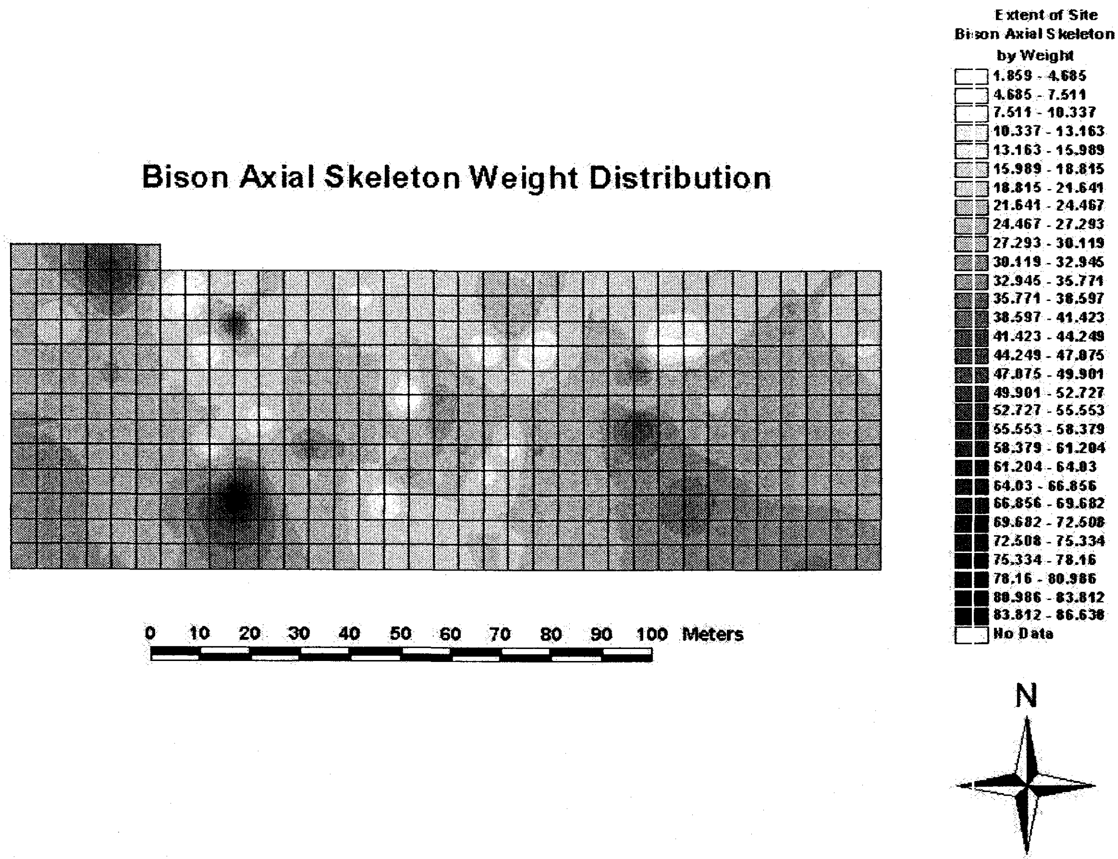

Figure 7.15 Bison Axial Skeleton Weight Distribution.

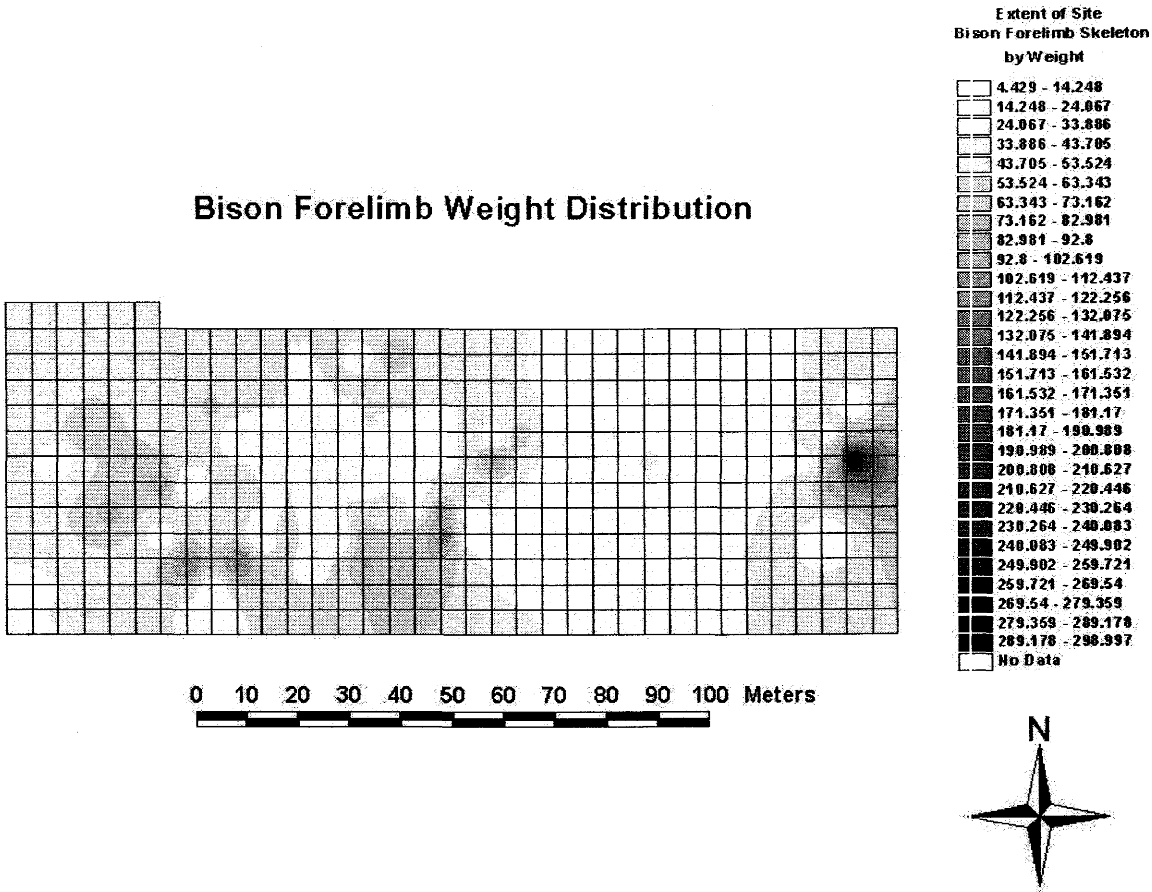

Figure 7.16 Bison Forelimb Weight Distribution.

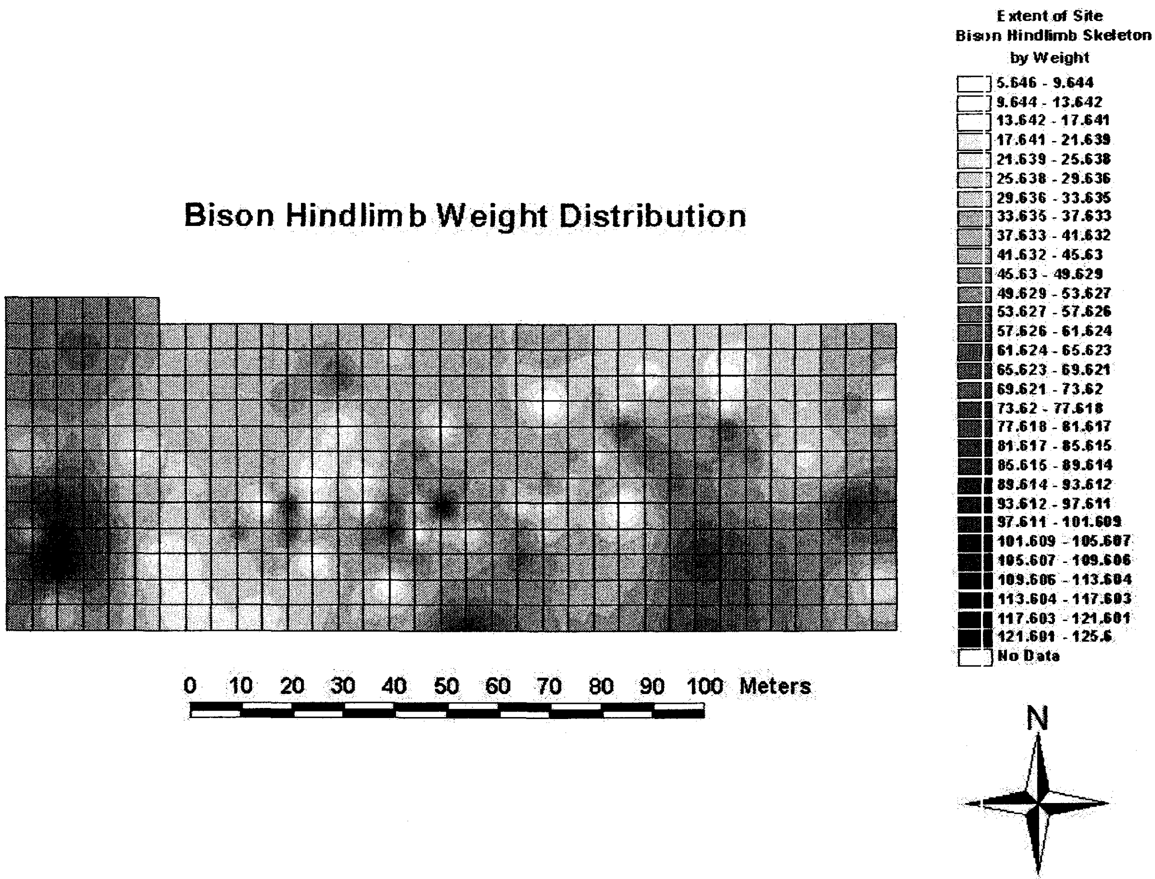

Figure 7.17 Bison Hindlimb Weight Distribution.

7.4 Summary and Discussion

Based on the distribution maps and the inter-relationships that exist between them, several different activities become apparent. First, lithic reduction and tool manufacturing activity areas were identified. This was confirmed by the presence of completed tools in the vicinity of debitage concentrations, which were also associated with areas where cores were located.

Another activity was the use of FCR to boil water, quite likely to extract bone grease or cook meat. This was shown as the FCR concentrations were associated with dense occurrences of burned bone. These burned bone concentrations were interpreted as areas where hearths were once located. As a result, the proximity of these two artifacts appears to represent the processing of faunal remains or the disposal of bone after processing.

Butchering activity is also quite evident at this site. Not only were the faunal remains heavily concentrated in one area of the site, but also there were cutmarks on the bone. Furthermore, hammer and anvil stones are associated with the faunal remains; they would have been used to break the bone into smaller pieces to extract marrow or to be boiled for the bone grease. Other butchering implements were also being created at this site, like the bifacial knives. It appears that different portions of bison were processed in separate areas as the forelimbs, hindlimbs, and axial portions of bison were all concentrated in areas separate from one another.

Chapter 8. Intersite Comparison

8.1 Introduction

In order to get an idea of how typical the artifact assemblage of the Sherwin Campbell site is in comparison to other OWP sites, the author attempted to do an intersite comparison. One difficulty encountered while undertaking this endeavor was finding OWP sites that were also camp/processing sites. Furthermore, the author wanted to compare this site only with others found in Saskatchewan. Due to the difficulty encountered in finding similar sites for comparison some kill sites had to be included. The components that were ultimately selected for this comparison were at the Garratt, Sjovold, and Tschetter sites.

The Garratt site (EcNj-7) is located on an alluvial floodplain of the Moosejaw Creek within the city of Moose Jaw. Personnel from the Saskatchewan Museum of Natural History (now the Royal Saskatchewan Museum) initially excavated it in 1966 (Morgan 1979:74). These excavations yielded deposits spanning a time period from 1990±75 BP (S-409), up to levels containing Prairie and Plains Side Notched projectile points (Morgan 1979:10). However, the OWP occupation was not dated. As a result, comparisons between the Sherwin Campbell site and this site were limited to only the topmost layers. The chipped stone industry of layers 1 and 2 from the Garratt site was composed of 2553 pieces of debitage, 12 core/core fragments, 19 Prairie Side-Notched points, 2 Plains-Side Notched points, 8 Plains Triangular points, 67 bifaces, and 20 unifaces (Morgan 1979:261-281). The chipped lithic assemblage included 9 lithic materials, of which only one, Knife River Flint, is an exotic (Morgan 1979:281). Similarly the majority of the lithics at the Sherwin Campbell site are local materials, with only a minor appearance of exotics.

The projectile points at both sites compare favorably, with one exception, the Garratt site produced Plains Triangular points, a type missing from the Sherwin Campbell assemblage. Both sites produced the Prairie and Plains Side-Notched projectile points, and the Prairie points from the Garratt site showed in the majority of the cases incomplete modification on both surfaces. The Garratt sample of Prairie points also showed a high frequency of convex bases, as with the Sherwin Campbell Prairie points (Morgan 1979:266).

Another tool type that appears within both site lithic assemblages is the pièces esquillèe. At the Garratt site, 37 of these tools were identified. Morgan distinguished between two types, the rectangular and the pseudo-core (Morgan 1979:278).

Morgan noted that the majority of her endscrapers from the Garratt site had edge angles falling between 65 and 75 degrees, and only two specimens had edge angles between 45 and 55 degrees (Morgan 1979:290). The 40 specimens of the Sherwin Campbell site which could have this feature measured, did not reflect Morgan's findings. Nearly equivalent numbers fell in both angle ranges, with 52.5% falling between the low angles of 30 to 55 degrees, and

47.5% falling between 60 to 75 degrees. Morgan (1979:290) proposed that the higher angled working edges were the result of many resharpening stages. If that is the case, then the Sherwin Campbell's collection shows that just under half of the endscrapers were exhausted with the remainder still being functional.

When the faunal assemblage is compared between these two sites, a greater variety of faunal species is represented at the Garratt site than at the Sherwin Campbell site. This may suggest that occupation of the Garratt site occurred later in the year when a greater variety of species were available to be exploited. However, some similarities were noted, in particular the high frequency of bison, as well as the presence of canid (Morgan 1979:97).

Another correspondence between these sites is that both contained a similar bone tool. One of the Garratt site's bone tool specimens had a blunt, rounded end and a lateral edge exhibiting rounding, smoothing, and polishing. This tool is very like the Sherwin Campbell specimen, suggesting that both had similar functions (Morgan 1979:292). However, Morgan (1979:292) suggested a scraping function for the Garratt site tool, whereas this author ascribed a flaking function to the Sherwin Campbell tool.

When the Garratt ceramic vessels are compared to the Sherwin Campbell vessels, several commonalties can be recognized. All 10 vessels from the upper layers at the Garratt site were grit-tempered as were the majority of the Sherwin Campbell vessels. The paste of the ceramics at both sites was also commonly laminated and poorly consolidated. Many of both sites' vessels have thickened lips due to an overlap on either the interior or exterior corner, or both. The surface finish of both sites' ceramics was most commonly cord-roughened; however, fabric-impressed and plain sherds were also noted in a few cases. The most common decorative element at both sites was CWT impressions, including one instance at both sites where a chevron design was produced by alternating the oblique angle of two CWT impressions. Following CWT impressions in frequency were incisions, found on samples of both sites' assemblages. The remaining two decorative motifs noted on the Garratt site ceramics were punctates and finger markings, neither of which were present in the Sherwin Campbell ceramics. One final commonality in both sites was the lack of decoration on some vessels (Morgan 1979:297-317).

The Tschetter site is located in the Dumferline Sandhills, about 18.8km northwest of Saskatoon (Prentice 1983:1, 5; Linnamae 1988:91). The University of Saskatchewan field school excavated this site from 1971 to 1975 (Prentice 1983:1). Excavations were also conducted by Prentice in 1979, by Urve Linnamae in 1980, and by the Saskatchewan Archaeological Society in 1984 (Linnamae 1988:101-103). The site has been interpreted as the remains of a bison pound. This component dated from 1005 to 914 BP (S-669, S-1631, S-2225) (Prentice 1983:32) (Table 8.1). Several complete tools and lithic detritus were associated with the faunal remains. These included 1305 pieces of debitage, 97 cores, 57 unifaces, 84 bifaces, 270 projectile points, 6 drill/perforators, 3 spokeshaves, and 62 retouched/utilized flakes (Prentice 1983:58-102 and 115). Several raw materials found here also occurred at the Sherwin Campbell site. These include SRC, jasper, SSP, chert, quartzite, quartz, silicified wood, chalcedony, KRF, obsidian, and basalt. Evidently, the peoples of both sites were using local raw materials with only the occasional appearance of exotics (Prentice 1983:126; Linnamae 1988:111).

Table 8.1 Radiocarbon Dates from the Sjovold and Tschetter Sites (Morlan 2003).

Sjovold			
Normalized Date	**Uncorrected Date**	**Layer**	**Lab No.**
1400+/-190	1320+/-190	4 to 5	S-1760
1420+/-190	1340+/-190	4 to 5	S-1761
Tschetter			
Normalized Date	**Uncorrected Date**	**Lab No.**	
1000+/-50	920+/-45	S-1631	
1085+/-80	1005+/-80	S-669	
1100+/-100	1020+/-100	S-2225	

The cores identified at the Tschetter site came in three forms, bipolar, micro-bipolar, and polymorphic (Prentice 1983:115-117). Based on Prentice's definitions of these different core types, only the bipolar and polymorphic core forms were recovered from the Sherwin Campbell site. One important commonality between both sites is the high dependence on the use of the bipolar technique to split usable material.

Prentice (1983) identified all 270 points as of the Prairie Side-Notched type. When compared to those from the Sherwin Campbell site, several similarities and differences are apparent. The majority of points from both sites exhibited incomplete retouch on the dorsal and ventral surfaces. Another similarity was that both samples of points exhibited asymmetrical shapes. One final commonality was that large numbers of basal edges of points from both sites were straight contracting to the proximal. However, the Tschetter site sample contained a large number of obtuse angle, rounded shoulder shapes. As well, the Tschetter site sample had a large proportion of points showing deeply rounded notches. Although the Sherwin Campbell site also had points with rounded notches, the majority were shallow rather than deep. Finally, a number of the Tschetter points had straight bases; however, this was followed closely by points with a convex basal shape. The sample from the Sherwin Campbell site had large numbers of convex bases followed by those with straight bases (Prentice 1983:104-112). The prominence of convex bases within these sites is in contrast to the suggestion that these points are not commonly found with convex bases. This could mean that the definition of this point type has to be re-examined, and possibly modified.

The ceramic sherds found at the Tschetter site represent four vessels. Like the vessels at the Sherwin Campbell site these exhibited coarsely laminated paste with grit-tempering. The exteriors of the vessels were all fabric-impressed which, though present at the Sherwin Campbell site, does not make up a very high percentage. Two of the vessels at the Tschetter site had been decorated with CWT impressions or with simple tool impressions. The remaining two vessels were undecorated (Prentice 1983:128-134). Both CWT and simple tool impressions were used as a mode of decoration on the Sherwin Campbell vessels, and as at the Tschetter site, several vessels from the Sherwin Campbell site also lacked decoration.

Finally, the faunal portion of the Tschetter site assemblage was predominately bison. In fact 99% of this faunal assemblage was composed of this species (Walker 1979:51). Also identified at this site were dog, wolf, badger, skunk, rabbit, and Richardson's ground squirrel (Linnamae 1988:114; Prentice 1983:35; Walker 1979:54). Of these the only definitive similarity between this and the Sherwin Campbell site is the presence of bison.

The Sjovold site (EiNs-4), located on the banks of the South Saskatchewan River near the town of Outlook, contained over 20 separate episodes of occupation dating from 3950 BP to the present (Dyck, and Morlan 1995:1). The single OWP component contained several artifacts that also make an appearance in the Sherwin Campbell assemblage, and was dated to 1300 – 1100 BP (Dyck and Morlan 1995:233) (Table 8.1). This included FCR made from materials such as gneiss, granite and quartzite (Dyck and Morlan 1995:239-240). Also recovered from the Sjovold site component was an endscraper, a single bifacially worked specimen, and several unifacially, bifacially, and utilized flakes (Dyck and Morlan 1995:242). These tools are well represented at the Sherwin Campbell site. Three Prairie Side-Notched projectile points were also identified at the Sjovold site, all of which had broad shallow notches, akin to those found on the points of this type from the Sherwin Campbell site (Dyck and Morlan 1995:242-243). As at Sherwin Campbell, a graver was identified at the Sjovold site making yet another common link between these two sites' tool kits (Dyck and Morlan 1995:242). Unfortunately, the OWP component at the Sjovold site did not contain any pottery (Dyck and Morlan 1995:241).

Several species are represented in the faunal remains from this layer; once again bison played one of the more prominent roles within the animal food sources, as it did within the Sherwin Campbell site. Also alike between these two sites was the exploitation of rabbit. However, the Sjovold site also had species such as deer, pronghorn, and several small mammals that are absent in the Sherwin Campbell site assemblage (Dyck and Morlan 1995:247-249).

8.2 Summary and Discussion.

It is clear after reviewing these sites and comparing them to the Sherwin Campbell site that several commonalties can be noted. First, the use of the Prairie Side-Notched point is obviously one similarity between all of these sites. Second, the use of bipolar cores is another common aspect as is the heavy exploitation of bison as a food resource. Finally, ceramics from these sites are often grit-tempered, have poorly consolidated paste, have cord-roughened or fabric-impressed exteriors, and employ CWT or simple tool impressions to produce decorative motifs.

Chapter 9. Summary and Conclusions

This thesis has been prepared to meet several research goals. As presented in the first chapter these research goals were:

1) The complete faunal, lithic, and pottery analysis of an Old Women's Phase site.
2) Use of these data to interpret the prehistoric subsistence patterns, age, and season of occupational use of the site.
3) To contribute information towards the Old Women's Phase.
4) To analyze distribution patterns of artifacts found in a disturbed context, with the hopes of being able to interpret activity areas.

With regard to the complete analysis of an Old Women's Phase site, all of the lithic, faunal, and ceramic assemblages were studied in detail. This included analyzing those artifacts that were collected during the fall of 1989, as well as those retrieved during the 2001 fieldwork. Based on the information gathered from these artifacts it was hoped that the data would contribute towards answering the next two research objectives.

The faunal analysis clearly indicated that the subsistence economy of people occupying this site was heavily focused on the Plains bison. Bison remains not only made up the vast majority of the faunal remains at the site, but they were also heavily processed to obtain the most from all portions of these animals. Other faunal remains were also found at this site, including the remains of a Nuttalls cottontail, muskrat, and canid. Though it is quite likely that these remains also represent exploited food resources, there was no direct confirmation of this line of thinking as no evidence of butchery was apparent on these remains.

The season of occupation was also more firmly substantiated based on the results of the faunal analysis. An immature distal bison humerus was aged to between 1 and 3 weeks, suggesting that the site was occupied sometime between early May and late June. However, further collections and excavations of this site would provide evidence to confirm this possibility.

The age of the site was determined through the analysis of the diagnostic projectile points and their known age ranges. The majority of the projectile points are Prairie Side-Notched. This point style was in existence from approximately 1200BP to 650BP. However, one Plains Side-Notched projectile point was also recovered. This point style was employed from 650 BP to 200BP. Based on the presence of the latter (single) projectile point, it is likely that this site was occupied just as this projectile point style was being introduced, sometime around 650BP.

With regard to the third research goal, the author not only presented the results of the detailed analysis of the artifacts that were retrieved from this site, but also synthesized information about the Old Women's Phase assemblages from three other Saskatchewan sites.

Within the second chapter of this thesis, sections were set aside to provide not only a detailed analysis of different physiographic aspects of the more immediate environment of the Coteau surrounding the archaeological site, but also information that encompassed the entire region known as the Missouri Coteau. Included with this data was a culture historical overview of the Missouri Coteau based on the available information from research that has been already conducted within the region.

The final research objective of this thesis was to recognize activity areas on the basis of the surface collected materials. Through the use of a GIS program, distinct activity areas were observed. One of the main activities, that of processing bone to extract grease, was suggested by the evidence at the west end of the site due to the close association of FCR and burnt bone remains. It was also quite clear that the site had a variety of stone tools created there, as was shown by the debitage concentrations and the associated tools found scattered across much of the collected area. Finally, differential treatment during butchering of portions of bison remains was also in evidence due to the separate concentrations of the axial skeleton, forelimb, and hindlimb portions of these animals.

Based on the analysis of the information produced at this site it becomes quite apparent that this site is first and foremost a processing site, with some habitation occurring at it while the processing took place. As stated previously, a likely candidate for the kill site is the nearby Lamarsh Bison Jump. Scattered throughout this area are also numerous tipi ring habitation sites. It appears that the sites in this area, both processing and habitation, form an interconnected network. They represent a location where groups would meet in order to herd and kill large numbers of bison at locations such as the Lamarsh Bison Jump.

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Appendix A.

Table 1. Faunal Resources of the Sherwin Campbell site. (E)=Extirpated, (Ext)=Extinct (M)= Migrational (Wapple 1999 (Mammals); Didiuk 1999 (Reptiles and Amphibians); Webster 1999 (Mammals).

Latin Name	Common Name
Antiodactyla	
Antilocapra americana	Pronghorn
Cervidae	
Cervus elaphus (E)	Elk
Alces alces (M)	Moose
Odocoileus hemionus	Mule Deer
Ococoileus virginianus	White-Tailed Deer
Bovidae	
Bison bison bison (E)	Bison
Lagamorpha	
Lepus townsendii	White-tailed Jack Rabbit
Lepus americanus	Snowshoe Hare
Sylvilagus nuttallii	Nuttalls Cottontail
Canidae	
Canis lupus (E)	Timber Wolf
Canis lupus nubilus (Ext)	Prairie Wolf
Canis latrans	Coyote
Vulpes vulpes	Red Fox
Ursidae	
Ursus americanus	Black Bear
Ursus arctos (E)	Grizzly Bear
Felidae	
Lynx lynx (E)	Lynx
Felis concolor	Mountain Lion
Mustilidae	
Mustela nivalis	Least Weasel
Mustela frenata	Long-tailed Weasel
Mustela vison	Mink
Lontra canadensis (E)	River Otter
Mephitis mephitis	Striped Skunk
Taxidea taxus	Badger
Gulo gulo (E)	Wolverine

Latin Name	Common Name
Procyonidae	
Procyon lotor	Raccoon
Erithizontidae	
Erethizon dorsatum	Porcupine
Castoridae	
Castor canadensis	Beaver
Scuridae	
Tamias minimus	Least Chipmunk
Spermophilus richardsonii	Richardson's Ground Squirrel
Spermophilus franklinii	Franklin's Ground Squirrel
Spermophilus tridecemlineatus	13-Lined Ground Squirrel
Cricetidae	
Peromyscus maniculatus	Deer Mouse
Onychomys leucogaster	Northern Grasshopper Mouse
Microtus pennsylvannicus	Meadow Vole
Microtus ochrogaster	Prairie Vole
Ondatra zibethica	Muskrat
Soricidae	
Sorex cinereus	Masked Shrew
Sorex haydeni	Hayden's Shrew
Verpertilionidae	
Lasionycteris noctivagans	Silver-haired Bat
Eptesicus fuscus	Big Brown Bat
Lasiurus blossevillii	Red Bat
Lasiurus cinereus	Hoary Bat
Bufonidae	
Bufo hemiophrys	Canadian Toad
Pelobatidae	
Scaphiopus bombifrons	Plains Spadefoot Toad
Hylidae	
Pseudacris maculata	Boreal Chorus Frog
Ranidae	
Rana pipiens	Northern Leopard Frog
Rana sylvatica	Wood Frog
Ambystomatidae	
Ambystoma tigrinum	Tiger Salamander
Colubridae	
Thamnophis radix	Plains Garter Snake

Table 2. Bird Resources of the Sherwin Campbell Site. (Smith 1999; Gough, G.A., Sauer, J.R. Iliff, M. Patuzent Bird Identification Infocenter. 1998. Version 97.1 Patuzent Wildlife Research Center, Laurel, MD. http://www.mbrpwrc.usgs.gov/Infocenter/infocenter.html.)

Latin Name	Common Name
Podicipedidae	
Podilymbus podiceps	Pie-billed Grebe
Podiceps nigricollis	Eared Grebe
Aechmophorus occidentalis	Western Grebe
Podiceps auritus	Horned Grebe
Podiceps grisegena (M)	Red-necked Grebe
Phalacrocoracidae	
Phalacrocorax auritus	Double-crested Cormorant
Ciconiidae	
Cathartes aura	Turkey Vulture
Accipitridae	
Pandion haliaetus (M)	Osprey
Buteo platypterus (M)	Broad-winged Hawk
Circus cyaneus	Northern Harrier
Buteo jamaicensis	Redtailed Hawk
Aquila chrysaetos	Golden Eagle
Accipiter striatus	Sharp-shinned Hawk
Buteo lagopus (M)	Rough-legged Hawk
Accipiter cooperii	Cooper's Hawk
Buteo swainsoni	Swainson's Hawk
Buteo regalis	Ferruginous Hawk
Haliaeetus leucocephalus	Bald Eagle
Accipiter gentiles	Northern Goshawk
Falconidae	
Falco columbarius	Merlin
Falco sparverius	American Kestrel
Falco rusticolus	Gyrfalcon
Falco peregrinus (M)	Peregrin Falcon
Falco mexicanus	Prairie Falcon
Pelicanidae	
Pelecanus erythrorhynchos	American White Pelican

Latin Name	Common Name
Anatidae	
Branta canadensis	Canada Goose
Anas americana	American Widgeon
Anas acuta	Northern Pintail
Anas crecca	Green-winged Teal
Aythya affinis	Lesser Scaup
Anas discors	Blue-winged Teal
Anas platyrynchos	Mallard
Anas cyanoptera	Cinnamon Teal
Oxyura jamaicensis	Ruddy Duck
Aythya valisineria	Canvasback
Chen caerulescens (M)	Snow Goose
Anser albifrons (M)	Greater White-fronted Goose
Chen rossii (M)	Ross's Goose
Histrionicus histrionicus (M)	Harlequin Duck
Anas clypeata	Nothern Shoveler
Mergus merganser (M)	Common Merganser
Mergus serrator (M)	Red-breasted Merganser
Anas strepera	Gadwall
Aythya americana	Redhead
Bucephala clangula (M)	Common Goldeneye
Aix sponsa (M)	Wood Duck
Anas rubripes (M)	American Black Duck
Lophodytes cucullatus (M)	Hooded Merganser
Aythya collaris (M)	Ring-necked Duck
Bucephala albeola (M)	Bufflehead
Cygnus columbianus (M)	Tundra Swan
Strigidae	
Aegolius acadicus	Northern Saw-whet Owl
Bubo virginianus	Great Horned Owl
Athene cunicularia	Burrowing Owl
Asio flammeus	Short-eared Owl
Nyctea scandiaca	Snowy Owl
Asio otus	Long-eared Owl
Rallidae	
Fulica americana	American Coot
Coturnicops noveboracensis	Yellow Rail
Rallus limicola	Virginia Rail
Porzana carolina	Sora

Latin Name	Common Name
Scoloacidae	Wilson's Phalarope
Phalaropus tricolor	
Catoptrophorus semipalmatus	Willet
Limosa fedoa	Marbled Goodwit
Phalaropus lobatus (M)	Red-necked Phalarope
Calidris minutilla (M)	Least Sandpiper
Limosa haemastica (M)	Hudsonian Godwit
Calidris pusilla (M)	Semipalmated Sandpiper
Calidris fuscicollis (M)	White-rumped Sandpiper
Calidris bairdii (M)	Baird's Sandpiper
Calidris melanotos (M)	Pectoral Sandpiper
Calidris himantopus (M)	Stilt Sandpiper
Tryngites subruficollis (M)	Buff-breasted Sandpiper
Tringa melanoleuca (M)	Greater Yellowlegs
Tringa solitaria (M)	Solitary Sandpiper
Gallinago gallinago	Common Snipe
Actitis macularia	Spotted Sandpiper
Recurvirostridae	
Recurvirostra americana	American Avocet
Phasianidae	
Perdix perdix	Grey Partridge
Tympanuchus phasianellus	Sharp-tailed Grouse
Gruidae	
Grus canadensis (M)	Sandhill Crane
Grus americana (M)	Whooping Crane
Charadriidae	
Charadrius semipalmatus (M)	Semipalmated Plover
Charadrius vociferus	Killdeer
Pluvialis squatarola (M)	Black-bellied Plover
Pluvialis dominica (M)	American Golden Plover
Laridae	
Sterna forsteri	Ferster's Tern
Chlidonias niger	Black Tern
Larus pipixcan	Franklin's Gull
Larus philadelphia (M)	Bonaparte's Gull
Larus argentatus (M)	Herring Gull
Larus delawarensis	Ring-billed Gull
Larus californicus	California Gull
Sterna hirundo	Common Tern
Larus glaucoides (M)	Iceland Gull
Larus glaucescens (M)	Glaucous Gull
Sterna caspia (M)	Caspian Tern
Columbidae	
Ectopistes migratoria (Ext)	Passenger Pigeon
Columba livia	Rock Dove
Zenaida macroura	Mourning Dove

Latin Name	Common Name
Trochilidae	
Archilochus colubris(M)	Ruby-throated Hummingbird
Picidae	
Melanerpes lewis (M)	Lewis's Woodpecker
Picoides tridactylus	Three-toed Woodpecker
Picoides pubescens	Downy Woodpecker
Picoides villosus	Hairy Woodpecker
Colaptes auratus	Northern Flicker
Alaudidae	
Eremophila alpestris	Horned Lark
Hirundinidae	
Stelgidopteryx serripennis	Northern Rough-winged Swallow
Riparia riparia	Bank Swallow
Hirundo rustica	Barn Swallow
Tachycineta bicolor	Tree Swallow
Petrochelidon pyrrohonota	Cliff Swallow
Sittadae	
Sitta canadensis	Red-breasted Nuthatch
Sitta carolinensis	White-breasted Nuthatch
Troglodytidae	
Troglodytes aedon	House Wren
Troglodytes troglodytes (M)	Winter Wren
Salpinctes obsoletus	Rock Wren
Cistothorus palustris (M)	Marsh Wren
Cistothorus platensis	Sedge Wren
Motticillidae	
Anthus rubescens (M)	American Pipit
Anthus spragueii	Sprague's Pipit

Latin Name	Common Name
Caprimulgidae	
Chordeiles minor	Common Nighthawk
Alcedinidae	
Ceryl alcyon	Belted Kingfisher
Tyrannidae	
Contopus cooperi (M)	Olive-sided Flycatcher
Sayornis sayi	Says' Phoebe
Empidonax minimus	Least Flycatcher
Empidonax traillii	Willow Flycatcher
Sayornis phoebe	Eastern Phoebe
Empidonax alnorum	Alder Flycatcher
Corvidae	
Corvus brachyrhynchos	American Crow
Cyanocitta cristata	Blue Jay
Corvus corax	Common Raven
Pica pica	Black-billed Magpie
Paridae	
Parus atricapillus	Black-capped Chickadee
Certhiidae	
Certhia americana (M)	Brown Creeper
Mimidae	
Mimus polyglottos	Northern Mockingbird
Toxostoma rufum	Brown Thrasher
Dumetella carolinensis	Gray Catbird
Turdidae	
Ixoreus naevius (M)	Varied Thrush
Catharus minimus (M)	Grey-cheeked Thrush
Sialia sialis (M)	Eastern Bluebird
Turdus migratorius	American Robin
Catharus ustulatus (M)	Swainson's Thrush
Catharus guttatus (M)	Hermit Thrush
Sialia currucoides	Mountain Bluebird
Catharus fuscescens	Veery
Bombycillidae	
Bombycilla garrulus	Bohemian Waxwing
Bombycilla cedrorum	Cedar Waxwing
Lannidae	
Lanius excubitor	Northern Shrike
Lanius ludovicianus	Loggerhead Shrike

Latin Name	Common Name
Vireonidae	
Vireo olivaceus	Red-eyed Vireo
Vireo solitarius	Blue-headed Vireo
Vireo philadelphicus (M)	Philadelphia Vireo
Vireo gilvus	Warbling Vireo
Perulidae	
Dendroica magnolia *(M)*	Magnolia Warbler
Dendroica tigrina *(M)*	Cape May Warbler
Dendroica palmarum *(M)*	Palm Warbler
Dendroica castanea *(M)*	Bay-breasted Warbler
Dendroica coronata (M)	Yellow-rumped Warbler
Dendroica striata (M)	Blackpoll Warbler
Wilsonia pusilla (M)	Wilson's Warbler
Mniotilta varia (M)	Black-and-white Warbler
Dendroica petechia	Yellow Warbler
Vermivora ruficapilla (M)	Nashville Warbler
Dendroica virens (M)	Black-throated Green Warbler
Dendroica fusca (M)	Blackburnian Warbler
Wilsonia canadensis (M)	Canada Warbler
Dendroica pensylvanica (M)	Chestnut-sided Warbler
Oporornis agilis (M)	Connecticut warbler
Oporornis philadelphia (M)	Mourning Warbler
Vermivora peregrina (M)	Tennessee Warbler
Vermivora celata (M)	Orange-crowned Warbler
Setophaga ruticilla (M)	American Redstart
Seiurus aurocapillus (M)	Ovenbird
Geothlypis trichas	Common Yellowthroat
Icteria virens	Yellow-breasted Chat
Emberizidae	
Ammodramus savannarum	Grasshopper Sparrow
Zonotrichia albicollis (M)	White-throated Sparrow
Melospiza lincolnii (M)	Lincoln's Sparrow
Melospiza georgiana (M)	Swamp Sparrow
Ammodramus nelsoni	Nelson's Sharp-tailed Sparrow
Spizella pallida	Clay-colored Sparrow
Pooecetes gramineus	Vesper Sparrow
Melospiza melodia	Song Sparrow
Passerculus sandwichensis	Savannah Sparrow
Spizella passerina	Chipping Sparrow
Ammospiza leconteii	Le Conte's Sparrow
Chondestes grammacus	Lark Sparrow
Zonotrichia leucophyrs (M)	White-crowned Sparrow
Zonotrichia querula (M)	Harris's Sparrow
Passerella iliaca (M)	Fox Sparrow
Spizella arborea (M)	American Tree Sparrow
Ammodramus bairdii	Baird's Sparrow
Calamospiza melanocorys	Lark Bunting
Calcarius mccownii	McCown's Longspur
Plectrophenax nivalis	Snow Bunting
Calcarius ornatus	Chestnut-collared Longspur

Latin Name	**Common Name**
Icteridae	
Euphagus carolinus	Rusty Blackbird
Agelaius phoeniceus	Red-winged Blackbird
Xanthocephalus xanthocephalus	Yellow-Headed Blackbird
Euphagus cyanocephalus	Brewer's Blackbird
Icterus galbula	Baltimore Oriole
Molothrus ater	Brown-headed Cowbird
Quiscalus quiscula	Common Grackle
Sturnella neglecta	Western Meadowlard
Dolichonyx oryzivorus	Bobolink
Fringillidae	
Carpodacus purpureus	Purple Finch
Loxia leucoptera	White-winged Crossbill
Carduelis pinus	Pine Sisken
Coccothraustes vespertinus	Evening Grosbeak
Pheucticus ludovicianus	Red-breasted Grosbeak
Pinicola enucleator	Pine Grosbeak
Pheucticus melanocephalus	Blackheaded Grosbeak
Seiurus noveboracensis (M)	Northern Waterthrush
Carduelis flammea	Common Redpoll
Carduelis hornemanni	Hoary Redpoll
Carduelis tristis	American Goldfinch
Junco hyemalis	Dark-eyed Junco
Regulidae	
Regulus calendula (M)	Ruby-crowned Kinglet
Regulus satrapa	Golden-crowned Kinglet
Passeridae	
Passer domesticus	House Sparrow

Table 3. Fish Resources of the Sherwin Campbell Site.
(Merkowsky 1999 and http://www.seagrant.wisc.edu/greatlakesfish/burbot.html).

Latin Name	Common Name
Acipenseridae	
Acipenser fulvescens	Lake Sturgeon
Percidae	
Perca flavescens	Yellow Perch
Stizostedion vitreum	Walleye
Esocidae	
Esox lucius	Northern Pike
Gadidae	
Lota lota	Burbot
Salmonidae	
Coregonus clupeaformis	Lake Whitefish
Hiodontidae	
Hiodon alosoides	Goldeye

Table 4. Projectile Point Metric and Non-Metric Analyzed Characteristics.

Non-Metric Projectile Point Characteristics
Total Shape Outline.
Tip Form.
Body Symmetry.
Lateral Edge Shape.
Basal Edge Shape.
Base Modification.
Hafting Element.
Shoulder Shape.
Notch Form.
Shape of Base.
Basal Juncture Shape
Transverse Cross Section Shape.
Longitudinal Cross Section Shape.
Location and Completeness of Flaking.
Completeness of Form
Metric Projectile Point Characteristics
Body Length.
Stem Length.
Total Length.
Body Width.
Shoulder Width.
Maximum Stem Width.
Minimum Stem Width.
Width of the Left Notch.
Depth of the Left Notch.
Width of the Right Notch.
Depth of the Right Notch.
Height of the Left Basal Edge.
Height of the Right Basal Edge
Maximum Body Thickness.
Maximum Stem Thickness.
Base Width to Body Width Index.
Basal Edge Height to Notch Width Index.

Table 5. Projectile Point Metric Analysis Results.

Catalog #	Body Length	Stem Length	Total Length	Body Width	Shoulder Width	Max Stem Width	Min Stem Width	Base Width	Width of Left Notch	Depth of Left Notch	Width of Right Notch	Depth of Right Notch	Height of Left Basal Edge	Height of Right Basal Edge	Max Body Thickness	Max Stem Thickness
1195	21.30	N/A	N/A	15.80	15.80	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4.9	
1194	N/A	N/A	N/A	10.44	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.1	N/A
3746	N/A	7.57	N/A	N/A	N/A	11.91	N/A	11.91	4.27	2.79	N/A	N/A	N/A	N/A	N/A	3.3
3827	16.34	N/A	N/A	13.10	13.10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.5	N/A
3817	14.84	6.79	21.63	13.58	13.58	N/A	N/A	N/A	2.68	1.63	N/A	N/A	N/A	N/A	5.3	4.5
886	N/A	5.67	N/A	N/A	N/A	10.34	N/A	10.34	2.43	1.76	N/A	N/A	N/A	N/A	N/A	3.3
3321	N/A	N/A	N/A	13.58	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.5	N/A
2144	16.17	N/A	N/A	16.41	16.41	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.2	N/A
1883	N/A	3.97	N/A	11.98	11.98	N/A	N/A	N/A	N/A	3.05	N/A	N/A	N/A	N/A	3.4	N/A
761	N/A	N/A	N/A	9.39	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.7	N/A
2516	N/A	5.53	N/A	N/A	N/A	13.66	N/A	13.66	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.4
3382	N/A	N/A	N/A	13.74	13.74	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4.4	N/A
965	N/A	7.41	N/A	16.35	16.35	N/A	N/A	N/A	3.76	3.25	N/A	N/A	N/A	N/A	4.6	2.8
3034	N/A	N/A	N/A	10.69	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.3	N/A
3832	18.51	6.70	25.21	13.56	13.56	12.30	9.50	12.30	N/A	1.30	2.95	2.20	N/A	3.47	3.8	2.4
3857	N/A	N/A	N/A	14.09	14.09	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.9	N/A
3836	20.19	N/A	N/A	17.06	17.06	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.8	N/A
3844	11.97	7.32	19.29	11.25	11.25	13.21	8.96	13.21	3.18	1.77	3.60	1.42	3.12	1.32	2.2	2.3
3828	11.03	8.80	19.83	13.07	13.07	13.55	9.25	13.55	4.64	2.10	4.98	2.04	3.76	3.83	3.2	2.9
3829	15.73	7.27	23.00	13.25	13.25	13.15	10.28	13.15	4.11	1.57	3.56	1.17	2.28	3.16	4.1	3.1
3830	13.83	7.03	20.86	14.16	14.16	14.42	10.10	14.42	5.00	2.61	4.29	1.77	2.54	1.83	4.9	2.9
3827	14.05	7.68	21.73	13.68	13.68	14.15	10.86	14.15	3.04	1.44	1.75	1.84	1.21	2.92	3.3	2.9
3833	11.11	7.88	18.99	15.09	15.09	16.10	10.06	16.10	3.23	2.44	3.75	3.08	4.96	4.56	4.8	3.4
3831	11.12	6.12	17.24	8.68	8.68	8.83	7.03	8.83	2.35	1.27	N/A	N/A	4.15	N/A	2.6	2.4
3826	11.60	7.13	18.73	15.39	15.39	15.40	10.23	15.40	3.91	2.54	3.79	2.73	2.31	3.79	4.2	2.3
3834	8.20	7.40	15.60	12.61	12.61	13.55	10.17	13.55	3.71	1.35	4.00	1.46	4.01	3.28	4.1	3.6

Table 6. Biface Metric and Non-Metric Analyzed Characteristics.

Non-Metric Biface Characteristics
1) Overall Shape.
1) Long Axis Symmetry.
3) Transverse Axis Symmetry.
4) Left Lateral Edge Shape.
5) Right Lateral Edge Shape.
6) Distal End Shape.
7) Edge Serration (present or absent).
8) Edge Sinuosity (present or absent).
9) Long Axis Shape.
10) Transverse Axis Shape.
11) Hafting (present or absent).
12) Backing (present or absent).
13) Completeness of Form.
Metric Biface Characteristics
1) Total Length.
2) Total Width.
3) Total Thickness.
4) Working Edge Angle.
5) Working Edge Length.

Table 7. Knife Metric Analysis Results.

Catalog Number	Length	Width	Thickness	Working Edge Angle (Degrees)	Maximum Working Edge Length
1597	41.29	25.82	9.92	40	40.44
72	30.12	17.76	5.64	50	24.92
850	N/A	25.23	8.51	65	13.73
3780	N/A	21.0	7.82	60	N/A
1865	N/A	15.45	4.39	50	N/A
3779	N/A	27.89	8.04	55	N/A
1739	N/A	18.34	8.23	65	N/A
3818	19.04	21.93	5.40	40	13.93
1338	N/A	31.46	8.77	60	N/A
266	34.08	21.18	7.27	40	34.08
3778	N/A	21.22	8.02	50	N/A
3796	29.81	29.03	8.29	55	22.81
3794	19.81	N/A	3.40	30	19.81
3793	37.21	20.51	8.15	70	37.21
3792	42.47	N/A	9.75	75	42.47
858	23.25	21.94	8.29	55	21.90
2115	23.70	22.98	8.80	55	21.16
3923	N/A	19.90	7.66	55	N/A
1613	N/A	16.20	5.42	35	N/A
597	N/A	14.38	4.39	40	N/A
1326	N/A	12.17	4.15	55	12.17
3671	38.20	N/A	11.82	50	N/A

Table 8. Pièce Esquillèe Metric Analysis Results.

Catalog Number	Length	Width	Thickness
3488	25.6	27.6	9.1

Table 9. Chi Tho Metric Analysis Results.

Catalog Number	Length	Width	Thickness	Working Edge Angle (Degrees)	Maximum Working Edge Length
3603	87.70	78.24	15.58	45	N/A

Table 10. Uniface Metric and Non-Metric Analyzed Characteristics.

Non-Metric Uniface Characteristics
1) Overall Shape.
2) Left Lateral Edge Shape.
3) Right Lateral Edge Shape.
4) Distal Edge Shape.
5) Proximal Edge Shape.
6) Dorsal Surface Shape in Transverse Cross Section.
7) Ventral Surface Shape in Transverse Cross Section.
8) Dorsal Surface Shape in Longitudinal Cross Section.
9) Ventral Surface Shape in Longitudinal Cross Section.
10) Number of Working Edges.
11) Amount of Dorsal Surface Retouch.
12) Amount of Distal End Retouch.
13) Amount of Proximal End Retouch.
14) Hafting (present or absent).
15) Completeness of Form.
Metric Uniface Characteristics
1) Total Length.
2) Total Width.
3) Total Thickness.
4) Distal Edge Working Angle.
5) Left Lateral Working Edge Angle.
6) Right Lateral Working Edge Angle.
7) Distal Working Edge Length.
8) Left Lateral Working Edge Length.
8) Right Lateral Working Edge Length.
10) Left Notch Width.
11) Left Notch Depth.

Table 11. Uniface Metric Analysis Results.

Catalog #	Max. Length	Max. Width	Max. Thickness	Distal Working Edge Angle	Left Edge Working Angle	Right Edge Working Angle	Distal Working Edge Length	Left Edge Working Length	Right Edge Working Length	Left Notch Width	Left Notch Depth
1168	19.80	20.79	8.44	70	N/A	N/A	20.79	N/A	N/A	N/A	N/A
1372	N/A	N/A	6.79	60	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1479	25.02	15.10	5.02	40	35	45	25.02	22.18	23.79	N/A	N/A
1634	34.45	23.44	8.66	60	50	65	22.18	29.46	30.35	N/A	N/A
1701	22.84	16.59	4.60	40	N/A	N/A	15.63	N/A	N/A	N/A	N/A
1720	15.54	18.30	3.96	40	N/A	N/A	18.30	N/A	N/A	N/A	N/A
1866	N/A	N/A	6.31	45	N/A	45	N/A	N/A	7.91	3.69	1.33
1899	57.27	35.99	16.77	N/A	N/A	40	N/A	N/A	42.92	N/A	N/A
2040	N/A	22.80	6.16	70	50	60	21.62	N/A	N/A	N/A	N/A
2041	N/A	18.31	6.71	40	45	N/A	18.31	N/A	N/A	N/A	N/A
251	23.62	16.10	6.83	50	N/A	N/A	16.10	N/A	N/A	N/A	N/A
2892	22.11	N/A	7.84	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3073	20.52	20.40	3.95	70	N/A	45	18.75	N/A	17.78	N/A	N/A
3132	34.47	13.53	6.77	N/A	80	N/A	N/A	33.65	N/A	N/A	N/A
3282	N/A	N/A	5.45	55	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3289	19.15	18.30	6.92	70	N/A	N/A	18.30	N/A	N/A	N/A	N/A
3457	20.70	18.80	6.12	45	N/A	N/A	18.80	N/A	N/A	N/A	N/A
3579	N/A	23.01	5.54	55	N/A	50	23.01	N/A	N/A	N/A	N/A
3773	21.17	22.66	5.95	55	N/A	N/A	20.22	N/A	N/A	N/A	N/A
3774	26.21	17.02	10.92	65	N/A	N/A	17.02	N/A	N/A	N/A	N/A
3783	24.08	21.19	8.59	70	N/A	N/A	21.19	N/A	N/A	N/A	N/A
3786	20.55	21.16	3.23	N/A	45	N/A	N/A	9.25	N/A	N/A	N/A
3787	24.93	10.63	4.45	N/A	40	35	17.58	13.53	17.17	N/A	N/A

Table 12. Uniface Metric Analysis Results.

Catalog #	Max. Length	Max. Width	Max. Thickness	Distal Working Edge Angle	Left Edge Working Angle	Right Edge Working Angle	Distal Working Edge Length	Left Edge Working Length	Right Edge Working Length	Left Notch Width	Left Notch Depth
3813	22.00	19.35	7.45	50	N/A	N/A	19.35	N/A	N/A	N/A	N/A
3828	N/A	N/A	6.97	70	N/A	50	N/A	N/A	N/A	N/A	N/A
3845	28.14	30.66	8.21	60	N/A	N/A	28.58	N/A	N/A	N/A	N/A
3846	17.72	N/A	5.87	55	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3847	18.89	24.87	7.07	50	40	40	24.32	14.97	14.97	N/A	N/A
3848	21.20	20.41	5.78	70	N/A	N/A	20.41	N/A	N/A	N/A	N/A
3849	20.07	25.75	7.11	70	35	50	25.75	15.80	16.89	N/A	N/A
3850	17.80	N/A	5.10	55	N/A	35	N/A	N/A	17.39	N/A	N/A
3852	17.77	17.65	6.02	45	N/A	N/A	15.54	N/A	N/A	N/A	N/A
3853	24.54	21.13	9.13	60	N/A	N/A	21.13	N/A	N/A	N/A	N/A
3854	24.22	20.22	6.21	60	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3855	26.91	18.19	5.23	N/A	N/A	25	11.15	N/A	13.46	N/A	N/A
3915	15.55	20.00	4.67	50	N/A	N/A	20.00	N/A	N/A	N/A	N/A
654	16.34	16.56	4.21	30	N/A	N/A	16.56	N/A	N/A	N/A	N/A
655	20.08	20.72	8.42	55	N/A	N/A	20.72	N/A	N/A	N/A	N/A
3838	23.16	20.98	7.50	60	N/A	50	20.98	N/A	10.26	N/A	N/A
3843	28.22	25.26	9.50	70	55	N/A	25.26	22.38	N/A	N/A	N/A
3842	14.30	14.45	3.97	50	40	N/A	14.45	11.91	N/A	N/A	N/A
3840	35.02	20.29	8.13	55	N/A	65	20.29	N/A	24.84	N/A	N/A
3841	24.02	18.85	7.17	75	N/A	N/A	18.85	N/A	N/A	N/A	N/A
3837	26.63	23.99	7.67	60	N/A	N/A	23.99	N/A	N/A	N/A	N/A
3839	24.41	21.05	7.84	70	N/A	N/A	21.05	N/A	N/A	N/A	N/A
1073	N/A	19.00	5.44	N/A	40	N/A	N/A	N/A	N/A	N/A	N/A

Table 13. Heavy Stone Tool Analyzed Non-Metric Characteristics.

Non-Metric Heavy Stone Tool Characteristics
1)Overall Shape.
2) Long Axis Cross Section Shape.
3) Transverse Cross Section Shape.
4) Distal Edge Modification.
5) Proximal Edge Modification.
6) Dorsal Surface Modification.
7) Ventral Surface Modification.
8) Left Lateral Edge Modification.
9) Right Lateral Edge Modification.
10) Tool Type.
11) Completeness of Form.

Table 14. Heavy Stone Tool Metric Results.

Catalog #	Total Length	Total Width	Total Thickness
642	75.5	54.0	30.9
197	96.1	63.3	61.5
930	81.3	60.7	24.8
2274	136.2	101.6	69.2
3139	107.5	101.5	62.8
2336	114.6	N/A	26.2
849	118.0	135.3	58.4
2007	N/A	67.8	46.7
2296	103.7	108.4	61.8
3306	120.5	111.5	24.9
1615	69.1	58.9	30.2
1353	88.2	57.7	43.6
1629	N/A	N/A	N/A
1471	N/A	N/A	N/A
1609	N/A	N/A	N/A

Table 15. Excavated Projectile Point Metric Results.

Catalog #	Body Length	Stem Length	Total Length	Body Width	Shoulder Width	Max. Stem Width	Min. Stem Width	Base Width	Width of Left Notch	Depth of Left Notch	Width of Right Notch	Depth of Right Notch	Height of Left Basal Edge	Height of Right Basal Edge	Max. Body Thickness	Max. Stem Thickness
569	15.2	6.3	21.5	14.3	14.3	11.4	10.0	10.6	3.2	1.6	4.6	1.5	1.9	2.2	3.2	2.5
186	N/A	6.8	N/A	N/A	N/A	N/A	9.1	N/A	3.3	1.6	3.3	1.0	2.6	N/A	N/A	3.7
255	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.5	N/A
48	13.3	6.7	20.0	11.8	11.8	8.1	7.8	8.1	N/A	1.8	2.6	1.1	N/A	2.2	3.3	2.8
538	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5.8	N/A
187	N/A	6.1	N/A	N/A	N/A	N/A	8.0	N/A	2.1	1.8	N/A	N/A	3.2	N/A	N/A	2.5
25	N/A	6.4	N/A	N/A	N/A	12.7	10.5	12.7	4.2	1.6	N/A	N/A	2.8	2.5	N/A	2.4
200	11.7	8.5	20.2	13.1	13.1	N/A	10.1	N/A	4.9	1.5	N/A	1.5	2.9	N/A	4.2	3.4

Table 16. Excavated Unifaces Metric Results.

Catalog Number	Length	Width	Thickness	Working Edge Angle (in degrees)	Distal Edge Working Length	Left Lateral Edge Working Length	Right Lateral Edge Working Length	Left Notch Width	Right Notch Width	Left Notch Depth	Right Notch Depth
567	17.81	19.04	6.32	60	19.04	N/A	15.35	N/A	N/A	N/A	N/A
414	19.04	23.08	7.24	60	23.08	9.74	N/A	N/A	N/A	N/A	N/A
139	19.28	12.82	2.64	40	8.44	12.9	12.9	2.33	2.34	0.81	0.73
149	21.73	19.73	4.64	40	N/A	N/A	N/A	N/A	N/A	N/A	N/A
131	23.68	17.84	7.64	60	N/A	22.97	N/A	N/A	N/A	N/A	N/A

Table 17. Excavated Biface Metric Results.

Catalog Number	Length	Width	Thickness	Working Edge Angle	Maximum Working Edge Length
570	36.72	16.81	8.57	70	34.61
413	31.87	15.41	6.85	40	30.35
412	32.24	10.83	4.76	40	32.24
568	19.17	16.34	5.29	35	17.81

Table18. NISP Calculations from the Surface Collection.

Element and Landmark	Bison	Large Mammal	Medium Mammal	Ungulate	N/A Species	Pig	Nuttals Cottontail
Cranium							
Upper 1st Incisor	0	0	0	0	0	1	0
Petrous Portion of Temporal	6	6	0	0	0	0	0
Zygomatic Temporal	2	0	0	0	0	0	0
2nd Premolar	1	0	0	0	0	0	0
1st Molar	22	0	0	0	0	0	0
2nd Molar	3	1	0	0	0	0	0
3rd Molar	1	0	0	0	0	0	0
Total	**35**	**7**	**0**	**0**	**0**	**1**	**0**
Mandible	4	0	0	0	0	0	0
Incisor/Canine	1	0	0	0	0	0	0
4th Premolar	1	0	0	0	0	0	0
1st Molar	7	0	0	0	0	0	0
2nd Molar	20	0	0	0	0	0	0
3rd Molar	11	0	0	0	0	0	0
Total	**44**	**0**	**0**	**0**	**0**	**0**	**0**
Cervical Vertebra	**1**	**0**	**0**	**0**	**0**	**0**	**0**
Thoracic Vertebra	**0**	**3**	**0**	**0**	**0**	**0**	**0**
Scapula	**5**	**4**	**1**	**0**	**0**	**0**	**0**
Humerus	**32**	**7**	**0**	**0**	**0**	**0**	**0**
Radius	**25**	**5**	**0**	**0**	**1**	**0**	**0**
Ulna	**6**	**2**	**0**	**0**	**0**	**0**	**0**
Radial Carpal	**13**	**0**	**0**	**1**	**0**	**0**	**0**
Internal Carpal	**10**	**1**	**0**	**0**	**0**	**0**	**0**
Ulnar Carpal	**5**	**1**	**1**	**0**	**0**	**0**	**0**
Unciform Carpal	**5**	**0**	**0**	**0**	**0**	**0**	**0**
Fused 2/3 Carpal	**18**	**0**	**0**	**1**	**0**	**0**	**0**
Metacarpal	**28**	**0**	**0**	**20**	**0**	**0**	**0**
Innominate	**6**	**1**	**1**	**0**	**0**	**0**	**0**
Femur	**2**	**4**	**0**	**0**	**0**	**0**	**1**
Patella	**2**	**0**	**0**	**0**	**0**	**0**	**0**
Tibia	**17**	**24**	**0**	**0**	**1**	**0**	**0**
Lateral Malleolus	**4**	**0**	**0**	**0**	**0**	**0**	**0**
Fused Central/4th Tarsal	**23**	**4**	**0**	**2**	**0**	**0**	**0**
Fused 2/3 Tarsal	**12**	**0**	**0**	**0**	**0**	**0**	**0**
Calcaneous	**26**	**3**	**0**	**0**	**0**	**0**	**0**
Talus	**87**	**23**	**0**	**4**	**0**	**0**	**0**
Metatarsal	**15**	**0**	**0**	**7**	**0**	**0**	**0**
1st Phalange	**26**	**0**	**0**	**3**	**0**	**0**	**0**
2nd Phalange	**31**	**0**	**0**	**6**	**0**	**0**	**0**
3rd Phalange	**6**	**0**	**0**	**0**	**0**	**0**	**0**
Proximal Medial Sesamoid	**2**	**0**	**0**	**0**	**0**	**0**	**0**
Distal Inferior Sesamoid	**1**	**0**	**0**	**0**	**0**	**0**	**0**

Element and Landmark	Bison	Large Mammal	Medium Mammal	Ungulate	N/A Species	Pig	Nuttals Cottontail
Miscellaneous Items							
Carpal No ID	0	0	0	1	0	0	0
Metapodial	2	1	0	48	2	0	0
Tooth No ID	17	0	0	16	0	0	0
Mandible/Maxilla	1	7	0	0	3	0	0
Rib Fragments	0	13	2	0	1	0	0
Rib Head	1	0	0	0	0	0	0
Skull Fragments	0	1	0	0	3	0	0
Spinous Process No ID	0	0	0	1	0	0	0
Enamel Fragments	0	0	0	916	322	0	0

Table 19. MNE, MNI, and %MAU Calculation for Mature Bison from the Surface Collection.

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Cranium							22	11
Frontal	0	0	1	1	0.5	1.2		
Horn Core	0	0	0	0	0	0		
Parietal	0	0	1	1	0.5	1.2		
Occipital	0	0	0	0	0	0		
Occipital Condyle	0	0	0	0	0	0		
Squamous Temporal	0	0	0	0	0	0		
Petrous Temporal	1	1	4	6	3	7.7		
Zygomatic Temporal	0	1	1	2	1	2.5		
External Auditory Meatus	0	0	0	0	0	0		
Zygomatic	0	0	0	0	0	0		
Nasal	0	0	0	0	0	0		
Maxilla	0	0	0	0	0	0		
Premaxilla	0	0	0	0	0	0		
2nd Premolar	0	1	0	1	0.5	1.2		
3rd Premolar	0	0	0	0	0	0		
4th Premolar	0	0	0	0	0	0		
1st Molar	6	5	11	22	11	28.5		
2nd Molar	1	1	0	2	1	2.5		
3rd Molar	0	0	1	1	0.5	1.2		
Mandible							20	14
Articular Condyle	0	0	0	0	0	0		
Coronoid Process	0	1	0	1	0.5	1.2		
Ramus	0	0	0	0	0	0		
Mandibular Foramen	0	0	0	0	0	0		
Lower Border	0	0	0	0	0	0		
Mental Foramen	1	0	0	1	0.5	1.2		
Diastema	1	0	0	1	0.5	1.2		
Symphysis	1	0	0	1	1	2.5		
Incisor/Canine	0	1	0	1	0.1	0.25		
2nd Premolar	0	0	0	0	0	0		
3rd Premolar	0	0	0	0	0	0		
4th Premolar	1	0	0	1	0.5	1.2		
1st Molar	3	2	2	7	3.5	9.0		
2nd Moar	4	14	2	20	10	25.9		
3rd Molar	5	5	1	11	5.5	14.2		
Deciduous Incisor/Canine	0	0	0	0	0	0		
Deciduous 2nd Premolar	0	0	0	0	0	0		
Deciduous 3rd Premolar	0	0	0	0	0	0		
Deciduous 4th Premolar	0	0	0	0	0	0		
Body/Corpus	0	0	0	0	0	0		
Gonial Angle	0	0	0	0	0	0		

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Cervical Vertebra							**1**	**1**
Prezygapophysis	0	0	1	1	0.1	0.25		
Postzygapophysis	0	0	0	0	0	0		
Neural Arch	0	0	0	0	0	0		
Neural Spine	0	0	0	0	0	0		
Transverse Process	0	0	0	0	0	0		
Centrum	0	0	1	1	0.2	0.51		
Transverse Foramen	0	0	1	1	0.1	0.25		
Scapula							**4**	**4**
Glenoid Cavity	4	0	0	4	2	5.1		
Coracoid Process	1	0	0	1	0.5	1.2		
Acromion	0	0	0	0	0	0		
Acromial Spine	0	0	0	0	0	0		
Neck	3	0	0	3	1.5	3.8		
Blade	0	0	1	1	0.5	1.2		
Superior Border	0	0	0	0	0	0		
Inferior Border	0	0	0	0	0	0		
Humerus							**26**	**13**
Head	0	0	0	0	0	0		
Lateral Tuberosity	0	0	0	0	0	0		
Medial Tuberosity	0	0	0	0	0	0		
Proximal Shaft	0	3	0	3	1.5	3.8		
Deltoid Tuberosity	0	0	0	0	0	0		
Teres Major Tuberosity	0	0	0	0	0	0		
Teres Minor Tuberosity	0	0	0	0	0	0		
Posterior Lateral Foramen	0	1	0	1	0.5	1.2		
Olecranon Fossa	9	11	0	20	10	25.9		
Radial Fossa	11	13	2	26	13	33.7		
Lateral Epicondyle	1	2	0	3	1.5	3.8		
Medial Epicondyle	7	9	0	16	8	20.7		
Lateral Condyle	3	6	1	10	5	12.9		
Medial Condyle	8	12	0	20	10	25.9		
Distal Shaft	10	10	1	21	10.5	27.2		
Radius							**13**	**9**
Lateral Glenoid Cavity	0	2	0	2	1	2.5		
Medial Glenoid Cavity	9	1	0	10	5	12.9		
Radial Tuberosity	1	0	0	1	0.5	1.2		
Posterior Lateral Foramen	0	0	0	0	0	0		
Proximal Posterior Shaft	8	3	0	11	5.5	14.2		
Proximal Anterior Shaft	7	3	0	10	5	12.9		
Distal Posterior Shaft	1	4	0	5	2.5	6.4		
Distal Anterior Shaft	2	4	0	6	3	7.7		
Radial Carpal Facet	3	3	0	6	3	7.7		
Internal Carpal Facet	2	3	0	5	2.5	6.4		

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Ulna							**4**	**2**
Olecranon Process	0	0	0	0	0	0		
Anconeal Process	2	2	0	4	2	5.1		
Semilunar Notch	2	2	0	4	2	5.1		
Coronoid Process	1	0	0	1	0.5	1.2		
Shaft	0	2	0	2	1	2.5		
Styloid Process	0	2	0	2	1	2.5		
Radial Carpal	3	10	0	13	6.5	16.8	**13**	**10**
Internal Carpal	3	6	0	9	4.5	11.6	**9**	**6**
Ulnar Carpal	3	2	0	5	2.5	6.4	**5**	**3**
Unciform Carpal	2	3	0	5	2.5	6.4	**5**	**3**
Fused 2/3 Carpal	12	5	1	18	9	23.3	**18**	**12**
Metacarpal							**23**	**13**
Carpal 2/3 Facet	9	5	0	14	7	18.1		
Unciform Carpal Facet	10	6	0	16	8	20.7		
Proximal Anterior Foramen	10	6	0	16	8	20.7		
Proximal Posterior Foramen	7	3	0	10	5	2.5		
Anterior Shaft	13	7	3	23	11.5	29.8		
Posterior Shaft	8	4	4	16	8	20.7		
Distal Anterior Foramen	1	0	3	4	2	5.1		
Distal Posterior Foramen	1	0	4	5	2.5	6.4		
Medial Condyle	1	1	4	6	3	7.7		
Lateral Condyle	1	1	4	6	3	7.7		
Innominate							**3**	**2**
Ilium Blade	0	0	0	0	0	0		
Ilium Shaft	0	2	0	2	1	2.5		
Ilio-Ischial Border	0	0	0	0	0	0		
Ischium Shaft	0	2	0	2	1	2.5		
Ischium Blade	0	0	0	0	0	0		
Ischial Tuber	0	0	0	0	0	0		
Pubis Shaft	1	1	0	2	1	2.5		
Pubic Symphysis	0	0	0	0	0	0		
Pubis Acetabulum	1	1	0	2	1	2.5		
Ilium Acetabulum	0	2	0	2	1	2.5		
Ischium Acetabulum	0	2	0	2	1	2.5		

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Femur							**1**	**1**
Head	0	0	1	1	0.5	1.2		
Greater Trochanter	0	0	0	0	0	0		
Lesser Trochanter	0	0	0	0	0	0		
Anterior Shaft	0	0	0	0	0	0		
Posterior Medial Foramen	0	0	0	0	0	0		
Linea Aspera	0	0	0	0	0	0		
Supracondyloid Fossa	0	0	0	0	0	0		
Trochlea	0	0	0	0	0	0		
Medial Condyle	0	0	0	0	0	0		
Lateral Condyle	0	0	0	0	0	0		
Medial Epicondyle	0	0	0	0	0	0		
Patella	1	1	0	2	1	2.5	**2**	**1**
Tibia							**13**	**7**
Medial Condyle	0	1	0	1	0.5	1.2		
Lateral Condyle	0	0	0	0	0	0		
Tibial Tuberosity	0	0	0	0	0	0		
Anterior Crest	0	0	0	0	0	0		
Posterior Lateral Foramen	0	1	0	1	0.5	1.2		
Proximal Posterior Shaft	0	1	0	1	0.5	1.2		
Distal Posterior Shaft	5	3	0	8	4	10.3		
Distal Anterior Shaft	7	5	0	12	6	15.5		
Medial Groove	4	6	0	10	5	12.9		
Lateral Groove	7	5	0	12	6	15.5		
Fibular Facet	6	4	0	10	5	12.9		
Lateral Malleolus	2	2	0	4	2	5.1	**4**	**2**
Fused Central/4th Tarsal	12	8	0	20	10	25.9	**20**	**12**
Fused 2/3 Tarsal	9	3	0	12	6	15.5	**12**	**9**
Calcaneous							**19**	**12**
Epiphyses	0	1	0	1	0.5	1.2		
Tuber Calis	1	5	1	7	3.5	9.0		
Tarsal C/4 Facet	3	6	0	9	4.5	11.6		
Fibular Facet	3	6	0	9	4.5	11.6		
Sustentaculum	7	12	0	19	9.5	24.6		
Astragulus							**77**	**39**
Proximal Condyle	37	38	2	77	38.5	100		
Distal Condyle	37	39	1	77	38.5	100		

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Metatarsal							**10**	**5**
Tarsal C/4 Facet	5	1	2	8	4	10.3		
Tarsal 2/3 Facet	4	1	2	7	3.5	9.0		
Proximal Anterior Foramen	4	1	1	6	3	7.7		
Proximal Posterior Foramen	2	0	0	2	1	2.5		
Anterior Shaft	5	2	3	10	5	12.9		
Posterior Shaft	3	2	0	5	2.5	6.4		
Distal Anterior Foramen	1	2	1	4	2	5.1		
Distal Posterior Foramen	1	2	0	3	1.5	3.8		
Medial Condyle	1	2	0	3	1.5	3.8		
Lateral Condyle	1	2	0	3	1.5	3.8		
1st Phalanx							**23**	**3**
Proximal	0	0	23	23	5.75	14.9		
Distal	0	0	21	21	5.25	13.6		
2nd Phalanx							**29**	**4**
Proximal	0	0	29	29	7.25	18.8		
Distal	0	0	29	29	7.25	18.8		
3rd Phalanx							**6**	**1**
Proximal	0	0	6	6	1.5	3.8		
Distal	0	0	4	4	1	2.5		
Proximal Medial Sesamoid	0	0	2	2	0.25	0.64	**2**	**1**
Distal Inferior Sesamoid	0	0	1	1	0.06	0.15	**1**	**1**

Table 20. MNE, MNI, and %MAU Calculations for Immature Bison from the Surface Collection.

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Mandible							2	1
Articular Condyle	0	0	0	0	0	0		
Coronoid Process	0	0	0	0	0	0		
Ramus	0	0	0	0	0	0		
Mandibular Foramen	0	0	0	0	0	0		
Lower Border	0	0	0	0	0	0		
Mental Foramen	0	0	0	0	0	0		
Diastema	0	0	0	0	0	0		
Symphasis	0	0	0	0	0	0		
Incisor Canine	0	0	0	0	0	0		
2nd Premolar	0	0	0	0	0	0		
3rd Premolar	0	0	0	0	0	0		
4th Premolar	0	0	0	0	0	0		
1st Molar	0	0	0	0	0	0		
2nd Moar	0	1	1	2	1	66.6		
3rd Molar	0	0	0	0	0	0		
Deciduous Incisor/Canine	0	0	0	0	0	0		
Deciduous 2nd Premolar	0	0	0	0	0	0		
Deciduous 3rd Premolar	0	0	0	0	0	0		
Deciduous 4th Premolar	0	0	0	0	0	0		
Body/Corpus	0	0	0	0	0	0		
Gonial Angle	0	0	0	0	0	0		
Humerus							1	1
Head	0	0	0	0	0	0		
Lateral Tuberosity	0	0	0	0	0	0		
Medial Tuberosity	0	0	0	0	0	0		
Proximal Shaft	0	0	0	0	0	0		
Deltoid Tuberosity	0	0	0	0	0	0		
Teres Major Tuberosity	0	0	0	0	0	0		
Teres Minor Tuberosity	0	0	0	0	0	0		
Posterior Lateral Foramen	0	0	0	0	0	0		
Olecranon Fossa	0	0	0	0	0	0		
Radial Fossa	0	0	0	0	0	0		
Lateral Epicondyle	0	0	0	0	0	0		
Medial Epicondyle	0	1	0	1	0.5	33.3		
Lateral Condyle	0	1	0	1	0.5	33.3		
Medial Condyle	0	0	0	0	0	0		
Distal Shaft	0	0	0	0	0	0		

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Radius							3	2
Lateral Glenoid Cavity	0	0	0	0	0	0		
Medial Glenoid Cavity	1	0	0	1	0.5	33.3		
Radial Tuberosity	0	0	0	0	0	0		
Posterior Lateral Foramen	0	0	0	0	0	0		
Proximal Posterior Shaft	1	0	0	1	0.5	33.3		
Proximal Anterior Shaft	1	0	0	1	0.5	33.3		
Distal Posterior Shaft	2	1	0	3	1.5	100		
Distal Anterior Shaft	1	1	0	2	1	66.6		
Radial Carpal Facet	2	1	0	3	1.5	100		
Internal Carpal Facet	2	1	0	3	1.5	100		
Metacarpal							1	1
Carpal 2/3 Facet	0	0	0	0	0	0		
Unciform Carpal Facet	0	0	0	0	0	0		
Proximal Anterior Foramen	0	0	0	0	0	0		
Proximal Posterior Foramen	0	0	0	0	0	0		
Anterior Shaft	0	0	1	1	0.5	33.3		
Posterior Shaft	0	0	1	1	0.5	33.3		
Distal Anterior Foramen	0	0	1	1	0.5	33.3		
Distal Posterior Foramen	0	0	1	1	0.5	33.3		
Medial Condyle	0	0	1	1	0.5	33.3		
Lateral Condyle	0	0	1	1	0.5	33.3		
Femur							1	1
Head	0	0	1	1	0.5	33.3		
Greater Trochanter	0	0	0	0	0	0		
Lesser Trochanter	0	0	0	0	0	0		
Anterior Shaft	0	0	0	0	0	0		
Posterior Medial Foramen	0	0	0	0	0	0		
Linea Aspera	0	0	0	0	0	0		
Supracondyloid Fossa	0	0	0	0	0	0		
Trochlea	0	0	0	0	0	0		
Medial Condyle	0	0	0	0	0	0		
Lateral Condyle	0	0	0	0	0	0		
Medial Epicondyle	0	0	0	0	0	0		
Metatarsal							1	1
Tarsal C/4 Facet	0	0	0	0	0	0		
Tarsal 2/3 Facet	0	0	0	0	0	0		
Proximal Anterior Foramen	0	0	0	0	0	0		
Proximal Posterior Foramen	0	0	0	0	0	0		
Anterior Shaft	0	0	1	1	0.5	33.3		
Posterior Shaft	0	0	1	1	0.5	33.3		
Distal Anterior Foramen	0	0	1	1	0.5	33.3		
Distal Posterior Foramen	0	0	1	1	0.5	33.3		
Medial Condyle	0	0	0	0	0	0		
Lateral Condyle	0	0	0	0	0	0		

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
1st Phalange							**3**	**2**
Proximal	0	0	3	3	0.75	50		
Distal	0	0	3	3	0.75	50		

Table 21. MNE, MNI, and %MAU Calculations for Nuttal's Cottontail from the Surface Collection.

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Femur							**1**	**1**
Head	0	0	0	0	0	0		
Greater Trochanter	1	0	0	1	0.5	100		
Lesser Trochanter	1	0	0	1	0.5	100		
Anterior Shaft	1	0	0	1	0.5	100		
Posterior Medial Foramen	0	0	0	0	0	0		
Linea Aspera	0	0	0	0	0	0		
Supracondyloid Fossa	0	0	0	0	0	0		
Trochlea	0	0	0	0	0	0		
Medial Condyle	0	0	0	0	0	0		
Lateral Condyle	0	0	0	0	0	0		
Medial Epicondyle	0	0	0	0	0	0		

Table 22. MNE, MNI, and %MAU Calculations for Domestic Pig from the Surface Collection.

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Cranium							1	1
Frontal	0	0	0	0	0	0		
Parietal	0	0	0	0	0	0		
Occipital	0	0	0	0	0	0		
Occipital Condyle	0	0	0	0	0	0		
Squamous Temporal	0	0	0	0	0	0		
Petrous Temporal	0	0	0	0	0	0		
Zygomatic Temporal	0	0	0	0	0	0		
External Auditory Meatus	0	0	0	0	0	0		
Zygomatic	0	0	0	0	0	0		
Nasal	0	0	0	0	0	0		
Maxilla	0	0	0	0	0	0		
Premaxilla	0	0	0	0	0	0		
1st Incisor	0	0	1	1	0.5	100		
2nd Incisor	0	0	0	0	0	0		
3rd Incisor	0	0	0	0	0	0		
Canine	0	0	0	0	0	0		
1st Premolar	0	0	0	0	0	0		
2nd Premolar	0	0	0	0	0	0		
3rd Premolar	0	0	0	0	0	0		
4th Premolar	0	0	0	0	0	0		
1st Molar	0	0	0	0	0	0		
2nd Molar	0	0	0	0	0	0		
3rd Molar	0	0	0	0	0	0		

Table 23. MNE, MNI, and %MAU Calculations for Large Mammals from the Surface Collection.

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Thoracic Vertebra							2	1
Prezygapophysis	0	0	0	0	0	0		
Postzygapophysis	0	0	0	0	0	0		
Neural Arch	0	0	1	1	0.06	0.8		
Neural Spine	0	0	2	2	0.13	1.7		
Transverse Process	0	0	0	0	0	0		
Centrum	0	0	0	0	0	0		
Scapula							3	2
Glenoid Cavity	1	0	2	3	1.5	20		
Coracoid Process	0	0	0	0	0	0		
Acromion	0	0	0	0	0	0		
Acromial Spine	0	0	1	1	0.5	6.6		
Neck	1	0	2	3	1.5	20		
Blade	0	0	1	1	0.5	6.6		
Superior Border	0	0	0	0	0	0		
Inferior Border	0	0	0	0	0	0		
Humerus							5	3
Head	0	0	0	0	0	0		
Lateral Tuberosity	0	0	0	0	0	0		
Medial Tuberosity	0	0	0	0	0	0		
Proximal Shaft	0	1	0	1	0.5	6.6		
Deltoid Tuberosity	0	1	0	1	0.5	6.6		
Teres Major Tuberosity	0	0	0	0	0	0		
Teres Minor Tuberosity	0	0	0	0	0	0		
Posterior Lateral Foramen	0	1	0	1	0.5	6.6		
Olecranon Fossa	0	0	0	0	0	0		
Radial Fossa	1	0	1	2	1	13.3		
Lateral Epicondyle	0	0	0	0	0	0		
Medial Epicondyle	0	0	0	0	0	0		
Lateral Condyle	0	0	1	1	0.5	6.6		
Medial Condyle	0	0	1	1	0.5	6.6		
Distal Shaft	2	2	1	5	2.5	33.3		
Radius							4	2
Lateral Glenoid Cavity	1	0	0	1	0.5	6.6		
Medial Glenoid Cavity	2	2	0	4	2	26.6		
Radial Tuberosity	0	0	0	0	0	0		
Posterior Lateral Foramen	0	0	1	1	0.5	6.6		
Proximal Posterior Shaft	0	0	1	1	0.5	6.6		
Proximal Anterior Shaft	1	2	0	3	1.5	20		
Distal Posterior Shaft	0	0	0	0	0	0		
Distal Anterior Shaft	0	0	0	0	0	0		
Radial Carpal Facet	0	0	0	0	0	0		
Internal Carpal Facet	0	0	0	0	0	0		

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Ulna							2	1
Olecranon Process	1	0	0	1	0.5	6.6		
Aconeal Process	1	0	0	1	0.5	6.6		
Semilunar Notch	1	1	0	2	1	13.3		
Coronoid Process	0	0	0	0	0	0		
Shaft	0	0	0	0	0	0		
Styloid Process	0	0	0	0	0	0		
Innominate							1	1
Ilium Blade	0	0	0	0	0	0		
Ilium Shaft	0	0	0	0	0	0		
Ilio-Ischial Border	0	0	0	0	0	0		
Ischium Shaft	0	0	0	0	0	0		
Ischium Blade	0	0	0	0	0	0		
Ischial Tuber	0	0	0	0	0	0		
Pubis Shaft	0	0	0	0	0	0		
Pubic Symphysis	0	0	0	0	0	0		
Pubis Acetabulum	0	0	0	0	0	0		
Ilium Acetabulum	1	0	0	1	0.5	6.6		
Ischium Acetabulum	0	0	0	0	0	0		
Femur							2	1
Head	0	0	2	2	1	13.3		
Greater Trochanter	0	0	0	0	0	0		
Lesser Trochanter	0	0	0	0	0	0		
Anterior Shaft	0	0	0	0	0	0		
Posterior Medial Foramen	0	0	0	0	0	0		
Linea Aspera	0	0	0	0	0	0		
Supracondyloid Fossa	0	0	0	0	0	0		
Trochlea	0	0	0	0	0	0		
Medial Condyle	0	0	0	0	0	0		
Lateral Condyle	0	0	0	0	0	0		
Medial Epicondyle	0	0	0	0	0	0		
Tibia							6	3
Medial Condyle	0	0	0	0	0	0		
Lateral Condyle	0	0	0	0	0	0		
Tibial Tuberosity	0	0	0	0	0	0		
Anterior Crest	0	0	0	0	0	0		
Posterior Lateral Foramen	0	0	0	0	0	0		
Proximal Posterior Shaft	0	0	3	3	1.5	20		
Distal Posterior Shaft	1	2	1	4	2	26.6		
Distal Anterior Shaft	3	0	2	5	2.5	33.3		
Medial Groove	3	0	2	5	2.5	33.3		
Lateral Groove	3	1	2	6	3	40		
Fibular Facet	3	1	0	4	2	26.6		
Fused Central/4th Tarsal	1	3	0	4	2	26.6	4	3

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Calcaneous							**2**	**1**
Epiphyses	0	0	0	0	0	0		
Tuber Calis	1	0	1	2	1	13.3		
Tarsal C/4 Facet	0	0	0	0	0	0		
Fibular Facet	0	0	0	0	0	0		
Sustentaculum	1	1	0	2	1	13.3		
Astragulus							**15**	**8**
Proximal Condyle	8	1	6	15	7.5	100		
Distal Condyle	4	1	7	12	6	80		

Table 24. MNE, MNI, and %MAU Calculations for Immature Large Mammals from the Surface Collection.

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Femur							**2**	**1**
Head	0	0	2	2	1	100		
Greater Trochanter	0	0	0	0	0	0		
Lesser Trochanter	0	0	0	0	0	0		
Anterior Shaft	0	0	0	0	0	0		
Posterior Medial Foramen	0	0	0	0	0	0		
Linea Aspera	0	0	0	0	0	0		
Supracondyloid Fossa	0	0	0	0	0	0		
Trochlea	0	0	0	0	0	0		
Medial Condyle	0	0	0	0	0	0		
Lateral Condyle	0	0	0	0	0	0		
Medial Epicondyle	0	0	0	0	0	0		
Tibia							**1**	**1**
Medial Condyle	0	0	0	0	0	0		
Lateral Condyle	0	0	0	0	0	0		
Tibial Tuberosity	0	0	0	0	0	0		
Anterior Crest	0	0	0	0	0	0		
Posterior Lateral Foramen	0	0	0	0	0	0		
Proximal Posterior Shaft	0	0	0	0	0	0		
Distal Posterior Shaft	0	0	0	0	0	0		
Distal Anterior Shaft	0	0	0	0	0	0		
Medial Groove	1	0	0	1	0.5	50		
Lateral Groove	0	0	0	0	0	0		
Fibular Facet	0	0	0	0	0	0		

Table 25. MNE, MNI, and %MAU Calculations for Medium Mammals from the Surface Collection.

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Scapula							1	1
Glenoid Cavity	0	0	0	0	0	0		
Coracoid Process	0	0	0	0	0	0		
Acromion	0	0	0	0	0	0		
Acromial Spine	0	0	1	1	0.5	100		
Neck	0	0	0	0	0	0		
Blade	0	0	1	1	0.5	100		
Superior Border	0	0	0	0	0	0		
Inferior Border	0	0	0	0	0	0		
Ulnar Carpal	1	0	0	1	0.5	100	1	1
Innominate							1	1
Ilium Blade	0	0	0	0	0	0		
Ilium Shaft	0	0	0	0	0	0		
Ilio-Ischial Border	0	0	0	0	0	0		
Ischium Shaft	0	0	0	0	0	0		
Ischium Blade	0	0	0	0	0	0		
Ischial Tuber	0	0	0	0	0	0		
Pubis Shaft	0	0	0	0	0	0		
Pubic Symphysis	0	0	0	0	0	0		
Pubis Acetabulum	0	0	0	0	0	0		
Ilium Acetabulum	0	0	0	0	0	0		
Ischium Acetabulum	1	0	0	1	0.5	100		

Table 26. MNI, MNE, and %MAU Calculations for Indeterminate Ungulate from the Surface Collection.

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Cranium							**1**	**1**
Frontal	0	0	0	0	0	0		
Horn Core	0	0	0	0	0	0		
Parietal	0	0	0	0	0	0		
Occipital	0	0	0	0	0	0		
Occipital Condyle	0	0	0	0	0	0		
Squamous Temporal	0	0	0	0	0	0		
Petrous Temporal	0	0	0	0	0	0		
Zygomatic Temporal	0	0	0	0	0	0		
External Auditory Meatus	0	0	0	0	0	0		
Zygomatic	0	0	0	0	0	0		
Nasal	0	0	0	0	0	0		
Maxilla	0	0	0	0	0	0		
Premaxilla	0	0	0	0	0	0		
2nd Premolar	0	0	0	0	0	0		
3rd Premolar	0	0	0	0	0	0		
4th Premolar	0	0	0	0	0	0		
1st Molar	0	0	0	0	0	0		
2nd Molar	0	0	1	1	0.5	12.5		
3rd Molar	0	0	0	0	0	0		
Radial Carpal	0	1	0	1	0.5	12.5	**1**	**1**
Fused 2/3 Carpal	0	0	1	1	0.5	12.5	**1**	**1**
Metacarpal							**8**	**4**
Carpal 2/3 Facet	3	1	2	6	3	75		
Unciform Carpal Facet	2	1	2	5	2.5	62.5		
Proximal Anterior Foramen	2	1	3	6	3	75		
Proximal Posterior Foramen	0	0	1	1	0.5	12.5		
Anterior Shaft	2	2	4	8	4	100		
Posterior Shaft	2	0	2	4	2	50		
Distal Anterior Foramen	1	0	1	2	1	25		
Distal Posterior Foramen	0	0	1	1	0.5	12.5		
Medial Condyle	1	0	1	2	1	25		
Lateral Condyle	0	0	1	1	0.5	12.5		
Fused Central/4th Tarsal	0	2	0	2	1	25	**2**	**2**
Astragulus							**4**	**2**
Proximal Condyle	0	1	3	4	2	50		
Distal Condyle	0	1	3	4	2	50		
Metatarsal							**4**	**2**
Tarsal C/4 Facet	2	0	0	2	1	25		
Tarsal 2/3 Facet	2	1	0	3	1.5	37.5		
Proximal Anterior Foramen	1	1	0	2	1	25		
Proximal Posterior Foramen	0	1	1	2	1	25		
Anterior Shaft	2	2	0	4	2	50		
Posterior Shaft	0	0	3	3	1.5	37.5		
Distal Anterior Foramen	0	0	0	0	0	0		
Distal Posterior Foramen	0	0	0	0	0	0		
Medial Condyle	0	0	0	0	0	0		
Lateral Condyle	0	0	0	0	0	0		

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
1st Palange							**3**	**1**
Proximal	0	0	2	2	0.5	12.5		
Distal	0	0	3	3	0.75	18.75		
2nd Phalanx							**5**	**2**
Proximal	0	0	5	5	1.25	31.25		
Distal	0	0	2	2	0.5	12.5		

Table 27. MNI, MNE, and %MAU Calculations for Indeterminate Faunal Specimens from the Surface Collection.

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Radius								
Lateral Glenoid Cavity	1	0	0	1	0.5	100	**1**	**1**
Medial Glenoid Cavity	0	0	0	0	0	0		
Radial Tuberosity	0	0	0	0	0	0		
Posterior Lateral Foramen	0	0	0	0	0	0		
Proximal Posterior Shaft	1	0	0	1	0.5	100		
Proximal Anterior Shaft	1	0	0	1	0.5	100		
Distal Posterior Shaft	0	0	0	0	0	0		
Distal Anterior Shaft	0	0	0	0	0	0		
Radial Carpal Facet	0	0	0	0	0	0		
Internal Carpal Facet	0	0	0	0	0	0		

Table 28. NISP Calculations for the Excavated Faunal Assemblage.

Element and Landmark	Bison	Ungulate	Muskrat	Canid	N/A Species
Crania					
Petrous Portion of Temporal	2	2	0	0	1
Zygomatic of Temporal	0	0	1	0	0
1st Premolar	2	0	0	0	0
1st Molar	9	0	0	0	0
Total	**12**	**4**	**1**	**0**	**17**
Mandible	58	5	0	0	0
Incisor	4	1	0	0	0
Indeterminate Pre-Molar	0	0	0	1	0
2nd Molar	1	0	0	0	0
3rd Molar	2	0	0	0	0
Total	**65**	**6**	**0**	**1**	**0**
Hyoid	**0**	**1**	**0**	**0**	**0**
Atlas	**0**	**0**	**0**	**0**	**1**
Thoracic Vertebra	**2**	**8**	**0**	**0**	**7**
Scapula	**0**	**7**	**0**	**0**	**5**
Humerus	**9**	**12**	**0**	**0**	**0**
Radius	**21**	**12**	**0**	**0**	**0**
Ulna	**2**	**5**	**0**	**0**	**0**
Radial Carpal	**1**	**0**	**0**	**0**	**0**
Internal Carpal	**3**	**0**	**0**	**0**	**0**
Ulnar Carpal	**1**	**0**	**0**	**0**	**0**
Unciform Carpal	**2**	**0**	**0**	**0**	**0**
Accessory Carpal	**1**	**0**	**0**	**0**	**0**
Fused 2/3 Carpal	**1**	**0**	**0**	**0**	**0**
Metacarpal	**3**	**18**	**0**	**0**	**1**
Innominate	**0**	**0**	**0**	**0**	**1**
Femur	**0**	**21**	**0**	**0**	**2**
Patella	**1**	**0**	**0**	**0**	**0**
Tibia	**5**	**20**	**0**	**0**	**1**
Fused Central/4th Tarsal	**1**	**0**	**0**	**0**	**0**
Fused 2/3 Tarsal	**2**	**0**	**0**	**0**	**0**
Metatarsal	**2**	**5**	**0**	**0**	**0**
1st Phalange	**3**	**0**	**0**	**0**	**0**
2nd Phalange	**6**	**0**	**0**	**0**	**0**
3rd Phalange	**4**	**0**	**0**	**0**	**0**
Proximal Medial Sesamoid	**1**	**0**	**0**	**0**	**0**
Distal Inferior Sesamoid	**1**	**0**	**0**	**0**	**0**
Micellaneous Items					
Indeterminate Premolar	**0**	**2**	**0**	**0**	**0**
Indeterminate Lower Molar	**3**	**0**	**0**	**0**	**0**
Indeterminate Lower Tooth	**0**	**1**	**0**	**0**	**0**
Metapodial	**0**	**1**	**0**	**0**	**1**
Mandible/Maxilla	**0**	**0**	**0**	**0**	**1**
Rib Fragments	**0**	**7**	**0**	**0**	**6**
Enamel Fragments	**0**	**189**	**0**	**0**	**13**
Skull Fragments	**1**	**2**	**0**	**0**	**16**
Test Pit 2					
Tibia	**0**	**1**	**0**	**0**	**0**
Unciform Carpal	**1**	**0**	**0**	**0**	**0**

Element and Landmark	Bison	Ungulate	Muskrat	Canid	N/A Species
<u>Miscellaneous Items</u>					
Indeterminate Tooth	**0**	**1**	**0**	**0**	**0**
<u>Test Pit 16</u>					
Rib Head	**1**	**0**	**0**	**0**	**0**
<u>Test Pit 21</u>					
Indeterminate Tooth	**0**	**9**	**0**	**0**	**0**
<u>Test Pit 24</u>					
Ulna	**2**	**0**	**0**	**0**	**1**
Fused Central/4th Tarsal	**1**	**0**	**0**	**0**	**0**
<u>Test Pit 25</u>					
Crania					
2nd Premolar	1	0	0	0	0
1st Molar	1	0	0	0	0
3rd Molar	1	0	0	0	0
<u>Total</u>	**3**	**0**	**0**	**0**	**0**
Mandible					
2nd Molar	1	0	0	0	0
3rd Molar	1	0	0	0	0
<u>Total</u>	**2**	**0**	**0**	**0**	**0**
Talus	**1**	**0**	**0**	**0**	**0**
Tibia	**0**	**2**	**0**	**0**	**0**
Miscellaneous					
Upper Indeterminate Molar	**1**	**0**	**0**	**0**	**0**
Indeterminate Tooth	**1**	**0**	**0**	**0**	**10**

Table 29. MNE, MNI, and %MAU Calculations for Bison from the Fieldwork.

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Cranium							**6**	**4**
Frontal	1	0	0	1	0.5	16.7		
Horn Core	0	0	0	0	0	0		
Parietal	0	0	0	0	0	0		
Occipital	0	0	0	0	0	0		
Occipital Condyle	0	0	0	0	0	0		
Squamous Temporal	0	0	0	0	0	0		
Petrous Temporal	0	1	1	2	1	33.3		
Zygomatic Temporal	0	0	0	0	0	0		
External Auditory Meatus	0	0	0	0	0	0		
Zygomatic	0	0	0	0	0	0		
Nasal	0	0	0	0	0	0		
Maxilla	0	0	0	0	0	0		
Premaxilla	0	0	0	0	0	0		
2nd Premolar	1	0	1	2	1	33.3		
3rd Premolar	0	0	0	0	0	0		
4th Premolar	0	0	0	0	0	0		
1st Molar	1	4	1	6	3	100		
2nd Molar	0	0	0	0	0	0		
3rd Molar	0	0	2	2	1	33.3		
Mandible							**4**	**3**
Articular Condyle	2	1	0	3	1.5	50		
Coronoid Process	3	1	0	4	2	66.7		
Ramus	1	1	0	2	1	33.3		
Mandibular Foramen	0	1	0	1	0.5	16.7		
Lower Border	0	2	1	3	1.5	50		
Mental Foramen	0	2	0	2	1	33.3		
Diastema	0	2	0	2	1	33.3		
Symphasis	0	2	0	2	1	33.3		
Incisor Canine	0	2	0	2	1	33.3		
2nd Premolar	0	1	0	1	0.5	16.7		
3rd Premolar	0	0	0	0	0	0		
4th Premolar	1	0	0	1	0.5	16.7		
1st Molar	1	0	1	2	1	33.3		
2nd Moar	1	1	0	2	1	33.3		
3rd Molar	0	1	0	1	0.5	16.7		
Deciduous Incisor/Canine	0	0	0	0	0	0		
Deciduous 2nd Premolar	0	0	0	0	0	0		
Deciduous 3rd Premolar	0	0	0	0	0	0		
Deciduous 4th Premolar	0	0	0	0	0	0		
Body/Corpus	1	2	0	3	1.5	50		
Gonial Angle	0	0	0	0	0	0		

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Thoracic Vertebra							1	1
Prezygapophysis	0	0	1	1	0.03	1		
Postzygapophysis	0	0	0	0	0	0		
Neural Arch	0	0	0	0	0	0		
Neural Spine	0	0	1	1	0.06	2		
Transverse Process	0	0	0	0	0	0		
Centrum	0	0	0	0	0	0		
Humerus							1	1
Head	0	0	0	0	0	0		
Lateral Tuberosity	0	0	0	0	0	0		
Medial Tuberosity	0	0	0	0	0	0		
Proximal Shaft	0	0	0	0	0	0		
Deltoid Tuberosity	0	0	0	0	0	0		
Teres Major Tuberosity	0	0	0	0	0	0		
Teres Minor Tuberosity	0	0	0	0	0	0		
Posterior Lateral Foramen	0	0	0	0	0	0		
Olecranon Fossa	1	1	0	2	1	33.3		
Radial Fossa	1	1	0	2	1	33.3		
Lateral Epicondyle	0	1	0	1	0.5	16.7		
Medial Epicondyle	1	1	0	2	1	33.3		
Lateral Condyle	0	1	0	1	0.5	16.7		
Medial Condyle	1	1	0	2	1	33.3		
Distal Shaft	1	1	0	2	1	33.3		
Radius							1	1
Lateral Glenoid Cavity	0	1	0	1	0.5	16.7		
Medial Glenoid Cavity	0	1	0	1	0.5	16.7		
Radial Tuberosity	0	1	0	1	0.5	16.7		
Posterior Lateral Foramen	0	0	0	0	0	0		
Proximal Posterior Shaft	0	1	0	1	0.5	16.7		
Proximal Anterior Shaft	0	1	0	1	0.5	16.7		
Distal Posterior Shaft	0	1	0	1	0.5	16.7		
Distal Anterior Shaft	0	1	0	1	0.5	16.7		
Radial Carpal Facet	0	1	0	1	0.5	16.7		
Internal Carpal Facet	0	1	0	1	0.5	16.7		
Ulna							2	2
Olecranon Process	1	1	0	2	1	33.3		
Aconeal Process	0	2	0	2	1	33.3		
Semilunar Notch	0	2	0	2	1	33.3		
Coronoid Process	0	1	0	1	0.5	16.7		
Shaft	0	1	0	1	0.5	16.7		
Styloid Process	0	1	0	1	0.5	16.7		
Radial Carpal	1	0	0	1	0.5	16.7	1	1
Internal Carpal	2	1	0	3	1.5	50	3	2
Ulnar Carpal	1	0	0	1	0.5	16.7	1	1

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Uniciform Carpal	1	2	0	3	1.5	50	**3**	**2**
Fused 2/3 Carpal	1	0	0	1	0.5	16.7	**1**	**1**
Accessory Carpal	1	0	0	1	0.5	16.7	**1**	**1**
Metacarpal							**2**	**1**
Carpal 2/3 Facet	0	0	0	0	0	0		
Unciform Carpal Facet	0	0	0	0	0	0		
Proximal Anterior Foramen	0	0	0	0	0	0		
Proximal Posterior Foramen	0	0	0	0	0	0		
Anterior Shaft	1	0	0	1	0.5	16.7		
Posterior Shaft	1	0	0	1	0.5	16.7		
Distal Anterior Foramen	1	0	0	1	0.5	16.7		
Distal Posterior Foramen	1	0	0	1	0.5	16.7		
Medial Condyle	1	1	0	2	1	33.3		
Lateral Condyle	1	1	0	2	1	33.3		
Patella	0	1	0	1	0.5	16.7	**1**	**1**
Tibia							**3**	**2**
Medial Condyle	0	0	0	0	0	0		
Lateral Condyle	0	0	0	0	0	0		
Tibial Tuberosity	0	0	0	0	0	0		
Anterior Crest	0	0	0	0	0	0		
Posterior Lateral Foramen	0	0	0	0	0	0		
Proximal Posterior Shaft	0	0	0	0	0	0		
Distal Posterior Shaft	0	2	0	2	1	33.3		
Distal Anterior Shaft	1	0	0	1	0.5	16.7		
Medial Groove	1	2	0	3	1.5	50		
Lateral Groove	1	2	0	3	1.5	50		
Fibular Facet	0	1	0	1	0.5	16.7		
Fused Central/4th Tarsal	2	0	0	2	1	33.3	**2**	**2**
Fused 2/3 Tarsal	0	0	1	1	0.5	16.7	**1**	**1**
Astragulus							**1**	**1**
Proximal Condyle	1	0	0	1	0.5	16.7		
Distal Condyle	1	0	0	1	0.5	16.7		

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Metatarsal							**2**	**2**
Tarsal C/4 Facet	2	0	0	2	1	33.3		
Tarsal 2/3 Facet	2	0	0	2	1	33.3		
Proximal Anterior Foramen	1	0	0	1	0.5	16.7		
Proximal Posterior Foramen	1	0	0	1	0.5	16.7		
Anterior Shaft	2	0	0	2	1	33.3		
Posterior Shaft	1	0	0	1	0.5	16.7		
Distal Anterior Foramen	0	0	0	0	0	0		
Distal Posterior Foramen	0	0	0	0	0	0		
Medial Condyle	0	1	0	1	0.5	16.7		
Lateral Condyle	0	1	0	1	0.5	16.7		
1st Phalanx							**4**	**2**
Proximal	0	0	4	4	1	33.3		
Distal	0	0	4	4	1	33.3		
2nd Phalanx							**5**	**3**
Proximal	0	0	4	4	1	33.3		
Distal	0	0	5	5	1.25	41.7		
3rd Phalanx							**3**	**2**
Proximal	0	0	3	3	0.75	25		
Distal	0	0	2	2	0.5	16.7		
Proximal Lateral Sesamoid	0	0	1	1	0.125	4.2	**1**	**1**
Proximal Medial Sesamoid	0	0	1	1	0.125	4.2	**1**	**1**
Distal Inferior Sesamoid	0	0	1	1	0.06	2	**1**	**1**

Table 30. MNE, MNI, and %MAU Calculations for the Muskrat from the Fieldwork.

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Cranium							1	1
Frontal	0	0	0	0	0	0		
Horn Core	0	0	0	0	0	0		
Parietal	0	0	0	0	0	0		
Occipital	0	0	0	0	0	0		
Occipital Condyle	0	0	0	0	0	0		
Squamous Temporal	0	0	0	0	0	0		
Petrous Temporal	0	0	0	0	0	0		
Zygomatic Temporal	0	1	0	1	0.5	100		
External Auditory Meatus	0	0	0	0	0	0		
Zygomatic	0	0	0	0	0	0		
Nasal	0	0	0	0	0	0		
Maxilla	0	0	0	0	0	0		
Premaxilla	0	0	0	0	0	0		
Incisor	0	0	0	0	0	0		
1st Molar	0	0	0	0	0	0		
2nd Molar	0	0	0	0	0	0		
3rd Molar	0	0	0	0	0	0		

Table 31. MNE, MNI, and %MAU Calculations for the Indeterminate Canid from the Fieldwork.

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Mandible							1	1
Articular Condyle	0	0	0	0	0	0		
Coronoid Process	0	0	0	0	0	0		
Ramus	0	0	0	0	0	0		
Mandibular Foramen	0	0	0	0	0	0		
Lower Border	0	0	0	0	0	0		
Mental Foramen	0	0	0	0	0	0		
Diastema	0	0	0	0	0	0		
Symphasis	0	0	0	0	0	0		
1st Incisor	0	0	0	0	0	0		
2nd Incisor	0	0	0	0	0	0		
3rd Incisor	0	0	0	0	0	0		
Canine	0	0	0	0	0	0		
1st Premolar	0	0	0	0	0	0		
2nd Premolar	0	0	0	0	0	0		
3rd Premolar	0	0	0	0	0	0		
4th Premolar	0	0	0	0	0	0		
Indeterminate Premolar	1	0	0	1	0.5	100		
1st Molar	0	0	0	0	0	0		
2nd Moar	0	0	0	0	0	0		
3rd Molar	0	0	0	0	0	0		
Deciduous Incisor/Canine	0	0	0	0	0	0		
Deciduous 2nd Premolar	0	0	0	0	0	0		
Deciduous 3rd Premolar	0	0	0	0	0	0		
Deciduous 4th Premolar	0	0	0	0	0	0		
Body/Corpus	0	0	0	0	0	0		
Gonial Angle	0	0	0	0	0	0		

Table 32. MNE, MNI, and %MAU Calculations for Indeterminate Ungulate from the Fieldwork.

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Cranium							**2**	**1**
Frontal	0	0	0	0	0	0		
Horn Core	0	0	0	0	0	0		
Parietal	0	0	0	0	0	0		
Occipital	0	0	0	0	0	0		
Occipital Condyle	0	0	0	0	0	0		
Squamous Temporal	0	0	0	0	0	0		
Petrous Temporal	1	0	1	2	1	40		
Zygomatic Temporal	0	0	0	0	0	0		
External Auditory Meatus	0	0	0	0	0	0		
Zygomatic	0	0	0	0	0	0		
Nasal	0	0	1	1	0.5	20		
Maxilla	0	0	0	0	0	0		
Premaxilla	0	0	0	0	0	0		
2nd Premolar	0	0	0	0	0	0		
3rd Premolar	0	0	0	0	0	0		
4th Premolar	0	0	0	0	0	0		
1st Molar	0	0	0	0	0	0		
2nd Molar	0	0	0	0	0	0		
3rd Molar	0	0	0	0	0	0		
Mandible							**2**	**1**
Articular Condyle	0	0	0	0	0	0		
Coronoid Process	1	1	0	2	1	40		
Ramus	0	1	0	1	0.5	20		
Mandibular Foramen	0	0	0	0	0	0		
Lower Border	0	0	0	0	0	0		
Mental Foramen	0	0	0	0	0	0		
Diastema	0	0	0	0	0	0		
Symphasis	0	0	0	0	0	0		
Incisor Canine	0	0	0	0	0	0		
2nd Premolar	0	0	0	0	0	0		
3rd Premolar	0	0	0	0	0	0		
4th Premolar	0	0	0	0	0	0		
1st Molar	0	0	0	0	0	0		
2nd Moar	0	0	0	0	0	0		
3rd Molar	0	0	0	0	0	0		
Deciduous Incisor/Canine	0	0	0	0	0	0		
Deciduous 2nd Premolar	0	0	0	0	0	0		
Deciduous 3rd Premolar	0	0	0	0	0	0		
Deciduous 4th Premolar	0	0	0	0	0	0		
Body/Corpus	0	0	0	0	0	0		
Gonial Angle	1	0	0	1	0.5	20		
Hyoid	0	0	1	1	0.5	20	**1**	**1**

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Thoracic Vertebra							4	1
Prezygapophysis	0	0	1	1	0.03	1.2		
Postzygapophysis	0	0	1	1	0.03	1.2		
Neural Arch	0	0	1	1	0.06	2.4		
Neural Spine	0	0	4	4	0.26	10.4		
Transverse Process	0	0	0	0	0	0		
Centrum	0	0	0	0	0	0		
Scapula							2	1
Glenoid Cavity	0	0	0	0	0	0		
Coracoid Process	0	0	0	0	0	0		
Acromion	0	0	0	0	0	0		
Acromial Spine	0	0	0	0	0	0		
Neck	1	1	0	2	1	40		
Blade	0	0	1	1	0.5	20		
Superior Border	0	0	0	0	0	0		
Inferior Border	1	0	0	1	0.5	20		
Humerus							4	3
Head	0	0	0	0	0	0		
Lateral Tuberosity	0	0	0	0	0	0		
Medial Tuberosity	0	0	0	0	0	0		
Proximal Shaft	0	2	2	4	2	80		
Deltoid Tuberosity	0	0	0	0	0	0		
Teres Major Tuberosity	0	2	0	2	1	40		
Teres Minor Tuberosity	0	0	0	0	0	0		
Posterior Lateral Foramen	0	1	0	1	0.5	20		
Olecranon Fossa	0	1	0	1	0.5	20		
Radial Fossa	0	0	0	0	0	0		
Lateral Epicondyle	0	0	0	0	0	0		
Medial Epicondyle	0	0	0	0	0	0		
Lateral Condyle	0	0	0	0	0	0		
Medial Condyle	0	0	0	0	0	0		
Distal Shaft	0	3	1	4	2	80		
Radius							2	2
Lateral Glenoid Cavity	1	0	0	1	0.5	20		
Medial Glenoid Cavity	0	0	0	0	0	0		
Radial Tuberosity	0	0	0	0	0	0		
Posterior Lateral Foramen	0	0	0	0	0	0		
Proximal Posterior Shaft	2	0	0	2	1	40		
Proximal Anterior Shaft	0	0	0	0	0	0		
Distal Posterior Shaft	0	0	2	2	1	40		
Distal Anterior Shaft	0	0	0	0	0	0		
Radial Carpal Facet	0	1	0	1	0.5	20		
Internal Carpal Facet	0	0	0	0	0	0		

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Ulna							**3**	**2**
Olecranon Process	0	0	0	0	0	0		
Aconeal Process	0	0	0	0	0	0		
Semilunar Notch	1	0	0	1	0.5	20		
Coronoid Process	0	0	0	0	0	0		
Shaft	1	1	1	3	1.5	60		
Styloid Process	0	0	0	0	0	0		
Metacarpal							**3**	**2**
Carpal 2/3 Facet	1	0	0	1	0.5	20		
Unciform Carpal Facet	0	0	0	0	0	0		
Proximal Anterior Foramen	1	0	0	1	0.5	20		
Proximal Posterior Foramen	0	0	0	0	0	0		
Anterior Shaft	1	0	2	3	1.5	60		
Posterior Shaft	0	0	1	1	0.5	20		
Distal Anterior Foramen	0	0	2	2	1	40		
Distal Posterior Foramen	0	0	0	0	0	0		
Medial Condyle	0	0	0	0	0	0		
Lateral Condyle	0	0	0	0	0	0		
Femur							**5**	**4**
Head	0	0	2	2	1	40		
Greater Trochanter	0	0	0	0	0	0		
Lesser Trochanter	0	0	0	0	0	0		
Anterior Shaft	0	0	5	5	2.5	100		
Posterior Medial Foramen	1	0	0	1	0.5	20		
Linea Aspera	4	0	0	4	2	80		
Supracondyloid Fossa	3	0	0	3	1.5	60		
Trochlea	0	0	0	0	0	0		
Medial Condyle	0	1	0	1	0.5	20		
Lateral Condyle	0	0	0	0	0	0		
Medial Epicondyle	0	0	0	0	0	0		
Tibia							**5**	**3**
Medial Condyle	0	0	0	0	0	0		
Lateral Condyle	0	0	0	0	0	0		
Tibial Tuberosity	0	0	0	0	0	0		
Anterior Crest	2	0	0	2	1	40		
Posterior Lateral Foramen	1	0	0	1	0.5	20		
Proximal Posterior Shaft	2	1	0	3	1.5	60		
Distal Posterior Shaft	3	2	0	5	2.5	100		
Distal Anterior Shaft	1	1	0	2	1	40		
Medial Groove	1	1	0	2	1	40		
Lateral Groove	0	0	0	0	0	0		
Fibular Facet	0	0	0	0	0	0		

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Metatarsal							1	1
Tarsal C/4 Facet	0	0	0	0	0	0		
Tarsal 2/3 Facet	0	0	0	0	0	0		
Proximal Anterior Foramen	0	0	0	0	0	0		
Proximal Posterior Foramen	0	0	0	0	0	0		
Anterior Shaft	0	0	1	1	0.5	20		
Posterior Shaft	0	0	0	0	0	0		
Distal Anterior Foramen	0	0	0	0	0	0		
Distal Posterior Foramen	0	0	0	0	0	0		
Medial Condyle	0	0	0	0	0	0		
Lateral Condyle	0	0	0	0	0	0		

Table 33. MNE, MNI, and %MAU Calculations for Indeterminate Faunal Specimens from the Fieldwork.

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Cranium								
Horn Core	0	0	0	0	0	0		
Parietal	0	0	0	0	0	0		
Occipital	0	0	0	0	0	0		
Occipital Condyle	0	0	0	0	0	0		
Squamous Temporal	0	0	0	0	0	0		
Petrous Temporal	0	0	1	1	0.5	33.3		
Zygomatic Temporal	0	0	0	0	0	0		
External Auditory Meatus	0	0	0	0	0	0		
Zygomatic	0	0	0	0	0	0		
Nasal	0	0	0	0	0	0		
Maxilla	0	0	0	0	0	0		
Premaxilla	0	0	0	0	0	0		
2nd Premolar	0	0	0	0	0	0		
3rd Premolar	0	0	0	0	0	0		
4th Premolar	0	0	0	0	0	0		
1st Molar	0	0	0	0	0	0		
2nd Molar	0	0	0	0	0	0		
3rd Molar	0	0	0	0	0	0		
Atlas							**1**	**1**
Prezygapophysis	0	0	0	0	0	0		
Postzygapophysis	0	0	0	0	0	0		
Neural Arch	0	0	1	1	1	66.6		
Neural Spine	0	0	0	0	0	0		
Centrum	0	0	0	0	0	0		
Thoracic Vertebra							**2**	**1**
Prezygapophysis	0	0	1	1	0.03	2		
Postzygopophysis	0	0	0	0	0	0		
Neural Arch	0	0	0	0	0	0		
Neural Spine	0	0	2	2	0.13	8.6		
Transverse Process	0	0	0	0	0	0		
Centrum	0	0	0	0	0	0		
Scapula							**3**	**2**
Glenoid Cavity	0	0	0	0	0	0		
Coracoid Process	0	0	0	0	0	0		
Acromion	0	0	0	0	0	0		
Acromial Spine	1	0	0	1	0.5	33.3		
Neck	0	1	0	1	0.5	33.3		
Blade	1	0	2	3	1.5	100		
Superior Border	0	1	1	2	1	66.6		
Inferior Border	0	0	0	0	0	0		

Element/Landmark	Left	Right	N/A Side	MNE	MAU	%MAU	Total MNE	Total MNI
Ulna							1	1
Olecranon Process	0	0	0	0	0	0		
Aconeal Process	0	0	0	0	0	0		
Semilunar Notch	0	0	0	0	0	0		
Coronoid Process	0	0	0	0	0	0		
Shaft	0	0	1	1	0.5	33.3		
Styloid Process	0	0	0	0	0	0		
Metacarpal							1	1
Carpal 2/3 Facet	0	0	0	0	0	0		
Unciform Carpal Facet	0	0	0	0	0	0		
Proximal Anterior Foramen	0	0	0	0	0	0		
Proximal Posterior Foramen	0	0	0	0	0	0		
Anterior Shaft	0	0	1	1	0.5	33.3		
Posterior Shaft	0	0	1	1	0.5	33.3		
Distal Anterior Foramen	0	0	0	0	0	0		
Distal Posterior Foramen	0	0	0	0	0	0		
Medial Condyle	0	0	0	0	0	0		
Innominate							1	1
Ilium Blade	0	0	0	0	0	0		
Ilium Shaft	0	0	0	0	0	0		
Ilio-Ischial Border	0	1	0	1	0.5	33.3		
Ischium Shaft	0	0	0	0	0	0		
Ischium Blade	0	0	0	0	0	0		
Ischial Tuber	0	0	0	0	0	0		
Pubis Shaft	0	0	0	0	0	0		
Pubic Symphysis	0	0	0	0	0	0		
Pubis Acetabulum	0	0	0	0	0	0		
Ilium Acetabulum	0	0	0	0	0	0		
Ischium Acetabulum	0	0	0	0	0	0		
Lateral Condyle	0	0	0	0	0	0		
Femur							2	2
Head	0	0	0	0	0	0		
Greater Trochanter	0	0	0	0	0	0		
Lesser Trochanter	0	0	0	0	0	0		
Anterior Shaft	0	0	0	0	0	0		
Posterior Medial Foramen	0	0	0	0	0	0		
Linea Aspera	2	0	0	2	1	66.6		
Supracondyloid Fossa	2	0	0	2	1	66.6		
Trochlea	0	0	0	0	0	0		
Medial Condyle	0	0	0	0	0	0		
Lateral Condyle	0	0	0	0	0	0		
Medial Epicondyle	0	0	0	0	0	0		

Table 34. Ceramic Metric and Non-Metric Analyzed Characteristics.

Non-Metric Ceramic Characteristics
1) Vessel Portion Represented
2) Temper
3) Paste
4) Exterior Surface Finish
5) Interior Surface Finish
6) Rim Profile
7) Lip Profile
8) Lip Decoration and Location
9) Rim Decoration and Location
10) Neck Shape
11) Neck Decoration
12) Shoulder Shape
13) Shoulder Decoration
14) Presence/Absence of Cooking Residue
Metric Ceramic Characteristics
1) Thickness of the Lip
2) Thickness of the Rim
3) Thickness of the Neck
4) Thickness of the Shoulder
5) Thickness of the Base

Table 35. Minimum and Maximum Thickness of Body Sherds.

Catalog #	Min. Thickness (mm)	Max. Thickness (mm)
3986	9.2	12.1
4038	12.9	13.4
4010	14.4	15.3
4041	8.2	9.7
4064	7.6	7.8
4008	10.9	13.6
1072	5.9	6.9
4048	8.5	8.9
4047	11.4	12.5
4016	8.8	11.2
4026	13.5	14.8
3565	9.9	10.1
1782	13.6	14.3
3595	9.8	10.2
4025	11.9	12.7
4009	16.7	16.8
4024	13.7	15.6
4027	10.1	10.9
4011	14.8	15.7
4033	10.8	13.9
3968	9.2	10.1
4050	6.6	7.1
3988	12.3	14.2
3992	11.0	13.9
3972	8.2	9.7
4014	11.4	13.7
4044	7.5	8.9
4013	13.3	14.6
1176	13.8	17.3
805	11.4	12.5
1274	7.3	9.5
1307	10.3	11.1
1667	5.7	6.4
1375	11.0	11.4
1049	9.9	11.0
3211	6.0	7.0
4012	13.7	15.3
4037	10.2	10.9

Table 35. Minimum and Maximum Thickness of Body Sherds Continued.

Catalog #	Min. Thickness (mm)	Max. Thickness (mm)
3180	11.6	12.4
3338	9.4	10.1
599	10.6	12.1
4043	14.5	15.2
3942	6.1	7.4
3927	9.8	12.5
3194	9.6	10.6
3672	7.4	7.8
2278	5.7	7.3
3587	5.9 and 9.2	8.4 and 10.5
3945	7.4	9.7
3946	12.3	13.5
547	11.2	11.3
3956	7.2	8.1
3957	7.5	7.8
3960	10.0	10.4
2303	13.7	14.8
3944	8.6	9.3
873	8.9	9.2
2299	9.8	12.1
632	7.7	7.9
4054	14.6	15.0
4007	9.6	10.2
4056	9.1	9.3
4058	9.3	10.3
4031	10.6	10.9
4032	6.4	6.7
4042	10.8	10.9
4084	8.9	9.1
4040	11.9	12.0
4046	13.0	14.0
4045	12.1	12.3
4015	16.0	18.0
4029	11.0	16.7
4039	12.1	13.0
4017	10.4	12.8
4001	8.3	10.0
4073	11.5	12.4
4028	10.6	12.6
4006	10.4	12.3