Fine Screen Faunal Analysis from the Hartley Site (FaNp-19)

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Saskatoon

by

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ABSTRACT

"It's not your blue blood, your pedigree or your college degree. It's what you do with your life that counts."-Millard Fuller (1935- _),

co-founder of Habitat for Humanity.

The Hartley site (FaNp-19) is a Late Prehistoric multicomponent habitation site located just south of the city of Saskatoon proper, but within the city-limits. The site is located in a series of stabilized sand dunes with slightly rolling terrain. The Hartley site is part of the original larger Preston Avenue site first recognized by Ken Cronk.

There were a number of questions that were to be answered in this study, in regard to the fine screen assemblage. 1) How would using just the available material affect the analysis?, 2) How would the different methodologies affect the results? Taking those variables into account, what information could be acquired regarding subsistence strategy, seasonality and the paleoecology at the site?

There were two amphibians, one reptile, six varieties of gastropods and a number of small and micro-mammals that were identified. It is interesting to note: that there was also a mini projectile point recovered in the fine screen material made of Swan River chert.

Previous conclusions from Grant Clarke's (1995) thesis regarding what species were consumed were confirmed. The recovery of specimens from animals that hibernate in the winter have provided additional information regarding the

seasonality at the site, suggesting that the season of occupation may extend into the spring. The gastropods, small mammals, reptile and amphibians provided a good framework on which to base the sympatry analysis. These species, many from similar environments and others that are more adaptable, afforded a comprehensive look at the past environment.

ACKNOWLEDGEMENTS

"No act of kindness, no matter how small, is ever wasted."-Aesop (620BC-560BC), The Lion and the Mouse.

As with any project of such magnitude there are many many people to thank. First and foremost, I must say thank you to my family who supported me throughout, in many ways, without your support I could not have completed this thesis. I also must say thank you to my thesis advisors Dr. David Meyer and Dr. Ernest Walker who provided support and understanding when perhaps a swift kick may have been in order. Grant Clarke allowed me to use and modify many of the maps from his thesis done on the Hartley site in 1995- thank you. Dr. Urve Linnamae who is not only a committee member but now, I also consider a friend, has provided me with good advice, guidance and straight talk about many things. Your honesty is appreciated Urve. A big thank you to Robert Forsyth who is a Research Associate for the Royal British Columbia Museum, who identified my gastropod material at the eleventh hour. Dr. Chivers and Mike Pollock, from the Department of Biology, U of S, must also be thanked for coming to the lab to look at the fragmented fish remains and giving me something to work with, even if the remains couldn't be identified.

A last minute request went out to numerous archaeologists in Alberta, Saskatchewan and Ottawa regarding the current state of fine screen analysis. There were several responses. A thank you to all who replied (in no particular order): B.

Hjermstad, I. Dyck, J. Brandon, K. Enns-Kavanagh, W. Unfreed, B. Ball. C. Ramsay, A. Ramsay, E. Gryba, and G. Oetelaar.

Additionally, I thank my fellow graduate students for their moral support, tips and for being sounding boards. Barb Neal graciously applied her lithic expertise with regards to the miniature projectile point. And thank you to Kevin Whatley, there were certainly some interesting times over the years that included, tears, tea, laughter, skeletons and most importantly friendship.

Thank you too to the Saskatchewan Archaeological Society who provided financial support by way of research grants over the years funded by Saskatchewan Lotteries.

DEDICATION

"Have patience with all things, but chiefly have patience with yourself."

-Saint Francis de Sales (1567-1622).

This thesis is dedicated to my family, my husband Chuck, my daughter Ami, and my son Travis. And to my mom Trudy who has always believed in me.
Thank you, all of you, for your support and patience.

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ABBREVIATIONS

MNI	minimum number of individuals
MNE	minimum number of elements
NISP	number of identifiable specimens
MSC	mammals size class
BSC	bird size class
OSC	other size class
N	number

Chapter 1

Overview of the Hartley site (FaNp-19)

1.1 Introduction

"The roots of education are bitter, but the fruit is sweet."

-Aristotle (384 BC-322 BC), philosopher.

The Hartley site (FaNp-19) is a Late Prehistoric multicomponent habitation site located just south of the current residential developments in the city of Saskatoon proper, but within the city-limits (Figure 1.1). The site is located in slightly rolling terrain formed by a series of stabilized sand dunes (Meyer 1997:1). It is part of the original, larger Preston Avenue site, first recognized in the early 1950s by Mr. Ken Cronk, a leading member of the Saskatoon Archaeological Society (Meyer 1997:1). Members of that Society identified the Preston Avenue site as a surface scatter that extended north-south along Preston Avenue for 3.25 km (Meyer 1989; Amundson and Kelly 1988:1). At that time Mr. Cronk also observed archaeological materials in the cut 'profiles' of the ditches within one section of the Preston Avenue site. He along with other members of the Saskatoon Archaeological Society (SAS) conducted "test excavations" in this portion of the site (Amundson and Kelly 1988; Meyer 1990a). Mr. Cronk recovered much pottery from this excavation area some of which he subsequently refitted to form vessel sections. These ceramic reconstructions are housed at the University of Saskatchewan, Department of Archaeology (Amundson 1988:2).

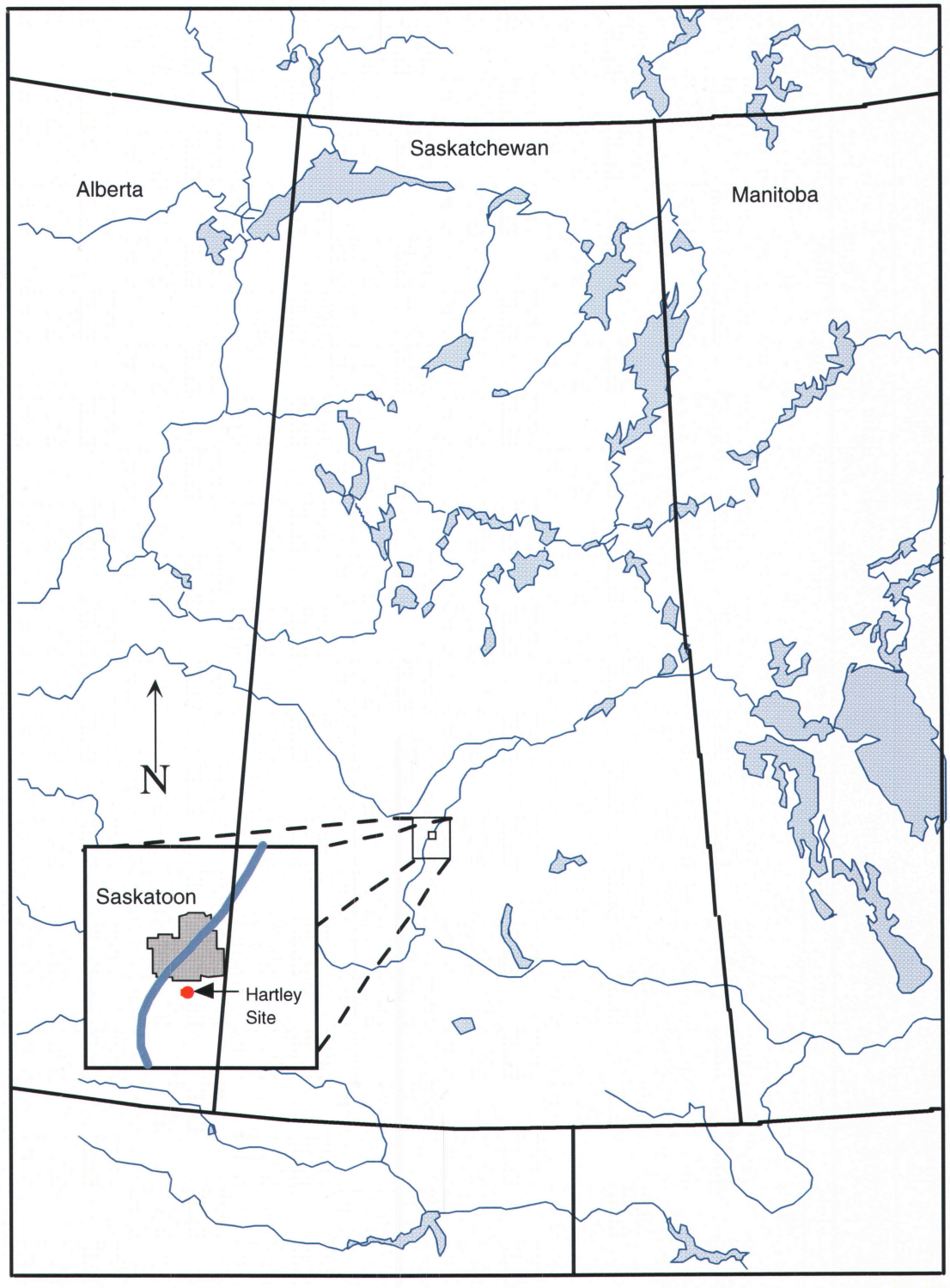


Figure 1.1: Map showing the Hartley site (FaNp-19) modified from Clarke (1995:2) with permission.

When Boyd Wettlaufer conducted a broad survey of Saskatchewan archaeological sites and collections in 1951, he traveled to Saskatoon and met with the members of the Saskatoon Archaeological Society. One of the sites to which he was taken by Cronk was the Preston Avenue site, and specifically that portion where Society members had conducted excavations. As a result, Wettlaufer (1960) officially reported this site assigning it the field designation S-57.

In the mid 1980s, the area in which Cronk had conducted his excavations was slated for the Southridge housing development by Cairns Development Limited. As a result, in 1985 James Finnigan and Muriel Carlson and other members of the Saskatoon Archaeological Society, carried out subsurface testing along with a visual reconnaissance of the area in which Cronk had excavated decades before. Subsequently, in 1987 Millenium Consultants was contracted by Cairns Development Limited to conduct additional surface reconnaissance and subsurface testing of the area. The Millenium archaeologists (Amundson and Kelly 1988) noted that while most of the site was disturbed, because it had been under cultivation for many years, there were still some intact deposits available for archaeological investigation. These undisturbed areas were either in low lying sections of the fields or in groves of trees.

The plans for this housing development were placed on hold but in the fall of 1988, Dr. David Meyer selected the site for a University of Saskatchewan field school class to excavate. As a result, field school excavations were conducted here from 1988 through 1995 by the Department of Anthropology and Archaeology at the University of Saskatchewan. These excavations were focused on an intact buried component surrounded by willow trees, referred to as the "Brushy Depression" (Clarke and Meyer 1992; Meyer 1989, 1990a, 1994, 1995; Meyer and Clarke 1991,

1993) (Figure 1.2, 1.3). There was also an additional undisturbed area identified by Millenium in a depression which extended eastward from the "Brushy Depression"(Amundson 1988:13). To the north, 11 m^2 were excavated in the "Wooded Hollow", a low, elongated area that supports a stand of balsam poplar and trembling aspen (Meyer 1997: 1) (Figure 1.2).

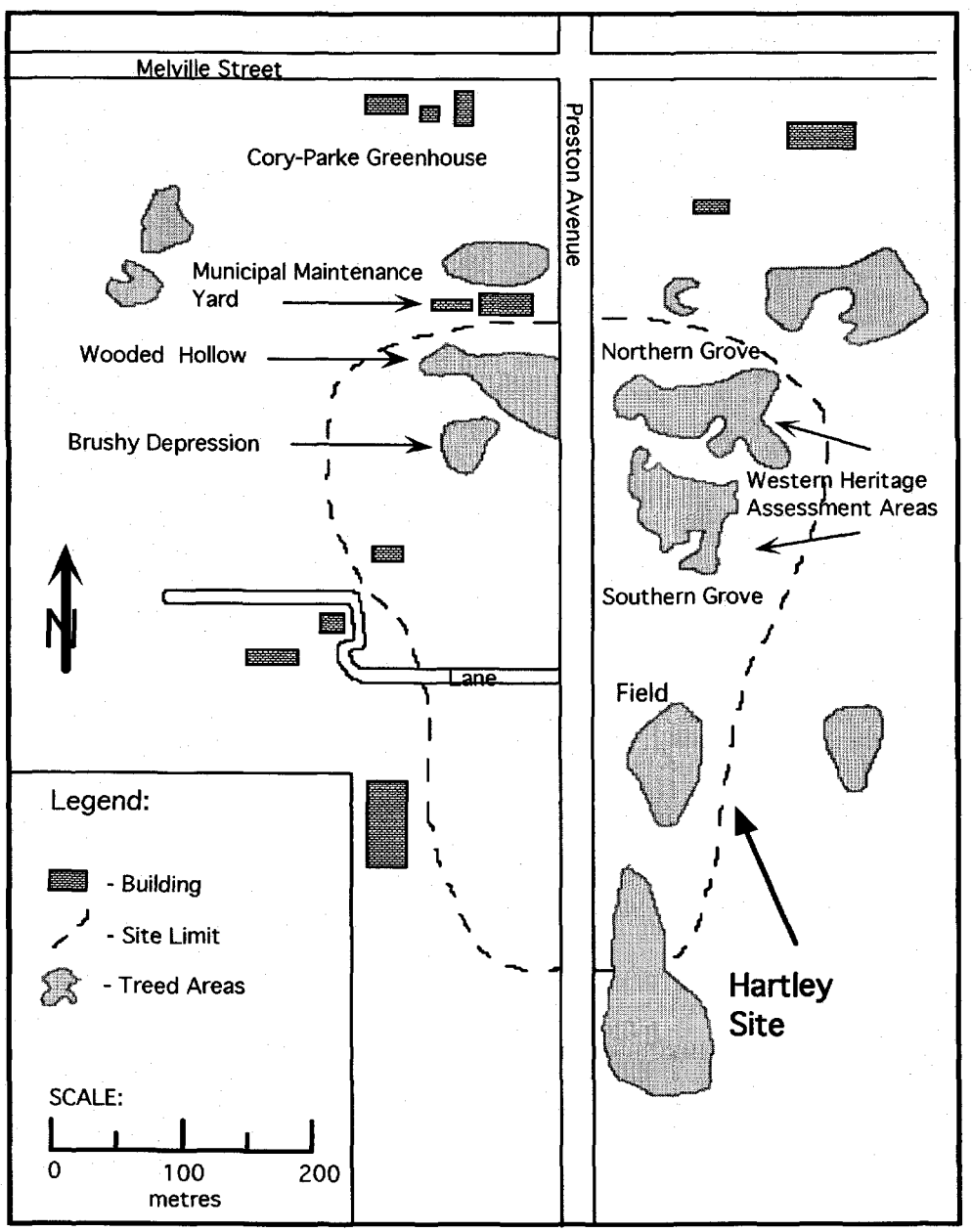


Figure 1.2: Map of the Hartley site showing the location of the Brushy Depression and the Wooded Hollow (modified from (Meyer 1995:2).

Figure 1.3: "Brushy Depression", with cultivated field surrounding it, notice farmhouse to the left, (photograph facing west, D. Farrow 2000).

In the winter of 1990-1991, the field school portion of the original Preston Avenue site (FaNp-2) was renamed the Hartley site (FaNp-19)(Figure 1.2). This change was seen as necessary because it was apparent that the original Preston Avenue site, at 3.25 km long, was inappropriately large and incorporated within it several individual sites (Meyer and Clarke 1991: preface). As such, the Hartley deposit was the second site recognized within the Preston Avenue "site", the Bill Richards site having been differentiated previously.

The Hartley site is also quite large measuring, about 500 x 400 m, and straddles Preston Avenue (Meyer 1997:1) (Figure 1.2). It is located in the North East quarter of section 10, township 36, range 5, west of the third meridian. The eastern areas of the site contain more recent cultural materials, namely a Mortlach occupation, whereas the western area of the site is an Avonlea/Old Women's transitional component (Clarke 1995:12) (Figure 1.2). Test excavations were

conducted in the eastern portion of the site (Northern and Southern Groves) by Western Heritage Services in 1992 (Rollans and McKeand 1992).

In July of 2003 excavations were again conducted at the site, in the more northerly area, the "Wooded Hollow" and on the east side of Preston Avenue by Stantec Consulting (Personal Communication Leslie Amundson 2003, 2004). Once again the area was being slated for residential development, this time by Dundee Corporation. The new residential area will be called Stonebridge (Personal Communication, Maggie Hanna 2004). It is anticipated that development will begin in 2004. The neighborhood will incorporate a park with signage that will inform the public of the archaeological sites present in the area (Personal Communication, Leslie Amundson 2003, 2004; Maggie Hanna 2004).

In total 111.5 m^2 were excavated by the students at the field schools from 1988-1995 (Figure1.4). Grant Clarke's 1995 M.A. thesis deals with the faunal material recovered from 1988-1990 from the brushy depression (1995:3). During those three years 49.5 m^2 were excavated. Clarke also included the analysis of fine screen material from one unit, 290N109E. Clarke observed that the fine screen analysis did provide additional information, in particular the new identification of a species of vole, a passeriform bird, and two genera of gastropods, but the analysis was time consuming and it was not feasible to proceed with it at that time (Clarke 1995).

The faunal assemblage which Clarke recognized in his thesis consisted of 22 different species of birds, fish and mammals, one species of fresh water mussel, and three genera of snails (Clarke 1995:3). Cultural materials recovered in the western

half of the site have for the most part have been consistent with the Avonlea/Old Women's cultural phase and are from a single occupation.

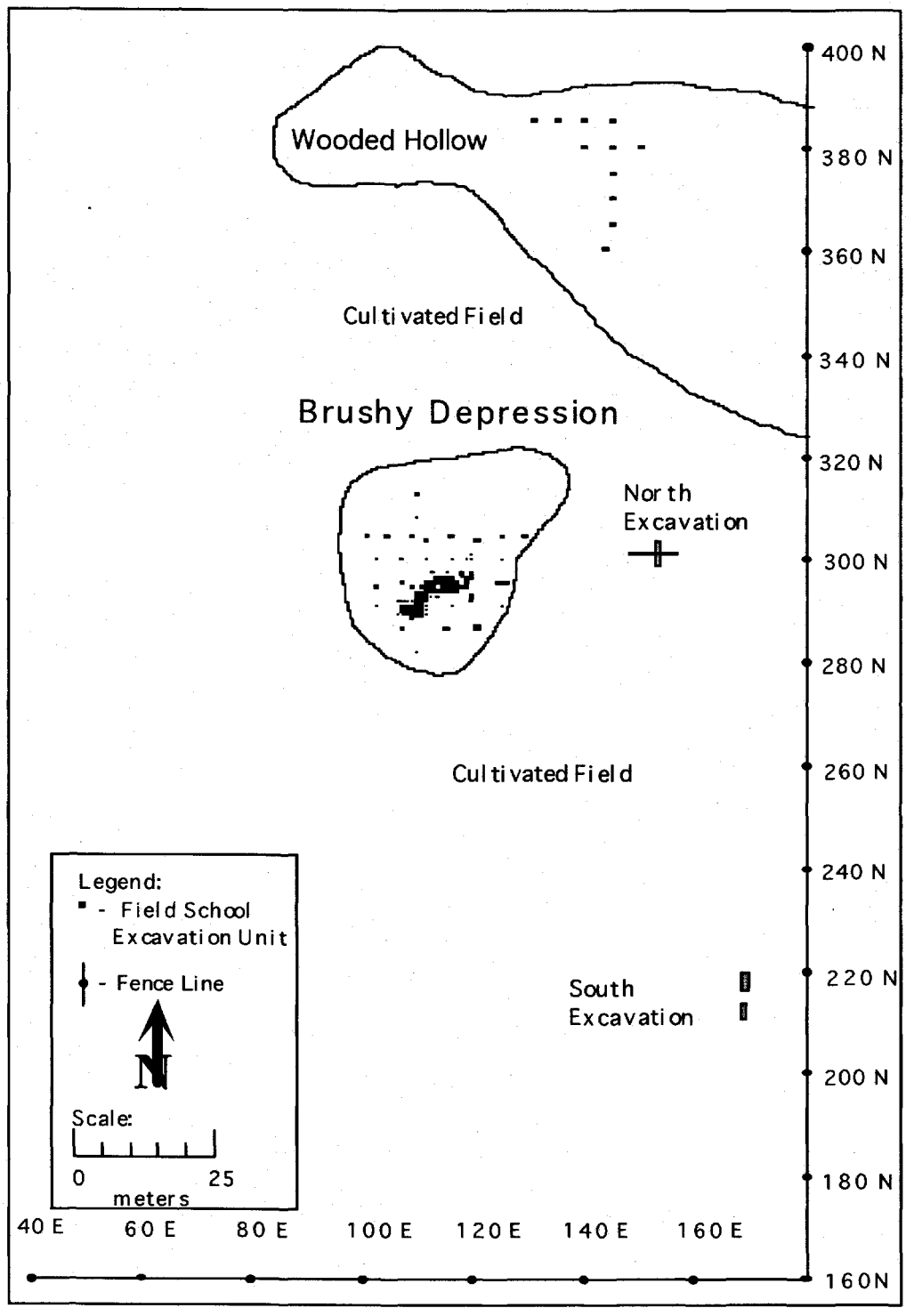


Figure 1.4: Map showing field school excavation areas at the Hartley site (modified from Clarke 1995:11).

1.2 Thesis problem

This thesis examines the fine screen material from the hearths and adjacent units at the Hartley site. Students collected these samples during field schools held at the site from 1988-1995. The material was analyzed with respect to assessing the assemblage and how it relates to subsistence practices, seasonality of the site, the utility of fine screen analysis and reconstruction of the paleoenvironment. It is hoped that this analysis will also allow for an assessment of the utility of undertaking this type of an analysis from stored samples.

1.3 Research Objectives

The objectives of this study are: (1-) to identify the taxa present in the fine screen assemblage and to evaluate these taxa to determine if they are part of the cultural assemblage or part of the background fauna, (2-) to determine the seasonality at the site through the species present, (3-) to assess the paleoenvironment at the site by sympatric analysis, (4-) to compare results of fine screen assemblages and the coarse screen results, while keeping in mind the objectives of assessing seasonality, subsistence, and paleoenvironment.

The changing methodologies at the Hartley site have provided a basis for a comparative study of such methodologies. In particular, comparison of the differential recovery of small faunal elements from different sizes and methods of screening is of interest. Grant Clarke already has shown that, indeed, the fine screen assemblage can provide more information than a coarser screen assemblage, just with his analysis of one unit (Clarke 1995). A number of researchers have demonstrated the utility of fine screening and have shown that its use provides important additional

information (Webster 1999). The interpretation of fine screen assemblages has been the subject of many articles (Bocek 1986, 1992; Gordon 1993; Grayson 1984; Hockett 1991; Morlan 1994; Muckle 1994; Shaffer 1992a; Stahl 1982, 1996). While it is recognized in the literature (Sanchez 1994; Shaffer 1992b) that larger screen mesh sizes are biased toward the recovery of remains from larger size classes of animals, the Hartley site fine screen assemblage provides an opportunity not only to assess a fine screen assemblage, but also to evaluate differences in screening techniques. Fine screening will likely provide new information regarding species that may have been utilized as part of the subsistence economy or that were part of the background fauna. The same holds true for plant remains. The assemblage must be analyzed with respect not only to its cultural aspects, but also with consideration of background fauna and rodent disturbance.

For this thesis research, only the fine screen material from the actual occupation layer is considered. Recoveries from levels excavated above and below the occupation layer have not been included in this study. The units chosen for analysis were those that included a large hearth and a smaller secondary hearth as well as adjacent units. All of the units were in the brushy depression. A variety of screening methods were used, the details of which are presented in Chapter 3.

1.4 Chapter Summaries

Chapter 2 provides an overview of the physical environment of the site locale. This overview includes discussion of geography, flora, fauna, chronometric dates, and regional context. In addition, a brief description of the miniature projectile point is included. Chapter 3 outlines the research methods and provides a summary of the

field schools held at the site, complete with a look at the changing fine screen methodologies used. This chapter also includes the methodology and terminology used in the identification process and the quantitative analysis. Chapter 4 introduces the faunal fine screen results and compares it to Clarke's fine screen and coarse screen results. Chapter 5 provides a look at the paleoecological setting. It reviews the regional biogeography as seen through the rodents and gastropods. Chapter 6 presents a summary of the results of the fine screen analysis at the Hartley site. This includes an assessment in regards to subsistence, seasonality, paleoevironment and methodologies.

Chapter 2

Introduction to the Hartley site

2.1 Physiography

"To archaeologists, the human past is owned by no one. It represents the cultural heritage of everyone who has ever lived on Earth or will live on it in the future. Archaeology puts all human societies on an equal footing."
–Brian Fagan (1996), archaeologist.

The Hartley site is located in a region of the province of Saskatchewan known generally as the prairie ecozone.(Acton et al 1998:119). The prairie ecozone encompasses the southern third of the province and divides the area in a diagonal manner with the division being from west to east and the most southerly area excluding the eastern corner of the province (Figure 2.1). To the north of the prairie ecoregion is the Boreal Forest and to the south are the Cypress Uplands. There are three small areas within the prairie ecoregion; they are the aspen parkland to the north, the moist mixed grassland in the center, and the mixed grassland in the south. The mixed prairie of which the prairie ecozone is a part, encompasses a very large region of North America that extends from Saskatchewan south to Texas (Acton et al 1998:119). The site is in the moist mixed grassland area of the prairie ecozone.

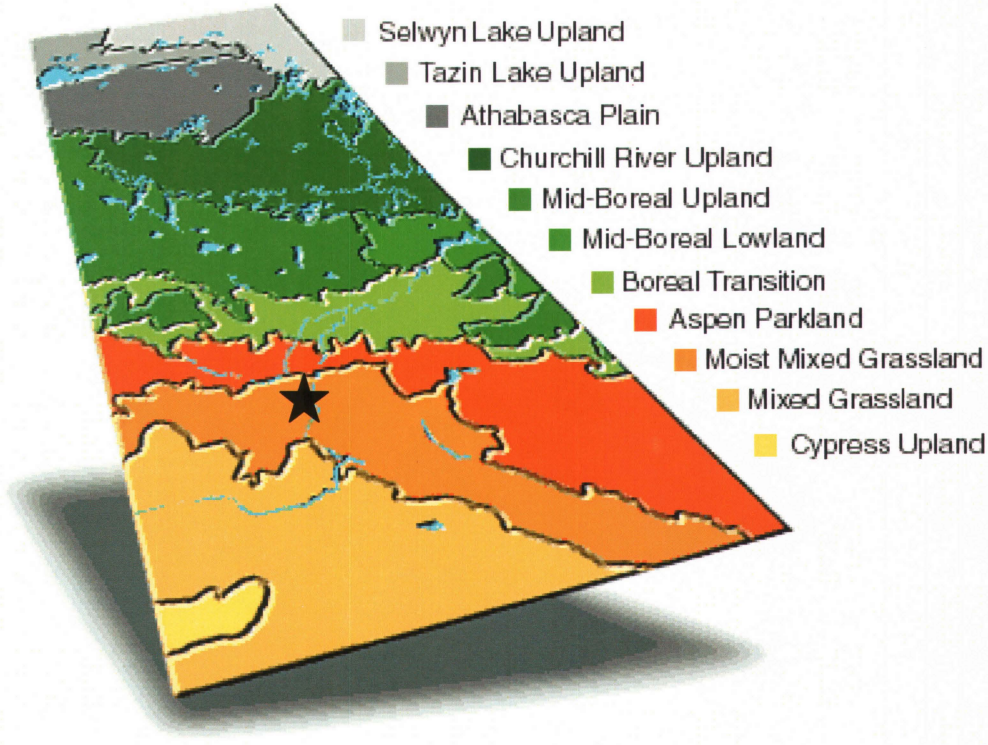


Figure 2.1 Ecoregions of Saskatchewan, used with permission goCanada.com November 2003.

In this ecoregion one can find broad plains that are interrupted by valleys and hilly uplands. One notable feature of this landscape is the seemingly 'endless level to undulating glaciolacustrine and glacial till plains' (Acton et al 1998:142). This is not to say that there is no diversity in the prairie landscape. This diversity, can be found in a variety of forms such as hummocky morainal uplands, sand dunes, and even badlands. In Saskatchewan, the plains lie between 500 and 600m asl and the uplands can extend from 50 –200m asl above the plains and may reach even as high as 700m asl in areas like the Bear Hills. Other major features in the region include the Missouri Coteau and the valleys of the various rivers such as the Souris, Qu'Appelle, South Saskatchewan, and North Saskatchewan. These rivers together form part of what is known as the Nelson River drainage basin. There are also a number of lakes in the surrounding area which include but are not limited to Lake Diefenbaker

(reservoir), Last Mountain Lake and Buffalo Pound Lake. All of these features exemplify the diversity that is found in the Moist mixed grassland ecoregion (Acton et al 1998:142-143).

The Hartley site is located in the Moose Wood Sand Hills which is an area of sand dunes that straddles the South Saskatchewan River south of Saskatoon (Acton et al 1998:151). In this area are many other archaeological sites also winter occupations located in wooded areas or brushy depressions. In particular additional sites located within the Moose Wood Sand Hills region are Bill Richards, Broadway Avenue, Lorne Avenue and Fitzgerald (Linnamae et al 1988). Located to the north and west of the Hartley site are the Dunfermline Sand Hills in which the Harder and Tschetter (Linnamae 1988: Linnamae et al 1988) sites are located, again winter occupations in brushy or wooded depressions. These sand dunes are remnant of deltaic deposits formed as the South Saskatchewan River emptied into Glacial Lake Saskatoon 11,500 years ago (Skawara 1988: 34). The sand dunes can have a moderate to steep slope. The soils are generally described as sandy Regosolic soils. Dark Brown sandy loam soils are present in the northern part of the area and are on a gently undulating glaciofluvial landscape (Acton et al 1998:142-151). Much of the region has been dramatically changed from its' original state by the practice of agriculture with 80% of this ecoregion currently under cultivation. Only 40% of the Moose Wood Sand Hills is cropland with the remainder of the land being pasture and rangeland (Acton et al 1998:142). Except for changes as a result of agricultural practices it is likely the Hartley site floral community and the sites environs look much the same today as it did at the time of occupation since the climate is essentially the same (Beaudoin 2003; Wendlund 1978: 281).

The closest permanent water source to the Hartley site is the South Saskatchewan River which is about 5 km away in a west northwest direction(Clarke 1995:14). There are also a number of sloughs which are within a couple of kilometers of the site; one slough in particular is located 700 m southeast of the site (Clarke 1995:14; Meyer 1990b).

Much of the area is at 530 m asl except the lower lying plains next to the South Saskatchewan River which are at 490 m asl. The elevation at the site is 509 m asl (Meyer 1990b).

2.2 Climate

The Moist Mixed Grasslands ecoregion has a climate that is classified as Dfb subhumid continental according to the Köppen Classification (Lundqvist 1999:118-119). This is humid continental with cool summers (Lundqvist 1999:118-119). There are marked temperature extremes with the mean January temperature being -16.7° C while the mean July temperature is 18.4°C. The majority of the annual precipitation occurs between May and September during which time 240 mm of the annual 383 mm of precipitation accumulates. There are usually around 110 frost free days making for a short, but as the average temperature indicates, a warm summer (Acton et al 1998:118-119). Lundqvist (1999: 118) goes on to say that the Dfb area is also characterized by long cold winters. The prevailing wind direction for most of the year is from the west-northwest, however, in late winter and early summer the wind direction changes to a south-southeast direction (Lundqvist 1999:119).

The climatic episode at the time the site was occupied is known as the Neo-Atlantic period (Beaudoin 2003; Wendlund 1978:281). This period lasted from ca. A.D. 790-1100. It is thought that during this period the climate was similar to today's

and was moister than the preceding Scandic and succeeding Pacific episodes (Beaudoin 2003; Wendlund 1978:281).

2.3 Stratigraphy

The texture of the soils at most of the site has been characterized as sandy to sandy loam. The occupation layer is 12-22 cm thick (Meyer 1990a) and according to Meyer (1990a) has " ... a sandy loam texture and is dark gray to black in colour. It is typically located at a depth of 5 to 12 centimetres below the surface in the central area of the brushy area." The occupation layer is found deeper in the outer portions of the grove due to the wind blowing sediments there from the surrounding fields (Meyer 1990a). The northwestern area of the brushy depression is generally where the occupational layer is most deeply buried. Figure 2.2 is a stylized profile drawing of one unit in the brushy depression.

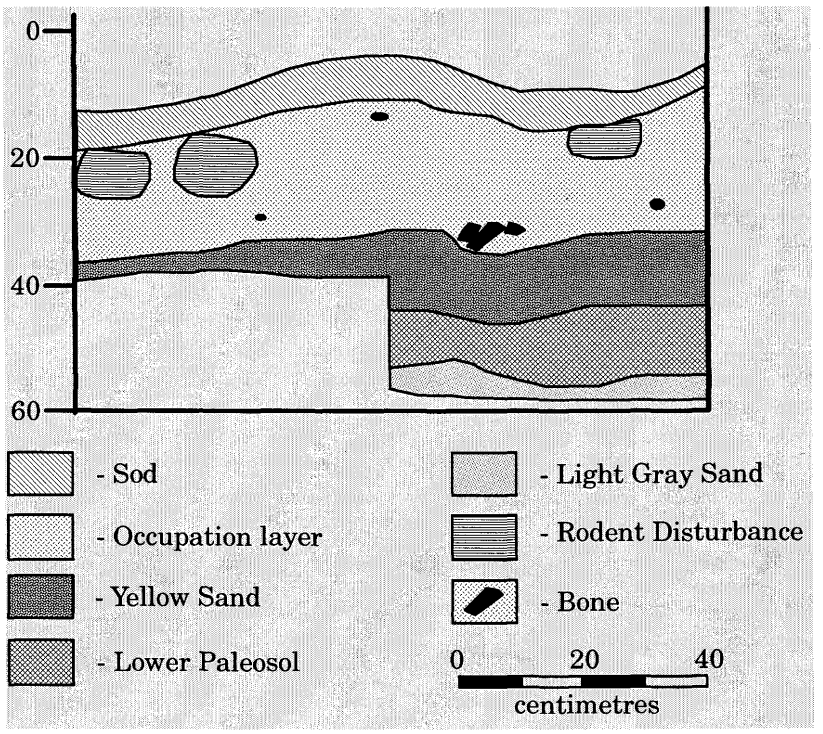


Figure 2.2 Stylized profile drawing of south wall of unit 295N 113E modified from Clarke (1995: 16).

Grant Clarke's 1995 thesis is based on materials recovered during the first three years (1988-1990) of excavations at the site. These excavations took place in the southwestern area of the site in a low, willow fringed area known as the 'brushy depression' (Meyer 1990a). In this area, Clarke (1995: 17) noted that there was a small amount of Mortlach material mixed with the Avonlea/Old Women's occupation, although he believed that the mixture was minor. There is no stratigraphic separation of the Avonlea/Old Women's material and following Meyer (1990b), Clarke feels (1995:3) that this is a culture in transition from Avonlea to Old Women's (see also Meyer 1997). Clarke (1995:17) notes that the projectile points (Avonlea and Prairie side-notched) characteristic of both phases are distributed evenly throughout this portion of the site. It is not unheard of to have both Avonlea and Prairie side-notched points material found together in the same occupation layer. Such sites include Long Creek (Wettlaufer 1960), Estuary Bison Pound (Adams 1977), Morkin (Byrne 1973), Gull Lake (Kehoe 1973), Bakken-Wright (Adams 1975) and Sheep Camp (Cazakoff 1986). In some cases, these may be actual transitional components, while others may be mixed components.

2.4 Chronometric Dates

There has been one radiocarbon date obtained at the Hartley site. The date of 1120± 60 B.P. (S-3382) is from an adult bison tibia, recovered in Unit 290N 106E. Calibrated, this radiocarbon date is cal. A.D. 762-1013 (p=1.00), the midpoint of which is A.D. 930 at 2 sigma (using the University of Washington Quaternary Isotope Lab Radiocarbon Calibration Program, Rev. 2.0 [1987]). A thermoluminescence date of A.D. 700±360 (DUR 93TL170-1Aspfg); has also been

obtained. This date was obtained from a sample of fired, consolidated soil from the hearth in Unit 290N 106E. The standard deviation for the thermoluminescence date is not as refined as the radiocarbon date, but the two appear to be similar in age. The sample was processed by the laboratory at Durham University, England (Clarke 1995:17-18).

2.5 Culture History

During the field schools, substantial amounts of raw, burned, and calcined bone were excavated. Other artifacts recovered included lithic tools, lithic debitage, potsherds, and fire-cracked rock suggesting a base camp with bison bone processing (Meyer and Clarke 1991: 8). Initially, a mixed Avonlea/Old Women's occupation was identified by the recovery of Avonlea type projectile points along with Prairie side-notched points and pottery sherds (Meyer 1989:8). As Meyer (1995:5) states though, "the Hartley site assemblage…is curious. It contains equal numbers of Avonlea and Prairie Side-notched points, as well as some points that are typologically intermediate…." Meyer's (1997:5) eventual interpretation was that this is a transitional assemblage between the Avonlea and Old Women's phases, the latter dominated by Prairie side-notched projectile points and coarse, thick pottery.

2.5.1 Miniature Projectile point

The description and metric analysis (Table 2.1) of the miniature projectile point that follows were completed with the assistance of a fellow graduate student, Barbara Neal.

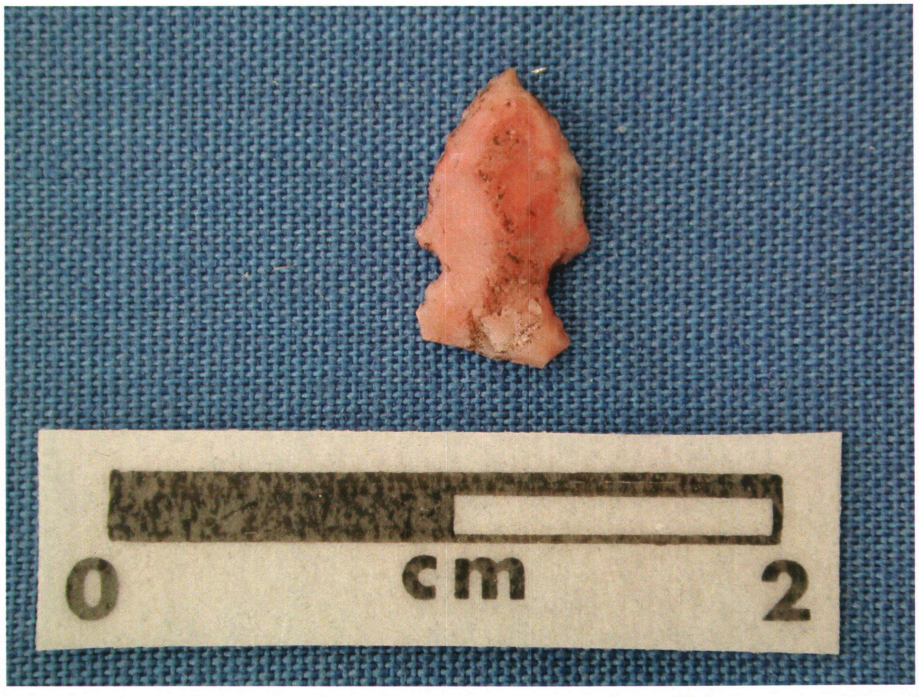
Table 2.1 Projectile point, metrics (Personal Communication Barbara Neal 2002).

Total length	9.10 mm
Width of body	5.45 mm
Width of neck	3.47 mm
Width of base	4.87 mm
Width of right notch	2.87 mm
Depth of right notch:	1.30 mm
Basal edge height (right	1.55 mm
Maximum thickness:	1.43 mm
Weight	less than 1.0 gram

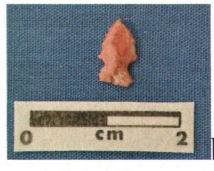
The projectile point was recovered from level four of Unit 295N 112E (Figures 2.3 and 2.24). It was found during the examination of the fine screen samples under the dissecting microscope. The miniature point is composed of heated Swan River Chert. The triangular body is slightly asymmetric with side notches, contracting basal edges, and a straight unfinished base. The cross-section retains the shape of the flake on which the point is manufactured: it is incurved ventrally and domed dorsally. The dorsal surface retains an arris. There is well-patterned unifacial, dorsal retouch along both lateral edges. The right side of the point as illustrated shows thinning flakes which extend past the lateral margin of the form to the medial axis. The retouch has created an uneven lateral edge along both sides of the point body. A single flake removal has created the left notch while multiple flake removals formed the right notch. The relatively straight basal margin is the result of the flake's shape and shows no human modification.

Dawe (1997) has reported the presence of toy projectile points in assemblages but none are quite this tiny. Regardless, it is a significant addition to the fine screen

assemblage and although diminutive, it conforms to the attributes of the Prairie Side-notched point type.

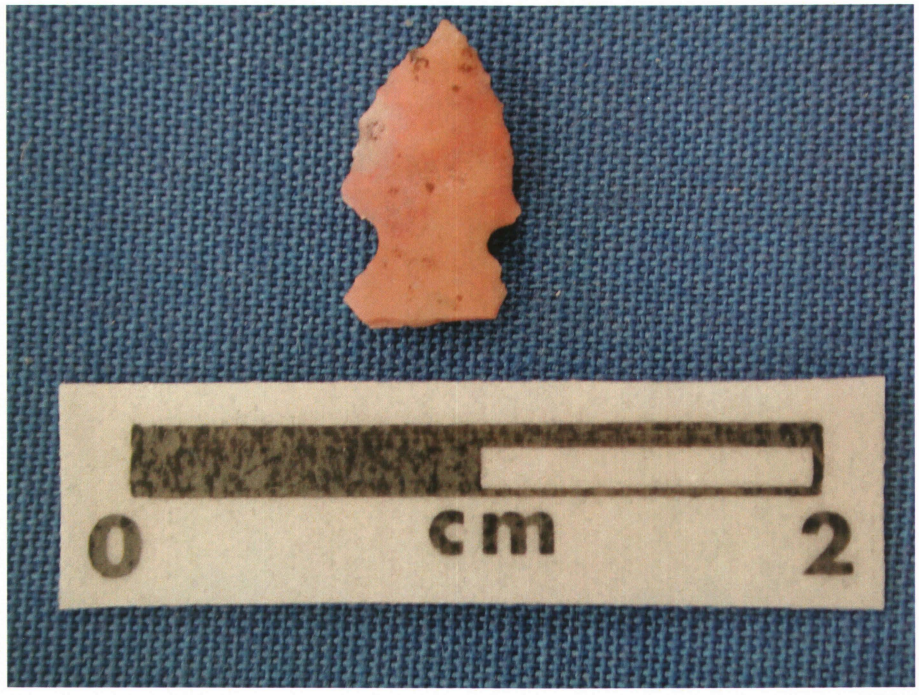


a.



b.

Figure 2.3. Dorsal surface of projectile point (# 488), showing arris, a. enlarged to show detail, b actual size.



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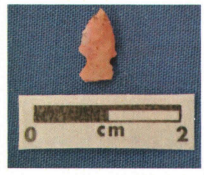

b.

Figure 2.4 Ventral surface of projectile point (# 488), a. enlarged to show detail, b. actual size.

An intact occupation layer identified by Millenium Consultants (Amundson and Kelly 1988) is situated in the field southeast of the brushy depression. Under Meyer's direction, this area was tested in 1992 (Figure 1.4) and the recovered artifacts were identified as Mortlach rather than Avonlea/ Old Women's Phase (Clarke 1995). These recovered artifacts included Plains Side-Notched projectile points, Mortlach potsherds, one iron projectile point, and a fragment of a sheet of copper or brass (Clarke 1995:12). For the most part, Clarke observes that the Mortlach occupation of the Hartley site is on the eastern and southeastern part of the site where it is separate from the Avonlea/Old Women's component. He notes that there is overlap of Mortlach and Avonlea/Old Women's material in the central part of

the site (Figure 2.5). Fortunately, however, in this central part of the site the Mortlach occupation was very light (Clarke 1995).

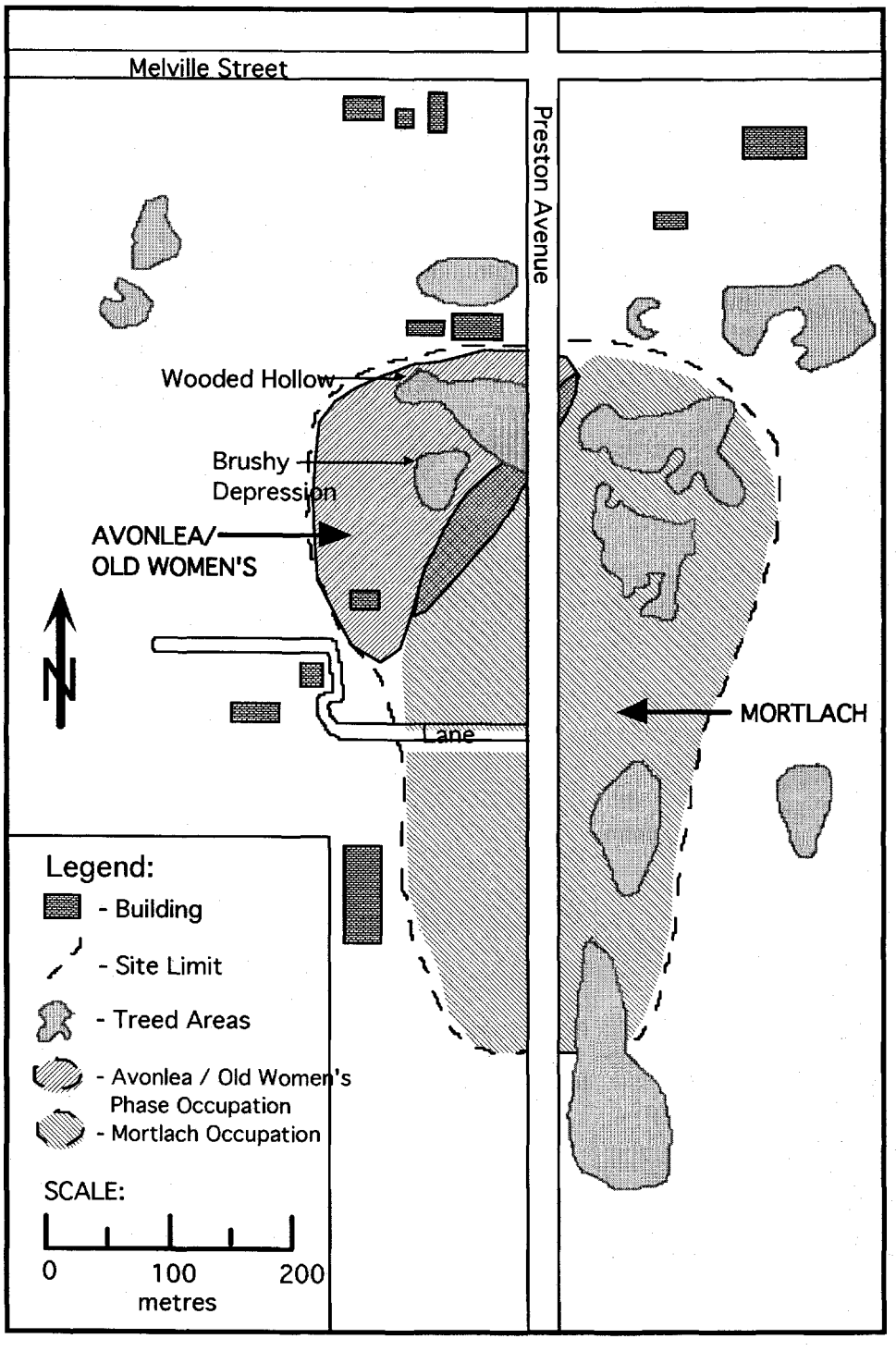

Figure 2.5: Map showing the distribution of Old Women's /Avonlea and Mortlach phase occupations at the site (modified from Clarke 1995:13 with permission).

Although there are two occupations here, the recoveries are treated as relating to the earlier Avonlea/Old Women's occupation since the Mortlach materials are sparse. This is the same approach taken by Clarke in his thesis.

2.6 Flora before and since agriculture

Some sources show the Saskatoon area as within the Aspen Parklands region (Thorpe 1999: 133.136), while other sources (Acton et al 1998:142) have Saskatoon and area in the Prairie ecozone and specifically in the moist mixed grasslands. This variation reflects the location of this area on the southern edge of the aspen parklands and so it is transitional between the aspen parkland to the north and the mixed grassland to the south (Archibold and Wilson 1980; Bird 1961) (Figure 2.1).

The modern flora and fauna versus that which would have existed a millennium ago, differs for the most part because of changes in the natural environment due to cultivation and residential development. Many of the same species of plants would have been present, with perhaps the differences being in the percent present rather than in variety. This area is at the edge of the aspen parklands ecoregion and so one will find an alternation of woodland, shrubland and grassland. The treed patches here are found in small rings around sloughs (Acton et al 1998:144). Since settlement of the area, the naturally occurring fires have been reduced which has allowed the aspens to increase their prevalence southward (Acton et al 1998:144; Archibold and Wilson 1980).

2.6.1 Flora

The type of vegetation that grows in this ecoregion is dependent on the particular terrain present. The characteristic grasses for the Moist Mixed Grassland Ecoregion are the mid-grasses, northern wheatgrasses, speargrasses, and blue grama

grass (Acton et al 1998: 145). Grasses that dominate in sandy areas of the ecoregion are sand grass, Canada wild rye, Indian rice grass, and sand dropseed (Acton et al 1998: 145). Grasses such as little bluestem, western porcupine grass, that grow in the Aspen Parkland may also be present. Scrublands are also an important part of this landscape and can be found in depressions by aspen stands or associated with sandy soils (Acton et al 1998:144). Pasture sage is plentiful. Preferring the sandy areas of this ecoregion are the forbs hairy golden aster, skeletonweed and prairie sunflower (Acton et al 1998:145). There are a number of shrubs that prefer sandy soils, such as Saskatoon berry, western snowberry, chokecherry, prairie rose, creeping juniper, wolf willow, bearberry and dogwood (Acton et al 1998:145). Trees native to the area are trembling aspen, Manitoba maple, balsam poplar, green ash, cottonwood, and willow (Clarke 1995:19) (Acton et al 1998:1445) . Much of this flora can still be seen here today (Meyer and Clarke 1991). Appendix I has a listing of the flora and fauna of this ecoregion complete with common and Latin names. Aboriginal peoples valued treed areas because they provided shelter from the elements (Epp 1991). Other plants and trees were used for medicinal purposes, as food sources, for fuel or as raw materials for tools such as arrows or bows and for building dwellings (Epp 1991).

2.6.2 **Fauna**

This ecoregion is quite diverse in the number and type of fauna it supports. The main food source in this region was the bison. Other large mammals were also important to the subsistence economy; these included elk, mule deer, pronghorns, bears and canids. Smaller mammals were also included in the diet, such as rabbits, hares, ground squirrels, birds (including eggs) and fish (Epp 1991).

Due again to agricultural settlement there are fewer species present at this time. The species most affected by the increase in human population were the larger mammals such as bison, wolf, elk, swift fox, and grizzly bear. Currently, some 51 species of mammals live in the grasslands of southern Saskatchewan with the big brown bat, porcupine, white-tailed jack rabbit, snowshoe hare, prairie and meadow voles, northern grasshopper mouse, and other mice and voles being predominant (Acton et al 1998: 145). Other mammals that are in the region at this time include the striped skunk, coyote, least weasel, red fox, mule and white-tailed deer, pronghorn, and cougar (Acton et al 1998:145-146; Banfield 1987). During pre-contact times the bison dominated this landscape, likely accompanied by elk, pronghorn, and mule deer. The large number of bison that were present also brought a number of their main predator, the plains wolf (Acton et al 1998:122).

A recent study of birds in the area recorded 196 species, six of which were introduced species. Of these, 92 breed in the area and ten reside there all year long. Of the remainder, 73 are termed "spring and autumn transient" (Acton et al 1998:146). Bird remains recovered from archaeological sites can be interpreted in a variety of ways. Birds such as the blue winged and green winged teals may have been important because of their plumage; the plumage of eagles is often used in ceremonies, as were bird skins (Epp 1991). Waterfowl in particular and their eggs were consumed (Epp 1991).

There are five snakes, six frogs and toads, one turtle, and one salamander that live in this ecoregion according to Acton et al (1998:146). There are three frogs (boreal chorus frog, Northern leopard frog, and wood frog) and a toad (the Canadian toad) that live in the area of the site. There is one salamander, the tiger salamander.

The reptiles are represented by two snakes: the western garter snake and the red-sided garter snake (Didiuk 1999:144).

The number of fish species in the mixed moist grasslands is somewhat lower than in the aspen parkland with 41 species versus the 47 in the parklands (Acton et al 1998:146). The nearest water source to the site is the South Saskatchewan River and it is unlikely that there were other water sources here large enough to have supported fish. The most prevalent game fish that inhabit the waters in the ecoregion area are walleye, yellow perch, northern pike and burbot (Acton et al 1998: 146). There are also sturgeon, goldeye, sauger and suckers in the South Saskatchewan River. The river is close enough (within 5 km), that fish could have been easily transported to the site on occasion.

2.7 Regional context and other fine screen or small mammal recovery analysis comparisons; the Thundercloud site (FaNp-25), the Sjovold site (EiNs-4) and the Redtail site (FbNp-10).

Three sites from Saskatchewan were briefly reviewed because of the fine screen analysis done at them or because of the small mammal remains recovered. Few sites on the northern plains have had fine screen analysis completed. Section 2.7.4 outlines the current state of fine screen collection and analysis.

2.7.1 Thundercloud site (FbNp-25)

One other site in Saskatchewan has had extensive fine screen analysis done: the Thundercloud site (FbNp-25) (Webster 1999). Webster speaks favorably of the utility of the fine screen analysis done at the Thundercloud site. Webster utilized a classification system based on live weight for faunal remains which could not be identified to taxon. These were designated size class 1-6 (SC 1-6), with 1 being the

smallest (Webster 1999: 40). The mammal size classes were based on Dyck and Morlan's (1995) classification. In his Table 12.2 Webster (1999: 201) compares the total number of identifiable elements for larger mammals to the total number of identifiable element for mammals, size class 3 or smaller. Fifty-one percent of the identifiable elements were from mammal size class 3 or smaller; these elements would not have been recovered using a 1/4 inch screen (Webster 1999:201). Webster says that while the fine screen sample results definitely increased the number of identifiable elements, they are not necessarily part of the cultural assemblage. "Some of these elements may represent animals which died during the time of occupation and are part of the background fauna... (or they) may represent intrusive elements (Webster 1999: 198)." In determining whether or not a particular element is part of the cultural assemblage Webster looked at the elements for evidence of burning, their location in or near a hearth, and their state of preservation compared to the rest of the assemblage. From there he continued with refining his interpretation by utilizing Morlan's (1994) taphonomic signatures for determining cultural utilization. Morlan's criteria also include burning, tooth marks, digestive marks and cut marks as criteria to decide whether or not an element is part of the cultural assemblage. Taphonomic signatures such as digestion are seen as ruling out cultural activity; they are due to other prey activity. So, Webster (1999) reassessed the fine screen materials and based on a combination of two or more variables as per Morlan (1994) found that 346 of the 956 elements that were mammal size class 3 or smaller qualified as potentially culturally utilized.

2.7.2 The Sjovold site (EiNs-4)

At the Sjovold site (EiNs-4), the standard screen size of 6mm was used and no fine screening was carried out, however, a fair amount of small mammal material was recovered (Dyck and Morlan 1995). The following is a summary of the faunal analysis from the Sjovold site (EiNs-4).

All of the species represented by fish, amphibian and bird (except raven) bones recovered from the site still live in the area today (Dyck and Morlan1995: 137). The raven was likely important in the past as a scavenger that foraged at kill sites and campsites. Numerous eggshell fragments were recovered and their thickness measured. The thickness was used to approximate the size of bird represented. They are difficult to identify to order, but the thickness of the shells indicates that they were not from songbirds. The thicknesses were compared to known thicknesses of eggshells today and range in size from a small pheasant to a much larger swan. It is thought that the site inhabitants may have collected eggs to eat (Dyck and Morlan 1995: 137)

Bone modification was extensively studied. The majority of the bone modifications were found on mammals larger than size class 2. Bone modifications found on the smaller elements (size class 2 or 1) for the most part consisted of rootlet etching. Both the number of specimens and the number of modifications increased with the increase in size class. For mammal size class 3 there were the following modifications recorded: burning, tooth marks, digested, etching and fracture states. For mammal size class 4 all of the above were noted as well as cut marks and weathering. The same can be said for mammal size class 4-5 except there were no

burned specimens. For birds, the modifications noted were few although tooth marks and rootlet etching and fracture states were noted. Recorded bone modifications on the amphibians and fish elements were even fewer with only etching and fracture states being present. Dyck and Morlan (1995:151) also noted that for size classes 1-3 most of the bones were either whole or were fractured when they were fresh.

2.7.3 The Redtail site (FbNp-10).

The Redtail site (FbNp-10) is also located within Wanuskewin Heritage Park north of the city of Saskatoon. During 1988 and 1989, fifty floatation samples were collected. The soil for floatation (Ramsay 1993:199) was placed in buckets with water that also contained 0.5 g/litre of dispersant (sodium hexametaphosphate "Calgon") to aid in the removal of clay from the sample. The floating organic material was then poured through a stack of soil sieves (mesh sizes 4.0, 2.0, 1.0 and 0.5 mm), this was called the light fraction. The heavy fraction consisted of the remaining residue and this was poured through a 1.0 mm mesh. Both fractions were dried on paper towels. The samples were sorted with a binocular microscope with magnification up to 100X. Bone, shell, charcoal, seeds and insects were separated.

Subsequently, in 1992, seven of these samples were submitted for analysis to Donalee Deck in Manitoba. Four of the floatation samples were from a hearth, one from a pit feature and one from a hearth/pit feature. Ramsay's (1993: 233) results are summarized here in Table 2.2.

Table 2.2 Summary of floatation sample artifacts from the Redtail site (FbNp-10), (Ramsay 1993:233).

Category	Number
Flakes	21
Calcined bone	1310
Shell fragments	4
Gastropods	7
Insect remains	7
Ochre	31
Fungal Sclerotia	present
Charcoal	220
Charred seeds	present
Identifiable bone	9
Bone fragments	317

There were 18 faunal specimens that were identifiable (Table 2.3). Eight of these specimens were likely frog, based on size; there was one rodent incisor fragment, one small mammal long bone fragment, a large mammal tooth fragment and seven gastropods. The seven gastropods represent two species; six specimens were complete and one was fragmented.

Table 2.3 Identifiable faunal specimens from floatation samples from the Redtail site (FbNb-10)).

Fauna	Number
Frog	8
Rodent	1
Small mammal	1
Large mammal	1
gastropods	7

2.7.4 Current fine screen utilization.

A brief electronic mail request was sent through the respective professional archaeology associations in Saskatchewan and Alberta to determine to what extent fine screening is carried out and the recoveries analyzed. Of the twelve respondents, six were in Alberta, five in Saskatchewan and one was from Ontario. All respondents routinely collect material for fine screening if it is felt that the time spent is warranted and some carry out the actual fine screening. Some simply collect the samples and save them in bulk for future analyses. Various methodologies and screen size are used and include window screen, which may be dry or water screened, 1/8" screens and geological screens. In three instances individuals have been or will be employed by consulting firms to analyze the material. Of the respondents two were associated with a university, one with a museum and the remainder with independent consulting companies.

Fine screening has been utilized for over 30 years; however; on the Northern Plains only selected samples have been analyzed. The cost of personnel to analyze the material and the potential for a great increase in the amount of time needed to do so, often make fine screen analysis unattractive and not feasible in consultant work. With many samples in existence there is much fine screen analysis waiting to be done.

2.8 Summary

This Late Precontact site is located in the south central part of Saskatchewan and has been known for many years. There are two occupations at this site, one an Avonlea/Old Women's transitional phase and the other a more recent Mortlach occupation. The Mortlach area of the site is mainly to the east and southeast of the Avonlea/Old Women's area. The site was extensively investigated from 1988-1995

during the years of the University of Saskatchewan's field schools. Most recently excavations took place there in July of 2003 by Stantec Consulting, as the area is slated for residential development. There is one radiocarbon date for the site and a thermoluminescence date. These indicate a date of occupation in the period ca A.D. 600-1000.

Climate in the site area has changed very little over the last 3000 years and the changes in the flora and fauna are mostly due to agricultural practices rather than a change in the environment (Beaudoin 2003; Wendlund 1978) Therefore, environmental conditions at the time the site was occupied would have been very similar to those known historically in this region.

The miniature projectile point provides a new and interesting addition to the lithic assemblage for this transitional Avonlea/Old Women's site.

Fine screening has been utilized for a number years but the recovered material is not often analyzed. Recently however, some consultants have deemed the potential results important enough to employ fine screen analysts.

Chapter 3

Site overview and research methods

3.1 Introduction

"Go confidently in the direction of your dreams. Live the life you have imagined."-Henry David Thoreau (1817-1862), writer.

Much of the site has been under cultivation for many years and consequently is disturbed. There is, however, an intact buried component surrounded by willow trees in an area known as the "Brushy Depression"(Figure 1.2). There was a second undisturbed area identified by Millenium Consultants in the depression which extended eastward from the Brushy Depression (Amundson and Kelly 1988:13). As previously discussed, the "Brushy Depression" (Meyer 1990a) was the location of most of the University of Saskatchewan's Department of Anthropology and Archaeology field schools here from 1988- 1995 (Clarke and Meyer 1992; Meyer 1989, 1990a, 1994, 1995; Meyer and Clarke 1991, 1993).

Rodent burrowing is usually present at archaeological sites on the Plains and can make interpretation challenging. While there has been much written on the subject, the conclusions are usually simply that rodents take artifacts out of an occupation layer and bring artifacts in as well. So, there will be mixing of the artifacts when there is rodent burrowing (Bocek 1986; 1992; Erlandson 1984). The conclusions drawn in this thesis partly take this mixing into account and present the data with this in mind

3.2 Screening methodology

The first field school held at the Hartley site by the University of Saskatchewan's, Department of Anthropology and Archaeology was in the fall of 1988 (Meyer 1989). In this first year 16.5 m^2 were excavated by natural levels and screened through 6 mm mesh screens (Meyer 1989). Indeed during all seven of the field schools held at this site, all excavated matrices were passed through 6 mm mesh screens. In the 1989 field season, 18 m^2 were excavated by arbitrary 10 cm levels, a practice that was maintained through subsequent field schools (Meyer 1990a). In 1989, two fish vertebrae were recovered prompting the decision to undertake systematic fine screening in 1990. This involved passing the dry matrix from the northeast quadrant of each unit through window screening (1.6 mm mesh) (Meyer and Clarke 1991). This methodology was continued in 1991 (Clarke and Meyer 1992) but in 1992 (Meyer and Clarke 1993) and 1993 the northeastern quadrant was water screened through window screen (Meyer 1994). Subsequently, water screening was abandoned because of its time consuming nature. Therefore, in 1994 and 1995 following the advice of Richard Morlan, the matrix from each northeast quadrant was dry screened by passing it through a 3mm (1/8 inch) screen (Meyer 1995).

3.3 Units Analyzed

The units analyzed were those adjacent to the two hearths encountered in the excavation block (Figure 3.1). The first area (Hearth Area One) includes seven units excavated in four different years; 1989 (290N105E), 1990 (290N106E, 289N105E), 1991(291N106E, 290N107E, 289N106E) and 1992(291N105E). These were all adjacent to a major hearth (Figure 3.1). This area includes units that were screened with two different techniques: dry screen and water screen through window screen

(1.6mm). A complete listing of the units, the year excavated and the methodology used is presented in (Table 3.1).

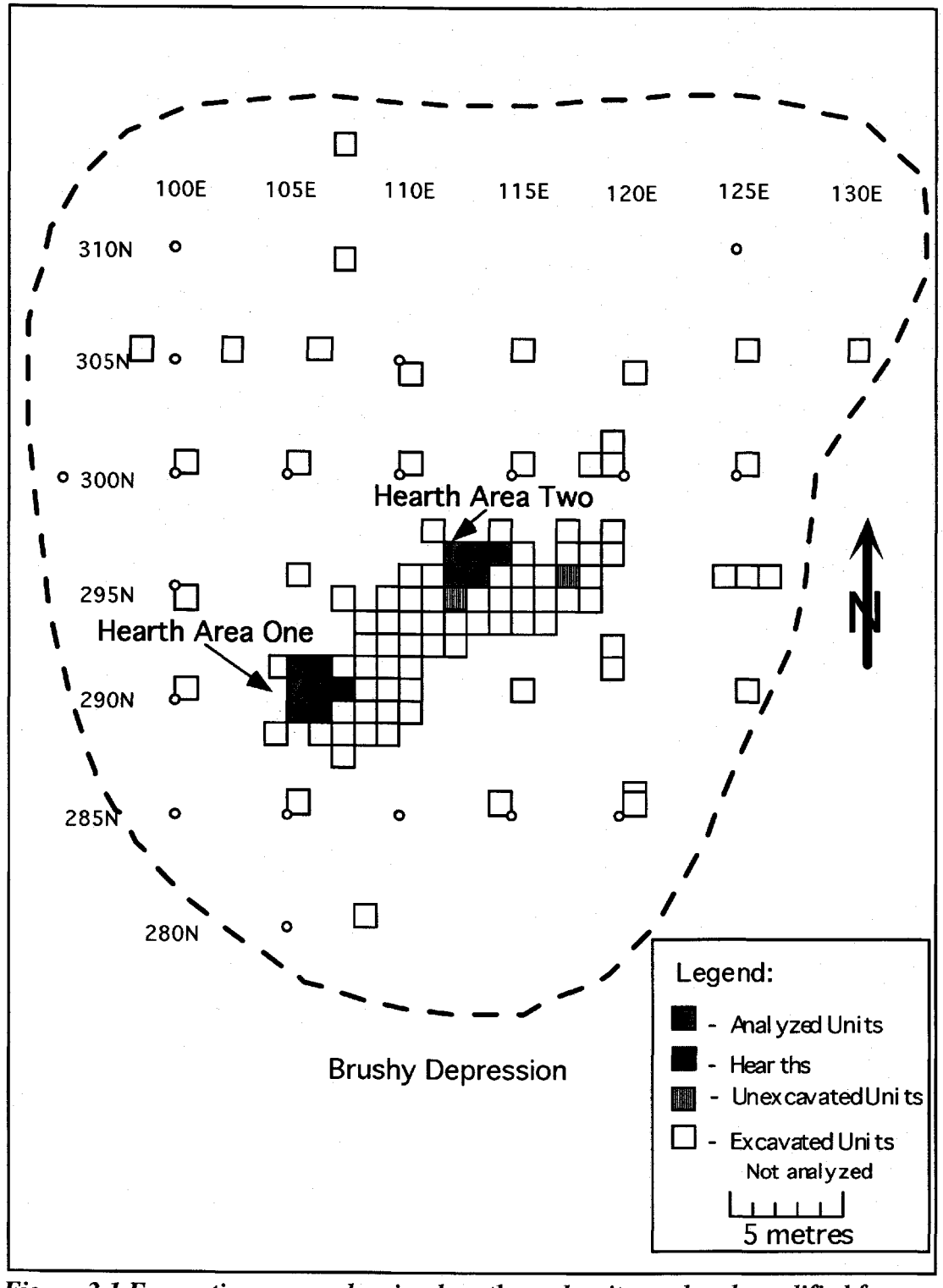

Figure 3.1 Excavation areas, showing hearths and units analyzed, modified from Clarke (1995:9) with permission.

The second area (Hearth Area Two) includes 5 units that were adjacent to a secondary hearth. These were excavated in four different years, 1990 (295N113E), 1992 (295N112E and 296N114E), 1993 (296N 113E) and 1995 (296N113E). Water screening and dry screening were employed (Table 3.1 provides details).

Table 3.1 Units analyzed, screening method and year of excavation

UNIT	*YEAR EXCAVATED*	*SCREEN TYPE*
Hearth One		
289N 105E	1990	6mm & dry1.6mm
289N 106E	1991	6mm & dry 1.6mm
*290N 105E	1989	6mm & dry1.6mm
*290N106E	1990	6mm & dry 1.6mm
290N 107E	1991	6mm & dry 1.6mm
291N 105E	1992	6mm & water 1.6mm
291N 106E	1991	6mm & 1.6 mm dry
Hearth Two		
295N 112E	1992	6mm & water1.6 mm
295N 113E	1990	6mm & dry 1.6 mm
*296N 112E	1995	6mm & 3mm dry
*296N 113E	1993	6mm & 1.6mm water
296N 114E	1992	6mm &1.6mm water

3.4 Methodology used in the fine screen sorting for this thesis

Standard sorting techniques were used to isolate potentially identifiable material from the fine screen samples collected during the field schools. It was decided to concentrate on the occupation layer adjacent to the two hearths which were exposed during the field school excavations. For the purpose of this thesis potentially identifiable faunal elements were separated out. These were bone and gastropods. The seeds were also separated out, but they were not analyzed at this time. For the most part, unidentifiable fragments of bone, tooth enamel, and lithic debitage were not separated out.

3.5 Qualitative and Quantitative analysis

After the initial sorting of the artifacts, the qualitative part of the assessment began. These descriptive details included noting any modification to the bone such as weathering, digestion, tooth marks, burning, calcination, rootlet etching, cut marks and fragmentation (and if fragmented which portion of the element). The quantitative analysis took place after all the artifacts were catalogued. The artifacts were catalogued in Filemaker Pro for the Macintosh. The nature of the catalogue allowed the calculations to be done by hand, for the most part.

3.5.1 Terminology

Standard terminology is used in this thesis, much of it based on Grayson's (1984) work. The term 'specimen' is used when referring to a bone, a tooth or a fragment of bone or tooth, from an archaeological site. The term 'element' refers only to a complete bone or tooth from an archaeological site (Grayson 1984). As noted by Webster (1999: 38) there needs to be additional clarification of these terms depending on the particular material being dealt with. In this thesis, gastropods are dealt with and since they can be whole it would seem that they could be referred to as an element, but the definition of an element mandates that it be a part of a skeleton, which a gastropod is not. Therefore a single gastropod is a specimen in this thesis. Then there is the term fragment, used here as defined in part by Brink and Dawe (1989:80) to describe a piece of bone. As used here it includes gastropod shells that are unrecognizable as to their original form or element.

In terms of quantitative measures, two of the most common measurements of taxonomic abundance are NISP and MNE (Lyman 1994). There are a number of other abbreviations, too, that are typically used in faunal analysis. The use of N for number, however, will not be used in favor of the number itself. MNI stands for minimum number of individuals, MNE for minimum number of elements needed to account for the NISP, NISP for number of identifiable specimens and MAU minimum number of animal units. As Lyman (1994) discusses at great length, there are many problems with any of these quantitative measures, mostly with the different ways in which they can be manipulated. The MNI's in this thesis are calculated for individual species. Not all of these were necessary in this thesis but are included here for thoroughness. Other abbreviations that are used here are related to specimens that were unidentifiable to a specific genus. These specimens were simply classed by size, and more general categories were employed, such as mammal size class (MSC), or bird size class, (BSC), or other size class (OSC) the latter includes fish, reptiles and amphibians. These size classes were modified after Webster (1999) and Thomas (1969) (Table 3.2).

3.6 Summary

The University of Saskatchewan held archaeology field schools at the Hartley site from 1988 until 1995. During this time a variety of fine screen techniques were used. The fine screen material from the hearths and adjacent units were analyzed for a total of twelve units. Standard quantitative terminology was used as well as a modification of a more general size class system for unidentifiable specimens

Table 3.2 Vertebrate size class list, modified from (Thomas 1969) and (Webster 1999).

Size class	weight	Other terms	examples
MSC6	200-700 kg	very large mammal	Bison, elk
MSC5	25-200 kg	Large mammal	Wolf
MSC4	5-25 kg	Medium mammal	Coyote, badger
MSC3	700-5000 g	small-medium mammal	Hares, fox, skunk
MSC2	100-700 g	Small mammal	Ground squirrel
MSC1	<100 g	Micro mammal	Mice voles
BSC5	---	Large bird	Crane
BSC4	---	Medium bird	Raven
BSC3	---	Small to medium bird	Duck
BSC2	---	Small bird	Robin
BSC1	---	Micro-bird	Warbler
OSC2	---		fish
OSC1	---		Salamanders, frogs, fish, toads

Chapter 4

Fine Screen Results and Assemblage comparison

4.1 Introduction

"Those who stand for nothing, fall for anything."

-Alexander Hamilton (1755-1804), Architect of the American Constitution.

This chapter presents results of the fine screen analysis and compares it to Grant Clarke's (1995) fine screen results. Clarke's other faunal results will also be considered. Included here is a detailed description of the faunal material and brief interpretations regarding seasonality, paleoecology, and subsistence practices at the site. These will be covered in more detail in Chapters 5 and 6.

Shaffer (1992b) discusses the biases of quarter inch screening at some length. He points out that specimens from mammals of less than 140 g live body weight are lost when only quarter inch screening is used. There have been numerous articles written regarding screen sizes and the recovery rate of small mammals and plant remains, all of them recognize that the recovery rate will be increased with smaller screen sizes (Bobrowsky 1987; Gordon 1993; Sanchez 1994; Struever 1968; Wagner 1982). The reason for doing such analysis or not doing fine screen analysis varies. In 1968 Struever acknowledged the limited amount of plant remains recovered with the standard 1/4 inch screens and advocated the use of smaller screen sizes to prevent

"bias to hunting rather than natural plant collecting". His reason for using smaller screens was not to recover small mammal remains but rather to recover plant material. Often the main reason for not carrying out fine screen analysis is because of its time consuming nature which is a valid concern. Whether or not to do fine screen analysis is dependent on what information the researcher wishes to gather from the assemblage.

Morlan (1994) states that in interpreting fine screen rodent material a specific charring pattern on the remains may indicate their use as a food source. Morlan describes specimens from the Tipperary Creek site (FbNp-1) that were from a Richardson's ground squirrel recovered near a hearth. The "bones are intact... (and have) charring on the incisor teeth and the distal phalanges", such charring only on the extremities indicates that the other bones were protected by flesh and skin during exposure to the hearth (Morlan 1994: 139).

Two separate hearths and their surrounding units were analyzed for this study. These two areas are designated as Hearth Area One and Hearth Area Two (Figure 3.1). The units chosen to be studied either incorporated the hearths directly or were adjacent to them. Only the occupation level was analyzed. Excavated levels above and below the occupation level were excluded.

4.2 Fine screen sorting methodology

The fine screen samples were examined under a dissecting microscope and any specimen that was potentially identifiable was removed from the sample for further study. All specimens were evaluated according to Morlan's (1994) classification of bone modification designed to aid in the interpretation of rodent

bones. These modifications include: 1. completeness or portion of element, 2. fracture state, 3. tooth marks, 4. digestion, 5. cut marks, 6. burning, 7. weathering, 8. rootlet etching, 9. other. One other category of bone modification that was included was no modification or staining. Although Morlan (1994) does include staining in his category 9- other, it was felt that this should be a separate and distinct category and not simply placed in the 'other' category. Although Morlan (1994:137) interprets lack of rootlet etching as an indication of remains from a burrow context, only one or two specimens in this assemblage showed any signs of rootlet etching and it is not felt that all of these remains are from a rodent burrow context. With regard to the interpretation of subsistence practices, it is felt by Morlan (1994) that a primary indicator of subsistence utilization is charring. The decision as to whether or not to include a particular specimen as part of the pre-modern assemblage was determined by the staining of a specimen, suggested by Morlan (1994) as indicative of it being part of the archaeological assemblage. A specimen with no staining and no burning, regardless of its completeness, was interpreted as being modern and not part of the archaeological assemblage. Evidence of digestion was seen as a probable indicator of carnivore activity (Morlan 1994:138).

4.3 Hearth Area One: Fine Screen Faunal Assemblage

Seven units from the area of hearth one were analyzed. In total, 255 faunal specimens were recovered from Hearth Area One, excluding gastropods which numbered 442 (Table 4.1).

Table 4.1 Table showing all fauna for Hearth Area One.

	Hearth 1		
	NISP	MNI	B
Bison	7	2	1
Ind MCS6	2	1	0
Canis spp.	3	1	2
Lepus spp.	5	1	4
Richardson gs	7	2	4
Spermophilus	28	1	10
MSC2unk	49	1	17
Meadow Vole	4	1	0
Grasshopper mouse	0	0	0
Gapper's vole	0	0	0
Mouse	0	0	0
Microtus spp.	14	1	2
MSC1 unk	69	Unk	13
Bird	12	Unk	0
Wood frog	1	1	0
Salamander	2	1	0
Snake	1	1	0
Fish	29	1	6
OSC1 unk	3	Unk	0
Unknown	21	Unk	0
Gastropods	442	unk	unk
MSC3 unk	0	0	0
BSC2 unk	1	0	0
MSC4 unk	1	0	0
Total	255		59
+ gastropods	697		

Order Artiodactyla MSC6

Probable Bovidae
Bison bison
Bison
Identified Specimens: NISP 7 MNI 2

Material: Six of the specimens are auditory ossicles. Three specimens represent the incus and are consistent with the size of those from the bison. One is burned, one is of the color and texture to suggest that it is part of the archaeological assemblage and

one shows no modification. Two specimens are mallei (plural of malleus) both are consistent in color and texture with the other specimens in the archaeological assemblage. There is one complete immature incisor which is stained. Another fragmented auditory ossicle is present.

Distribution and Habitat: The bison is the largest North American land mammal. Females weigh around 408 kilograms while large males can reach up to 544 kilograms. The distribution of the bison at one time included most of central North America. Bison are gregarious and will travel together in herds and migrate according to the season (Morgan 1979; Roe 1970). They are for the most part diurnal, feeding morning and evening. Like other ruminants bison spend a portion of their day chewing their cud. They are a grazing animal and while their mainstay are grasses and sedges they will also consume berries and lichen. They inhabit a great variety of habitats from grasslands to coniferous forests. The reproductive cycle of the bison is important archeologically for assessing site seasonality. For modern bison, the rutting or breeding season, lasts from early July to late September. The gestation period is from 270-300 days. Therefore the calves could be born anytime from April to July (Banfield 1987), although the peak is during the first part of May.

Analysis & Interpretation: The identification of bison in the fine screen assemblage is interesting, but it does not provide any new information regarding species present at the site or of the site seasonality.

Indeterminate Artiodactyl
Identified Specimens: NISP 2 MNI 1

Material: These specimens are fragments of artiodactyl teeth with no modification.

Order Carnivora

Canidae
Canis sp
Identified Specimens: NISP 3 MNI 1

Material: One specimen is a lower right canine consistent in color and texture with the rest of the precontact assemblage Two specimens are burned- an incisor tooth root and an occipital condyle.

Distribution and Habitat: Members of this family are found throughout Canada and the United States. These specimens could belong to any number of canids including the domestic dog.

Analysis & Interpretation: Since these are stained they are likely part of the archaeological assemblage. Canids do not hibernate and the presence of these specimens does not provide any information regarding seasonality. The presence of burned specimens suggests use as a food. Canids may have also been procured for their pelts and tails.

Order Lagomorpha

Leporidae
***Lepus* spp.**
Identified Specimens: NISP 5 MNI 1

Material: Two specimens are burned, a left upper premolar and a 2nd incisor. Both are consistent with the size of the jackrabbits in the comparative collection. Three specimens are from indeterminate leporids; two are burned while one is stained. These specimens could be either species and were not diagnostic beyond genus.

Distribution and Habitat: Two leporids are currently common to the site area the snowshoe hare and the white-tailed jackrabbit (Acton et al 1998). The snowshoe hare,

Lepus americanus is common in forested areas throughout Canada. This hare is an average sized mammal with the total length being between 413-518 mm and they weigh between 1.42 – 1.55 kg. These leporids are crepuscular and nocturnal, meaning they are active at twilight and during the night. They do not hibernate. During the summer months the hares eat a variety of grasses and forbs. In the winter, their favorite foods are willow, birch, maple, and trembling aspen bark and twigs. Hares prefer forests, swamps, and riverside thickets. On the prairies, they can be found in aspen "bluffs" (copses). These hares occupy a large range throughout Canada. There are 11 geographical subspecies (Banfield 1987).

White-tailed jackrabbits (*Lepus townsendii)* prefer cultivated areas as well as the short-grass sagebrush plains. This rabbit is much larger than the snowshoe hare. The typical range in length is from 495-695 mm and its weight varies from 2.6-4.4 kg. It is mostly a nocturnal creature and does not hibernate. For the most part these are solitary animals, but they can occasionally be found in small groups of three or four during the mating season. Their range may be larger than that of the snowshoe hare and their populations do not fluctuate as greatly as those of the snowshoe hare. Jackrabbits eat a variety of plants in the summer including grasses but are partial to vegetable greens. In the winter they eat bark, buds and twigs. This species inhabits the northern Great Plains of North America. In Canada, they are for the most part, confined to the prairie areas of Saskatchewan, Alberta and Manitoba. There are 2 subspecies in Canada (Banfield 1987).

Analysis & Interpretation :The burned specimens suggest that these animals were procured as a food source. They may have been acquired for their pelts as well (Hockett 1991).

Order Rodentia

Sciuridae
Spermophilus richardsonii
Richardson's ground squirrel
Identified Specimens: NISP 6 MNI 1

Material: Of the six specimens, two are charred, a left lower 2nd molar and a right upper 2nd molar. A fragmented premolar is calcined. The remaining three premolars are stained.

Distribution and Habitat: Described as "one of the most familiar small mammals of the Canadian Prairies" (Banfield 1987:114), this rodent is often referred to colloquially as a gopher. It is about 30 cm (12 inches) long and has short front and back legs. Average length of adults is about 285 mm with the average weight in the spring being about 405 g which increases over the summer to 485 g just before hibernation in the fall. This squirrel lives in loose colonies and will live in close proximity with other species such as the meadow vole depending on topography. Its activities are diurnal. The burrow of the Richardson's ground squirrel is rather complicated and can have up to eight entrances which may have blind passageways, a maze of galleries, and numerous chambers. In the winter months the burrows are deeper and the entrances to the hibernation area are plugged, making them difficult to find. The fact that they hibernate for 7 months of the year may provide information regarding seasonality of archaeological sites. Richardson's ground squirrels often

begin to hibernate as early as August, but the majority will be hibernating for sure by October. Their appearance in the spring is usually after the middle of March on the Canadian prairies. When they emerge is dependent on the weather; a warm spring can bring them out earlier. They feed on roots, leaves, and seeds of native grasses and forbs. In preparation for hibernation they begin to collect and store seeds. They may store these seeds in preparation for when they awaken in the spring. They also will eat grasshoppers and other ground squirrels. Their preferred habitat is one that is sandy or gravelly on the open prairie (for ease in digging burrows), and they avoid wetlands (Banfield 1987: 115-116).

Distribution: The central plains of North America. Distributed across the southern portions of the three Prairie Provinces (Banfield 1987:115-116).

Analysis & Interpretation: Regionally, Fine Screen analysis has been conducted at the Redtail (Ramsay 1993) and Thundercloud (Webster 1999) sites in the Wanuskewin Heritage Park; however, Koch's work is especially relevant here because of her interpretation of rodent material in relation to seasonality assessment. Koch (1995:48-55) in her work at the McIntosh site in Nebraska, warns that rodent remains may not be a reliable seasonality indicator and may only indicate when they were procured, however, she continues that the hibernating schedules of the small rodents suggest that the McIntosh site was likely inhabited during the warm months. None of the rodents that Koch (1995) analyzed were thought to be part of the cultural assemblage (1995:48). In contrast, the burned and calcined specimens in the Hartley site assemblage may indicate these were from animals procured as a food source.

The particular elements recovered fit nicely into the categories set out by Morlan (1994) for evidence of use as food items. The other specimens are stained and are likely contemporaneous with the precontact faunal assemblage. No other modifications were noted.

***Spermophilus* sp. (MSC2)**
Identified Specimens: NISP 28 MNI 1

Material: Fourteen specimens were burned: eight 1st phalanges, two 3rd phalanges , one 2nd phalange, one left tibia fragment, an incisor fragment and a left 3rd metatarsal. Fourteen specimens were stained: the proximal portion of a rib, a first phalanx, a molar, calcaneus, a distal end of a tibia, two incisor fragments, a 2nd upper right premolar, an indeterminate molar with very worn cusps, a dorsal fragment of a vertebrae, a fragment of a right innominate, and two 3rd phalanges. The rib fragment shows the characteristic pitting and thinning that may indicate carnivore digestion.

Distribution and Habitat: see above

Analysis & Interpretation : Although these specimens could not be identified beyond genus it is likely that they are *Spermophilus richardsonii* since this is the most common rodent of this size that resides in the area. One specimen that has no modification is likely a recent addition and not part of the archaeological assemblage. Several of the stained specimens are likely part of the background fauna present at the time of occupation, but some may relate to animals procured for food. The burned specimens were very likely from animals that were part of the diet (Morlan 1994).

MSC2 Indeterminate

Identified Specimens: NISP 49 MNI 1

Interpretation: Seventeen of these indeterminate MSC2 were burned, 29 were stained and three had no modification. Those with no modification are likely recent intrusive elements and are not part of the archaeological assemblage.

Family Cricetidae
Subfamily Microtinae
Microtus pennsylvanicus
Meadow vole

Identified Specimens: NISP 2 MNI 1

Material: There are two specimens. Both are stained and are considered to be pre-modern. One is a complete left M_1, another is a fragmented right M_1.

Distribution and Habitat: This medium-sized vole, Banfield calls the "ubiquitous 'field mouse' of most of Canada" (Banfield 1987 :209).The size of the vole varies depending on location and food availability. Maximum length is over 200 mm and the average weight is over 71 g. Meadow voles are diurnal. They do not hibernate and for the most part are terrestrial. This little vole prefers wet meadows, but will also inhabit grasslands and other areas as long as there is a protective carpet of grasses. It does not prefer to live in deep forested areas or high dry grasslands. The meadow vole is a very wide-ranging species across all of North America; there are 13 sub species within Canada (Banfield 1987: 210-211).

Analysis & Interpretation: There is no indication that these animals were part of the food supply, but they are considered part of the ancient background fauna due to their

staining which is same as the archaeological assemblage. There are no other modifications.

MSC1 Indeterminate
Identified Specimens: NISP 69 MNI unknown

Material: Unfortunately many of these specimens were very fragmented making exact identification impossible. Three of the 17 long bone shafts were burned as were six of the 17 incisors. Five of six phalanges were burned, a premolar was calcined and a tooth root and a molar were burned. The femur was burned as was one of the humeri. Two of the remaining specimens show signs of digestion from a carnivore and the remainder of the specimens are stained.

Distribution and Habitat: see above
Analysis & Interpretation: The burn pattern on these elements again fits well with those criteria set out by Morlan (1994) as an indicator for the dietary use of these animals.

MSC1

Microtus spp.
Identified Specimens: NISP 14 MNI1

Although these have been classified as MSC 1 they could also belong to MSC 2 and be smaller because of sexual dimorphism or because they represent younger animals. The burning pattern on a number of distal elements suggests some type of roasting process for eating (Morlan 1994).

MSC4

Indeterminate
NISP 1
Probable Mammal
Unidentifiable NISP 21 MNI Unknown
These specimens are unidentifiable.

Order Passeriformes

Emberizidae
Small birds BSC1
Identified Specimens: NISP 12 MNI unknown

Material: Twelve specimens were identified as belonging to bird size class one (BSC 1) and one specimen that was a little larger was tentatively assigned to size class two (BSC2). None of these were identifiable beyond the level of family. These specimens were consistent in size with the many birds that may live in the area throughout the year. One specimen showed no modification; the others were all the color and texture of the rest of the pre-modern assemblage.

Distribution and Habitat: There are a number of small birds that reside in the Moose Wood Sand Hills region.

Analysis & Interpretation: Since these specimens are stained they are likely the same age as the archaeological assemblage, but they appear to be a part of the background fauna.

BSC2
Indeterminate
NISP 1

There was one specimen that was slightly larger than the other bird specimens. The distal end of a right tarsometatarsus this element was stained. It was unidentifiable beyond size class.

Order Anura

Ranidae
Rana sylvatica
Wood frog

or
Rana pipiens
Northern leopard frog

Identified Specimens: NISP 1 MNI 1

Material: One specimen was identified, a stained whole vertebra. It was identified based on the morphology of the transverse processes.

Distribution and Habitat: The wood frog hibernates on land over winter under a layer of leaf litter and humus, whereas the Northern leopard frog hibernates by lying on the bottom of lakes or streams in the mud or sand in a shallow depression (Personal Communication Keith Roney 2003). Since there is no permanent water at the site it is thought that this specimen is from a wood frog, however; the Northern leopard frog could have been an extralimital species in this case. The wood frog resides in most of Saskatchewan except for the southwest portion of the province. The Northern leopard frog inhabits most of the province except for the most northerly edge. Amphibians avoid temperature extremes, and in order to keep their skins moist will bury themselves in cool mud in the heat of the summer and will do the same in winter to avoid the cold. They will hibernate simply below the leaf litter and humus and will often be insulated by a layer of snow (Personal Communication Keith Roney 2003). The wood frog, interestingly, is able to tolerate some freezing of its body fluids and, therefore, can hibernate closer to the surface (Didiuk 1999:143-144). Breeding takes place in aquatic environments in the spring. The wood frog begins breeding very early in the spring when snow and ice may still be present. How successful they are is dependent on the longevity of the water source (Didiuk 1999:143-144).

Analysis & Interpretation

The color and texture of this specimen implies that it is contemporaneous with the cultural occupation at the site. Presumably it is part of the background fauna.

Order Caudata

Ambystomidae
Ambystoma trigrinum
Tiger salamander
Identified Specimens: NISP 2 MNI 1

Material: Two vertebrae were identified; both were the color and texture of the rest of the assemblage and are consistent with the vertebral specimens in the comparative collection.

Distribution and Habitat: The tiger salamander resides in the southern third of Saskatchewan. The activity of an amphibian is governed by the air temperature since they are ectotherms. They estivate in the summer to avoid temperature extremes and hibernate in the winter below the frost line (Didiuk 1999: 143-144). This salamander will sometimes overwinter in burrows of pocket gophers or ground squirrels; alternatively, it will make its own burrow in which to hibernate (Personal Communication Roney 2003). Breeding begins early in the spring when water is available. (Didiuk 1999 :143-144).

Analysis & Interpretation

The staining on this specimen implies that it is contemporaneous with the cultural occupation at the site.

Order Colubridae

Genus Thamnophis sp
Garter snake
Identified Specimens: NISP 1 MNI 1

Material: The dorsal portion of a stained vertebra is present.

Distribution and Habitat: There are two species of garter snakes that live in the site area. The red-sided garter snake, *Thamnophis sirtalis,* inhabits areas that extend north of the site area while the plains garter snake, *Thamnophis radix,* is more of a southerly inhabitant in the province. *T. radix* is a frequent inhabitant of the Plains and prefers grasslands. *T. sirtalis* on the other hand prefers a wetter environment, being found in moist grasslands, by riverbanks, ponds and areas with heavy cover (Didiuk 1999:143-144). The recovered fragment of a vertebrae cannot be identified beyond genus.

Analysis & Interpretation: The presence of reptile remains, like the amphibian remains, suggests they died at the site in the spring, summer or fall. This specimen is not thought to be cultural but rather is part of the paleoenvironmental picture and background fauna. The garter snake requires a deeper overwintering site than the amphibians; they will find natural cavities such as rodent burrows or rock crevices that allow them to get below the frost line during the winter, some of which can be up to 10 feet deep (Personal Communication Keith Roney 2003).

Order Osteichthyes

Identified Specimens: NISP 29 MNI 1

Material: There are three vertebrae which are stained, as well as two teeth, one stained and the other burned. There are eight spines and fin rays - four of which were

stained and four that were burned — a stained dentary and one stained caudal plate. There were nine specimens that were unidentifiable.

Analysis & Interpretation: Many of these specimens were very fragmented, making definitive species identification impossible. There were no diagnostic specimens such as otoliths or scales. The presence of burned specimens indicates that these fish may have been subsistence items.

OSC1

Indeterminate
NISP 3

There were three specimens in this category but due to fragmentation they were not identifiable beyond size class.

Phyllum Mollusca

Order Mesogastropoda

Class Gastropoda

Family Vallonidae
Vallonia gracilicosta
Identified Specimens: NISP 825

Morphology: The shells are dextral and the umbillicus is slightly elevated. This particular species is identified by its thickened apertural lip (Forsyth 2004a). Most of the shells are quite tiny being 2.8 mm in width.

Material: There are 825 specimens. None of these have been burned or modified in any way.

Distribution and Habitat: *Vallonia sp* are a terrestrial or land snail and live across North America in a wide variety of habitats that includes leaf litter, under rocks, in

bark and dead wood. They will reside in dry or moist areas if they are well-drained (Forsyth 2004a; LaRocque 1953).

Family Planorbidae

.

Gyraulus sp
Also known as a Ramshorn Snail.

Morphology: These snails are planorbids (flat spire) and are dextral. The shell is 5-8 mm wide depending on the species (Clarke 1981).

Identified Specimens: NISP 3 MNI 3
Material: 4
Distribution and Habitat: These are a freshwater snail that will live in both intermittent and permanent bodies of water throughout Canada (Clarke 1981) .

Family Lymnaeidae

Morphology: These snails are described as lymaeaform or spiral shaped.

Distribution & Habitat: Lymnaeids are found across Canada (Clarke 1981:130-149). They are generally adapted to a semi-aquatic environment and some species live in lakes and rivers and other species can live in more temporary water sources such as ditches and marshes (Clarke 1981).

Material: 32 The *Stagnicola*, & *Fossaria* were grouped together for the count.
Possible ***Stagnicola caperata***

Distribution and Habitat: These are freshwater or pond snails. These snails are often found across the prairies from Manitoba to Alberta and most often are found in temporary water areas such as ditches and shallow pools. Some species of *Stagnicola sp.* are found in lakes and rivers (Clarke 1981).

Analysis & Interpretation: These specimens may indicate the site area was moister than today and may have included areas of standing water.

Stagnicola sp.

Distribution and Habitat: freshwater or pond snails. These snails are found across the prairies from Manitoba to Alberta. They are found in temporary bodies of water such as ditches and shallow pools. There are even some species that inhabit lakes and rivers (Clarke 1981).

Analysis & Interpretation: see above

Possible ***Fossaria*** fragment
Fossaria sp.

Distribution and Habitat: These pond snails are found in much of North America south of the tree line. They occupy perennial ponds, ditches and the vegetation in muddy areas (Clarke 1981).

Family Succineidae
Catinella sp.

Identified Specimens: NISP 1 MNI 1
Material: 1
Distribution and Habitat: These snails are wetland snail and may live in marshes.

Family Vertiginidae

Vertigo binneyana

Identified Specimens: NISP 49 MNI 49
Material: **49**
Distribution and Habitat: These are terrestrial snail and no other information is available.
Analysis & Interpretation: These snails are often mistaken for Gastrocopta but can be distinguished from them by the more cylindrical nature of *Vertigo sp.*

4.4 Hearth Area Two: Fine Screen Faunal Assemblage

Samples from five units from Hearth Area Two were available for analysis. A total of 228 specimens were recovered (Table 4.2), excluding gastropods. There were 469 gastropods recovered. The miniature projectile point was also recovered from this area.

Table 4.2 Table showing all fauna for Hearth Area Two.

	Hearth Area Two		
	NISP	MNI	B
Ind MCS6	7	Unk	1
	0		
Canis spp.	2	1	0
Lepus spp.	3	1	2
Richardson gs	3	1	1
Spermophilus	40	1	1
MSC2unk	0	1	3
Meadow Vole	13	2	0
Grasshopper mouse	6	2	0
Gapper's vole	3	1	0
Mouse	2	1	0
Microtus spp.	11	1	0
MSC1 unk	81	2	5
Bird	25	2	0
Wood frog	4	1	0
Salamander	2	1	0
Snake	0	0	0
Fish	13	1	0
OSC1 unk	1	1	0
Unknown	11	Unk	6
Gastropods	469	unk	0
MSC3 unk	4	1	2
BSC2 unk	0	0	0
MSC4 unk	0	0	0
Total	228		21
+gastropods	697		

MSC6
Indeterminate Artiodactyl

Identified Specimens: NISP 7 MNI 1

Material: These are all enamel fragments. They may be from any artiodactyl. Six of the specimens are stained and one is burned.

Order Carnivora

Family Canidae
Canis sp.
Identified Specimens: NISP 2 MNI 1

Material: One stained incisor MSC 3. One right, 3rd incisor root that is stained, MSC 3.

Distribution and Habitat: see hearth one.

Order Lagomorpha

Family Leporidae
Lepus spp.
Identified Specimens: NISP 3 MNI 1

Material: Two of the specimens are1st phalanges and they are calcined. The third specimen is a stained incisor.

Distribution and Habitat: See hearth one.
Analysis & Interpretation: These specimens are too fragmented to identify beyond *genus.*

Order Rodentia

Family Sciuridae

Spermophilus richardsonii
Richardson's ground squirrel
Identified Specimens: NISP 3 MNI 1

Material: All specimens were stained and consist of a left mandible with one 1st molar, a left 2nd molar and a left 1st premolar, lower.

Distribution and Habitat: see hearth one.

Analysis & Interpretation: It is thought that all of these stained specimens are pre-modern and are part of the background faunal assemblage since they are not burned.

MSC 2

Spermophilus sp.
Identified Specimens: NISP 37 MNI 1

Material: Nine of the specimens were burned or calcined, these consisted of three 1st phalanges, two of which were calcined, two 3rd phalanges, one of which was calcined, two long bone shaft fragments, a 3rd metatarsal and a 2nd metacarpal. Twenty-five specimens were stained. These fragmented specimens included: two incisors, five metapodials, six vertebrae, one calcaneus, five long bone shafts, one innominate, one right mandible, three 1st phalanges and a partial scapula. Two specimens, a 1st phalanx and a metatarsal, had no staining. One long bone shaft was both stained and digested.

Distribution and Habitat: see hearth one.
Analysis & Interpretation: All specimens except those with no modification are thought to be part of the archaeological assemblage. The burned specimens which for the most part are the distal limb elements, adhere nicely to Morlan's (1994) criteria for identifying the specimens as part of the diet at the site. The digested specimen likely represents carnivore activity.

Family Cricetidae

Subfamily Microtinae

Microtus pennsylvanicus
Meadow vole
Identified Specimens: NISP 13 MNI 2

Material: All of the specimens are stained and, therefore, likely contemporaneous with the archaeological assemblage. Over half of the specimens are teeth: there are two left lower 1st molars, two right 2nd molars - an upper and a lower - and three 3rd

molars, all lowers, with one being a right, one a left and the other too fragmented to determine side. There are two mandibular fragments, one left and one right, as well as a partial sacrum and two right proximal femoral fragments.

Distribution and Habitat: See hearth one for description.

Analysis & Interpretation: These specimens, because of their lack of burning, are likely part of the background fauna and their staining indicates they are the same age as the archaeological assemblage.

Clethrionomys gapperi
Gapper's red backed vole

Identified Specimens: NISP 3 MNI 1

Material: A 1st right lower molar and two 3rd molars both left, one upper and one lower.

Distribution and Habitat: The 15 subspecies of this common vole are found in areas of both brush and forest throughout Canada (Banfield 1987:180-181). The size of this prolific little vole varies greatly in its range area but Banfield (1987) gives an average weight of 13-42 g and length of 120-164 mm. During the winter months these voles like to congregate in large groups; however, during the summer, except for the females and their litters, they remain solitary. For the most part, these small rodents are terrestrial. Their activities are most brisk from sunrise to sunset. Since they do not hibernate, Gapper's red backed voles are active in all seasons. Their nests are constructed from the leaf litter and moss from their habitat area and may be under a log. Often rather than constructing new ones, they borrow tunnels, burrows, and nests of other species. Their range in the summer can be very large but it is much

smaller during the winter. This little vole is mostly an omnivore, whose diet varies depending on the season. Insects, however, are not one of their favorite foods. They will eat springtime shoots, summer berries, fall seeds and winter bark. They are also carnivorous and will eat other mouse carcasses. They do not cache much food for the winter. Their preferred habitat is forest, but, "on the prairies they are often found in aspen bluffs and shrubby vegetation in coulees" (Banfield 1987:181).

Analysis & Interpretation: It is thought that these stained specimens are part of the background fauna at the site at the time of occupation. These voles probably were not a dietary item and since they do not hibernate their presence gives no hint as to the season during which this site was occupied.

Microtus spp.
Identified Specimens: NISP 11 MNI 1

Material: All specimens except one of the M1's was stained. There were a variety of teeth: an M2, an unidentifiable molar, an incisor and a M1. There was also a vertebrae and a talus. All specimens were too fragmentary to identify beyond the level of genus.

Family Cricetidae
Subfamily Cricetinae

Onychomys leucogaster
Northern grasshopper mouse
Identified Specimens: NISP 6 MNI 2

Material: All of the specimens are stained. There are three partial mandibles and three 1st molars, one upper and two lowers.

Distribution and Habitat: Although not as common as many other species of rodents this species does have a wide range and is found in the Great Plains from the

Canadian prairies to the Gulf of Mexico (Banfield 1987:174-175). Average length ranges from 141-161 mm, and weight ranges from 41-52 g. This mouse often has much written about it because of its' carnivorous behaviour. On the Great Plains this mouse will rely on grasshoppers as its mainstay. This little mouse is nocturnal and does not hibernate.

Analysis & Interpretation: Since these specimens are stained but not charred, it is likely that they are not a part of the diet, but represent instead part of the background faunal assemblage in pre-modern times.

Family Muridae
Mus musculus
House mouse
Identified Specimens: NISP 2 MNI 1

Material: One mandibular fragment and one molar are both very light in color.
Analysis & Interpretation: These specimens are not part of the archaeological assemblage since the house mouse is an introduced species. These specimens are a very light color and so are a recent addition to the site.

Unidentified MSC1
Identified Specimens: NISP 81 MNI unknown
Material: These specimens were unidentifiable and consisted of pieces that were burned, stained, calcined or unmodified.

Unknown
Identified specimens: NISP 11
Material: These specimens exhibited a variety of modifications but were unidentifiable.

Unidentified MSC3
Identified specimens: NISP 4 MNI Unknown
Material :There are four specimens but they are unidentifiable.

Class Amphibia
Order Caudata

Family **Ambystomidae**
Ambystoma trigrinum
Tiger salamander
Identified Specimens: NISP 2 MNI 1

Material: Two stained vertebrae.
Distribution and Habitat: See Hearth Area One information.

Analysis & Interpretation: One of these vertebrae was recovered at the top of the occupation layer, while the other was in the next level down and so was within the occupation layer. Both specimens were stained. The vertebra recovered in Hearth Area One was located in level six and so was also well within the occupation layer. These specimens are not part of the cultural assemblage, but rather provide information on the microenvironment of the site.

Order Anura

Family Ranidae
Rana sylvatica
wood frog
Identified Specimens: NISP 4 MNI 1

Material: There were four specimens, all of which were stained. There are two vertebrae, one long bone shaft and a portion of the innominate, the acetabulum.

Distribution and Habitat: See hearth one.
Analysis & Interpretation: These specimens are not part of the cultural assemblage but may provide information on the paleoenvironment.

Class Aves

Emberizidae
Indeterminate bird

BSC1 warbler and sparrow sized
Identified Specimens: NISP 25 MNI 1

Material: Twenty specimens were stained which included a right and left carpometacarpi, a coracoid, eleven long bone shafts, a radius and six that were unidentifiable. Five specimens had no staining and are likely a more recent addition to the site. No specimens were burned.

Analysis & Interpretation: The size of these specimens are such that they could belong to any number of small birds that normally reside in the area.

Order Osteichthyes
OSC1

Indeterminate fish
Identified Specimens: NISP 13 MNI 1

Material: Thirteen specimens were identified as belonging to Osteichthyes. Two specimens had no staining and were not identifiable as to specific element. Eleven specimens were stained; these consisted of four vertebrae, three palatal teeth portions and four that were unidentifiable.

Analysis & Interpretation: Fish, (and other meat,) may be dried or boiled before consumption which would not produce any burning (Wheeler and Jones 1989). Once again these specimens are very fragmented and no diagnostic specimens are present. On the plains fish were generally avoided as a food source (Malainey2001).

OSC 1

Unidentifiable
NISP 1

Gastropods

For this analysis the gastropod descriptions were grouped together under the Hearth Area One presentation. However, in Hearth Area Two there were 469 gastropod specimens recovered. For species, habitat and description see Section 4.3.

4.5 Discussion

From the burned elements recovered in and around the hearth areas it is apparent that the occupants at the site were utilizing leporids, fish and rodents as a dietary addition (Hockett 1991; Morlan 1994).

Seasonality at the site as indicated by the *Spermophilus spp.* specimens suggests spring through summer because of their hibernation schedule. This is consistent with Clarke's (1995:124-125) thesis findings. The fish would only have been available after break up of the South Saskatchewan River .

The majority of the gastropod specimens are land snails, (825) *Vallonia gracilicosta* and *Vertigo binneyana* (49) (Forsyth 2004a). The other four identified to at least genus are wetland species. These will for the most part, live in intermittent or temporary bodies of water as well as lakes and rivers. The *Stagnicola sp* specimens, however, prefer a wetter environment than the other species and this may be indicative of a moister environment, with standing water present at the site (Clarke 1981). However, there are only 31 *Stagnicola sp* specimens.

4.6 Clarke's 1995 faunal assemblage

4.6.1 Bison

The majority of the faunal remains that Clarke identified were from bison. A total of 22,901 bison specimens were identified. Of these, 4,288 specimens were

complete or nearly complete (Clarke 1995:34). The MNI for the bison is 28, based on the number of identified petrous portions of the temporal bone. The MAU derived from the petrous is 26. The remainder of the bison assemblage was so fragmentary that the specimens were not large enough to be recognizable as to element (Clarke 1995: 37).

Fetal bison elements

The fetal elements were assessed in regard to gaining insight as to the seasonality of the site. The gestational age of the fetal elements from the site was based on a variety of parameters. These were degree of fusion of the metapodials and vertebrae, as well as a metric analysis.

There was some diversity in the fetal ages of the bison elements at the site. The ages ranged from 4.75 gestational months to 7 gestational months, which was the age of the largest femur.

Using fetal bison to assess the seasonality of a site is based on an understanding of the reproductive pattern of the bison. The rut, or breeding season, extends from July to September (Banfield 1987:403-407).Their gestation time is between 9- 10 months, with birthing beginning in April and continuing through June. There is often a peak in birthing in the first part of May. Considering that modern climatic conditions are similar to those at the time of occupation, it is assumed as well, that the reproductive schedule for bison is also similar.

Immature bison elements

Clarke also did a number of long bone measurements using procedures set out by Dale Walde (1994) specifically for fragmented bison remains. Much of the bison bone at the site was highly processed which necessitated a method that allowed for the measurements even with fragmentation. These ages imply that animals were procured in the month of March (Clarke 1995:45). Further in support of a winter occupation, specifically December through March, are other smaller and differentially fused fetal elements such as metapodials and vertebrae (Clarke 1995: 45-46). The overall age range for the bison was from 0.6 to 9.6 years of age (Clarke 1995: 55).

The site's bison assemblage analyzed by Clarke (1995) was consistent with a nursery herd because of the high number of fetal elements and adult females. There were also a few males represented which is often the case with a winter occupation. Clarke states that the bison remains suggest that the bison were hunted throughout the winter. The mandibles did not exhibit eruption and wear patterns that corresponded to a late winter or spring occupation and so seasonality assessment without the fetal remains would have been difficult (Clarke 1995: 57).

4.6.2 Grant Clarke's (1995) non -bison non-fine screen assemblage

Classification

In Clarke's 1995 thesis he identified 22 species of vertebrates and four genera of invertebrates (1995: 31). Rather than using the mammal size classes according to Thomas (1969), Clarke's classification of mammals that were unidentifiable beyond class level was based on qualitative terms. He used five classes based on live weight.

His classification was as follows: those mammals with a live weight of less than 100 grams are micro-mammals, those with a live weight of 100-700 grams are small mammals and those with a live weight between 700-5,000 grams are medium mammals. Those mammals weighing 5-25 kilograms are large mammals and those with a live weight greater than 25 kilograms are very large mammals. For Aves, Clarke (1995:31) simply placed them in small, medium and large categories and states that these categories are somewhat "more subjective than those used for mammals".

Overview

The mammals are the most diverse class of animals at the site and comprise 52% (N=14) of the identified species. There were seven species of birds identified, making them the second most diverse class. The gastropods comprise 19% of the assemblage and are not thought to relate to the cultural assemblage but rather are part of the natural environment. Fish and pelecypods each make up 4% of the assemblage. Ninety-eight percent of the identified specimens are bison.

In the fine screen sample that Clarke analyzed there were no fish, bison or bird remains. There were, however, a number of smaller mammal specimens. These included some specimens that could only be identified to the genus level *Spermophilus sp.* because they were for the most part postcranial. There were six *Spermophilus sp* elements which were burned. Ten specimens identified as *Clethrionomys gapperi* were recovered from the fine screen sample and it is interesting to note that this species was not identified from the coarse screen sample. One left upper molar is identified as *Microtus pennsylvanicus* and is unburned. Classified simply as small mammal were eight specimens from the fine screen

sample, two of which were burned. Thirty-three of the forty-one specimens classified as micro-mammals were recovered from the fine screen sample. Eleven of the elements from the fine screen are burned; there are no other modifications present on these specimens.

Gastropods

Sixty-eight percent of the gastropods were recovered from the fine screen material.

4.6.3 Seasonality of Non-bison remains

The avian specimens that could be examined did not contain any medullary bone and so this could not be used as a seasonal indicator (Clarke 1995:121. Lack of medullary bone may indicate that there were only male specimens present or that it is a non-breeding female (Rick 1975:188). However, the presence of migratory water fowl, the green and the blue-winged teals, provides a possible hint at the seasonality of the site. The green-winged teal may migrate as early as September and as late as November and return as early as April. Their migration times, though, are dependent on weather conditions. Clarke concludes that the avian remains suggest a seasonality of late April /early May to early November (Clarke 1995).

Based on the principles of Koch (1995:48), rough estimates were made on the site seasonality based on the rodent remains. Only one of the species of rodents recovered by Clarke (1995) at the site hibernates during the winter month, the Richardson's ground squirrel (*Spermophilus richardsonii).* A minimum of six individuals were present in Clarke's assemblage.

Clarke states that the seasonality suggested by the avian and rodent remains is somewhat different than what the fetal bison remains indicate, although the rodent

hibernation schedules overlap with the bison spring fetal remains. He states that none of the bison remains indicate that the site was occupied earlier than November, which is too late for the ground squirrels. The presence of northern pike also suggests an occupation of the site into the early spring. Therefore, Clarke (1995: 124) does not definitively establish the seasonality of the site.

4.6.4 Summary of the non-bison and fine screen material from Clarke's 1995 Research.

The faunal assemblage at the Hartley site contained a minimum of 22 species of vertebrates and four genera of invertebrates. This diversity Clarke (1995:118). says was in part due to the material recovered from the fine screen

One additional species of vole, the Gapper's red-backed vole, was newly identified in the fine screen sample. The number of micro-mammals recovered increased with the fine screen sample, but they were not identifiable beyond a general qualitative category. They were important to understanding the assemblage as a whole.

Using Morlan's (1994) bone modification scheme, Clarke assessed the fine screen assemblage in much the same way as the bison remains. These criteria allowed Clarke to sometimes eliminate certain specimens from being included in the Avonlea/Old Women's phase cultural material because they did not have the same bone modification as the rest of the assemblage. Three avian species were eliminated from Clarke's (1995:119) list of animals present at the site. These three were: the Domestic turkey *(Melagris gallapavo),* which is a modern introduced species, the Ruffed Grouse *(Bonasa umbellus)* and the Great Horned Owl *(Bubo virginianus)* . Both the Ruffed grouse and the Great Horned Owl are native to the area but were

considered not part of the Avonlea/Old Women's phase faunal assemblage because of the texture and condition of the bone. It may have been recently deposited at the site by predators.

The gastropods while not deemed to be cultural were important for other information that can be extrapolated from their presence. There were 86 specimens attributed to the *Vallonia sp.* This particular genus is quite diverse in its' geographic range and is often associated with treed or shady areas (Clarke 1995:116). Sixty-eight percent of the gastropods were recovered in the fine screen material.

Clarke cites several reasons that may account for the diversity of the culturally introduced fauna at the site. Some of the animals may have been procured for their plumage or pelts. Others may have been part of the diet. Only five of the twenty-two categories of mammals have no burned specimens. The categories *Vulpes sp,* medium mammal, *Spermophilus sp.,* small mammal and micro-mammal were all found to have large amounts of burned material. Clarke concludes that it is likely that these are all dietary items. This, he continues, is further confirmed by the high proportion of green bone fractures. Cut marks are not often found on the small and micro-mammals and so are not helpful in the determination of their use (Morlan 1994). Some animals such as rabbits and canines may have served a dual purpose; they may have been acquired for their pelts and then cooked for eating (Clarke 1995).

Few of the avian specimens were burned. However, Clarke still feels that they may have been acquired as part of the diet. He points out, as well, that the ravens and the teal could also have been procured for their plumage. The avian specimens had no carnivore modifications. The same is true of the fish remains. Clarke (1995:120) also feels the fish were part of the diet even though no specimens were burned. He (1995:

120) also speculates on the use of the pelecypods in the assemblage and remarks that they are edible but those recovered show no cultural modifications.

The seasonality of the site differed somewhat depending on which indicator was used. The fetal bison remains indicated that the site was occupied in the winter, after November, whereas the *Spermophilus richardsonii* assemblage points to a spring/summer occupation because of their hibernation schedule. The migratory bird remains and the fish remains also suggest the occupation of the site extended into the spring (Clarke 1995).

4.7 Fine Screen Material, both assemblages.

4.7.1 Clarke's Fine screen material

In Clarke's 1995 thesis he analyzed the fine screen sample from one unit (1 x1). The unit he chose was 290N 109E. This unit was chosen because the fine screen sample was large and because of the presence of small mammal remains and fish elements in the coarse screening. The sample was sorted by categories: tooth enamel, fire-cracked rock, lithic debitage, unidentifiable shell fragments, gastropods, shells and identifiable faunal material. Seventy-nine specimens were identified, particularly noteworthy were the identification of a previously unrecognized vole, a passeriform bird, and two genera of gastropods.

Clarke (1995:176) notes on his distribution map that the high number of micro-mammals in 290N 109E is due to the fine screen material identification. He continues that the use of screens that are smaller than 6 mm results in a large increase in the recovery rate of faunal material that would likely have been lost through larger

mesh sizes. Clarke especially notes the recovery of *C. gapperi* teeth in the fine screen sample, whereas there were no other *C. gapperi* diagnostic elements in the coarse screen sample. So, this particular rodent would not have been included as part of the faunal assemblage were it not for the fine screen sample that was analyzed. (Clarke 1995:176).

Clarke also notes the increase in recovery numbers of fish elements from the fine screen sample, as well as gastropods. There were four other units from which gastropods were recovered in the coarse screen. Fish elements were recovered in nine other units besides the fine screen unit.

4.7.2 Fine Screen Summary Farrow thesis

Two amphibians were identified: the tiger salamander and a frog, as well as one reptile, a snake -*Thamnophis sp.* While there were many fish specimens, they proved to be extremely difficult to identify to genus and species. Even though the identification did not prove to be as successful as I would have preferred, on consultation with Dr. D.P. Chivers and one of his graduate students, Michael Pollock, from the Department of Biology, University of Saskatchewan, some additional information was garnered on the specimens. In the assemblage there are a number of true spines. The walleye and perch are fish that have true spines that are known to be present in the South Saskatchewan river. The size of the vertebrae from the fine screen sample are too large to be from fish that would only have lived in the spring time creeks and so they must have been transported to the site from the South Saskatchewan river. The concavity on both sides of the vertebrae indicate that they

are from teleosts. The palatal teeth may have been from goldeyes which are easy to catch and are present in the river today as well.

4.7.3 Summary and Comparison of Fine Screen Assemblages

In Clarke's fine screen analysis seventy-nine specimens were identified. Particularly noteworthy were the identification of a previously unrecognized vole, a passeriform bird and two genera of gastropods. Specifically those species identified were *Spermophilus richardsonii, Clethrionomys gapperi* and *Microtus pennsylvanicus ,Spermophilus sp.* There were also a number of indeterminate micro-mammals. Clarke also notes the increase in recovery numbers of fish elements from the fine screen sample, as well as gastropods.

Excluding the gastropods, in this thesis 486 faunal specimens were recovered that could be potentially identified. There were approximately 911 complete gastropods and a number of fragmented specimens which could not accurately be counted. There are six genera of gastropods, four or five of which can be identified to the level of species. These include two terrestrial snails: one species from the Vallonidae family, *Vallonia gracilicosta* and one from the family Vertiginidae, *Vertigo binneyana.* The terrestrial snails accounted for 96% of the specimens. The remainder were aquatic species and included the genera *Gyraulus sp., Catinella sp., Stagnicola sp. or Fossaria sp.*

The identified specimens included probable *Bison bison, Canis sp., Lepus spp., Spermophilus richardsonii, Spermophilus sp., Microtus pennsylvanicus, Onychomys leucogaster, Mus musculus, Clethrionomys gapperi*, Indeterminate Emberizidae, *Rana sylvatica or Rana pipiens, Ambystoma trigrinum, Thamnophis*

spp., Osteichthyes and six varieties of gastropods. Many of these were also identified in Clarke's assemblage either in the coarse screen (the leporids, the canids , the ground squirrels and the fish) or in the fine screen (the Gapper's red backed vole and the meadow vole). However, Clarke did not identify any reptiles or amphibians in his assemblage.

4.8 Summary

There were a number of new species identified in the fine screen assemblage. In particular these species were: *Rana sylvatica or Rana pipiens, Ambystoma trigrinum, Thamnophis spp. and Onychomys leucogaster.* As to be expected, the fine screen assemblage has a predilection for the smaller species and may not be the best tool for accurate identification of the larger species due to the fragmented nature of the fine screen specimens.

The specimens in this assemblage were all evaluated utilizing Morlan's (1994) classification system. The bone modifications recorded were completeness of element, digestive marks, burning, staining, none, rootlet etching and fracture state (Morlan 1994: 137). Very few specimens in this assemblage had rootlet etching, some had been digested, a few burned or calcined, many were stained and a very few had none of these modifications. Some of the rodent specimens, either *Spermophilus richardsonii* or others only classified to MSC2, exhibited a burning pattern similar to that which Morlan (1994: 137), says is indicative of "food preparation". Some of the unidentified MSC1 specimens in the Hartley assemblage exhibited this same patterning of charring although none of the MSC1 specimens that were identified to species showed this patterning. This leads to a question regarding the classification of

the unidentified specimens as belonging to MSC1; perhaps they should be in MSC2 and are smaller simply because they are immature or reflect sexual dimorphism. None of the MSC1 specimens in the hearths were burned.

The digested specimens were likely deposited by a prey animal such as a raptor or another carnivore such as one of the canids (Morlan 1994; Stahl 1996). Although the fine screen assemblage is small it still provides new information about the site and confirms previous findings by Clarke (1995) regarding seasonality and subsistence.

Chapter 5
Regional Paleobiogeography

5.1 Methods: Sympatry analysis

"If you want to get somewhere you have to know where you want to go and how to get there. Then never, never, never give up."

-Norman Vincent Peale (1898-1993), minister, author.

This chapter examines the paleobiogeography of the Hartley site, utilizing the recovered rodents and the gastropods remains. Paleobiogeography is the study of the distribution of plants and animals in a particular geographic location in the past. In this case, however, only the animals by way of the faunal remains will be considered. This allows us to reconstruct the past regional and site environment.

According to Graham and Semken (1987: 3-6), there are a number of potential problems to take into consideration when doing such an analysis: First, there can be difficulties when identifying archaeological specimens to species since osteological differences between species may not exist. Rather, species differentiation may only be found in variations in the living animal such as color of the pelt or with gastropods the soft fleshy parts. It is necessary to identify the fauna utilized in the comparison down to species. Secondly, the faunal material must be contemporaneous. A third problem is that spatial and time distributions are also necessary to control but are not problematic in an archaeological analysis. Finally, the

various taphonomic pathways have to be considered and "a local fauna does not represent a 'snapshot' of the past, but is a reflection of prehistoric associations biased by a series of accumulations and preservation filters" (Graham and Semken 1987:6).

There are various methods used to assess past environments from archaeological assemblages, such as the study of phytoliths (Rosen 1999), small mammals (Graham and Semken 1987), seeds and gastropods (Bobrowsky 1984: 82). The small mammals and gastropods will be utilized here. As well, the amphibians will be included in the sympatry analysis.

The fine screen assemblage at the Hartley site has yielded a number of specimens identifiable to the species level: four rodents, one amphibian and three gastropods. These are the Richardson's ground squirrel, (*Spermophilus richardsonii),* the northern grasshopper mouse (*Onychomys leucogaster)*, the Gapper's red-backed vole (*Clethrionomys gapperi),* the meadow vole (Microtus pennsylvanicus), the tiger salamander (*Ambystoma trigrinum*), and three gastropods, *Vallonia gracilicosta* , *Vertigo binneyana* and *Gyraulus parvus or G. circumstriatus* the latter is an aquatic snail. The former two are terrestrial.

Environmental changes are but one factor to be considered when changes in the faunal community have occurred (Graham and Semken 1987). Agriculture practices also change the faunal inhabitants and such is the case with the modern absence of large ungulates such as bison from the area.

Sympatry of the local fauna is found by looking at the modern geographic range of the taxa present in the archaeological assemblage and noting where all or most of them overlap (Graham and Semken 1987:7). If all of the species that are present in the archaeological assemblage occur in the same geographic area with the

modern fauna, the area of sympatry is said to be harmonious, indicating that the environment likely has changed very little. If the sympatry of the species present in the archaeological assemblage does not include the site area, it is thought that environmental change has taken place. As well, if the faunal community in the archaeological assemblage also includes species that no longer live in the area it is said that the area of sympatry is disharmonious and it also implies environmental change. Through this type of analysis one may be able to determine why these changes in the faunal community have taken place (Graham and Semken 1987:7).

Graham and Semken (1987:8) caution though, that in the analysis of sympatry there are five factors that affect the utility of the technique. Firstly, one must identify specimens to the species level because members of a particular *genus* are often found in a very large geographic area. Secondly, the particular species in consideration should not have changed considerably in their physiological or ecological needs. This is not likely a problem in sites as recent as the Hartley site. Thirdly, the contemporary geographic range of the species must be known and if it has changed it is important to know under what circumstances. Fourth, there may be differences in published geographical distribution maps and this may affect the perceived area of sympatry. Finally, because the sympatric boundaries are often determined by a few species, this may unduly weight the ecological and physiological factors by these species.

To determine the area of sympatry for the Hartley site, the species in the faunal assemblage and their geographic ranges were assessed using Banfield (1987), Forsyth (Personal Communication 2004), Roney (Personal Communication, 2003), Wapple (1999), Didiuk (1999) and Clarke (1981) to determine the areas of overlap.

All of the species present in the fine screen assemblage are currently present in the region.

The fine screen assemblage does not represent all of the fauna that were present at the site when it was occupied. As expected, numerous larger mammals were not represented in the fine screen sample. So, for the most part the smaller species are represented.

5.2 Paleoenvironmental Reconstruction

Micro-mammals, amphibians and gastropods live in fairly small geographical areas and have short life spans. This makes them ideal for interpreting paleoenvironments. Since they do not live long, the environment likely did not change much during their life spans. They also do not travel very far and so reflect the environment of a fairly small geographic area.

5.2.1 Rodents

There are two species of Microtine rodents present in the fine screen assemblage, the Gapper's red-backed vole (*Clethrionomys gapperi*) and the meadow vole (*Microtus pennsylvanicus*). Based on MNI there are three meadow voles and one Gapper's red-backed vole represented. Other small mammals that are present are the Richardson's ground squirrel (*Spermophilus richardsonii*), of which there are three, and the northern grasshopper mouse (*Onychomys leucogaster*) which has an MNI of two. The meadow vole is a wide ranging vole across Canada (Banfield 1987). While the northern grasshopper mouse has a wide range across the western great Plains and south (Banfield 1987:175-176); the Gapper's red-backed vole is found in areas of both brush and forest throughout Canada (Banfield 1987:180-184). The Richardson's

ground squirrel (*Spermophilus richardsonii)* occupies the same environments as the meadow vole and other rodents. These squirrels have a large geographic distribution across the southern portions of the three prairie provinces and south throughout the Great Plains (Banfield 1987:114-117).

The area of sympatry is large and so not precise because of the widespread distribution of the various species. This is an harmonious sympatry with the geographical range of these species incorporating the site, indicating that the environmental conditions at the time of occupation were roughly the same as now (Graham and Semken 1987:7).

Discussion

Of the rodents present in the fine screen sample, only the Gapper's red-backed vole has a preference for a habitat that includes a water source. The meadow vole, and the Richardson's ground squirrel will coexist in the same area. Even though the Richardson's ground squirrel does not prefer wet lands and the meadow vole prefers wet meadows, each of these species can adapt to such areas (Banfield 1987). The preferred habitat of the northern grasshopper mouse is not known. The environment suggested by these rodents is similar to the environment that is present today.

5.2.2 Gastropods

A representative sample of gastropods was sent for identification to Mr. Robert Forsyth, a Research Associate at the Royal British Colombia Museum. There are six or seven genera of gastropods, and four or five can be identified to the level of species. The exact numbers for the gastropods is not known. The majority of the specimens, 825 of 911, belong to the family Vallonidae and specifically the species

Vallonia gracilicosta. These are a minute terrestrial snail, generally, with a width varying around 2.8 mm. The shell is flattened-helciform, translucent, and may be brownish or grayish white. The apertural lip is thickened. These snails are distributed across much of North America. They live in leaf litter, under rocks, bark and even dead wood. These areas are usually dry to moist and well-drained (Forsyth 2004a).

The second terrestrial snail is represented by at least 49 specimens from the family Vertiginidae, *Vertigo binneyana.* These, too, are a very minute snail measuring around 2 mm. They are easily mistaken for Gastrocopta. Not much is known regarding the ecology of this variety of snail (Personal Communication, Forsyth 2004).

The remainder of the snails are all freshwater species. There are approximately 32 individuals represented from the family Lymnaeidae, some of which may be from the genus *Stagnicola or Fossaria* (there may be a few that are *Stagnicola caperata* but that is tentative) (Forsyth 2004). The morphology of the shells is a high conical spire with a large aperture. These snails are often referred to as pond snails and can be found in a variety of habitats that include temporary areas of standing water such as ditches, shallow pools, vernal ponds and even mud flats across most of Canada and the United States (Clarke 1981).

There are perhaps four specimens from the family Planorbidae, *Gyraulus sp.* perhaps *parvus or circumstriatus (*Forsyth 2004*).*These snails are also known as ramshorn snails and are characterized by their planospiral or flat morphology. They are distributed across most of Canada and the United States. They can be found in a variety of habitats including woodland pools, roadside ditches and prairie ponds. *G. parvus* frequently lives on submerged vegetation (Clarke 1981).

The final genera present is from the family Succineidae, *Catinella sp.* It too is an aquatic species that may live in a marsh environment and is represented by one individual (Personal Communication, Forsyth 2004).

Discussion

The most abundant gastropods represented by far are the land snails, *Vallonia gracilicosta* at 91% and the *Vertigo binneyana* at 5%.Together they comprise 96% of the sample. This corresponds with the abundance of *Vallonia sp.* recognized by Grant Clarke (1995). Since the majority of the gastropods are land snails, this indicates that the site environment was very similar at the time of occupation to what it is today, an area that sees spring time standing water and areas of mud where gastropods will live.

5.2.3 Amphibians & Reptiles

There are two species of amphibians in the fine screen sample, the tiger salamander *(Ambystoma trigrinum)* and the wood frog *(Rana sylvatica)* or Northern leopard frog *(Rana pipiens)*. There is also one reptile present. It, however, was only identified to the genus level *Thamnophis sp.*

Discussion

The presence of amphibians suggests that the site area has occasionally provided enough standing water in the spring to support the young. Frogs may also travel considerable distance and so may simply have been passing through the area.

5.3 Summary of paleoenvironmental indicators.

All of the species present point to an area that is moist, especially in the spring time. In years of higher precipitation perhaps the area is moist all year around. This is

likely not any different than what one would see presently. It is an area that has treed depressions where winter snow and spring runoff can accumulate. This environment is favorable for all the species that were recovered at the site. The area of sympatry is harmonious, meaning that the geographic ranges of all the species that were recovered in the archaeological assemblage overlap and the same species are currently present in the area. Since this area of sympatry includes the site presently, it implies that the environment has not changed since the time the site was occupied.

Chapter 6

Conclusions

6.1 Utility of Fine Screening

"It's not what you find, it's what you find out."

-David Hurst Thomas (1998:96), archaeologist.

Since the late 60's fine screen analyses have gained in popularity. It is well known that the coarse screens are inadequate for recovery of small mammal remains and there is a great deal of published literature comparing the differential recovery rates of coarse screens - 6.3 mm (1/4 inch) - and fine screens - 3.17-1.5 mm (1/8 inch to 1/16 inch) - (Barker 1975; Bobrowsky 1987; Gordon 1993; Pendleton 1983; Muckle 1994; Sanchez 1994; Shaffer 1992b; Stahl 1996; Struever 1968; Wagner 1982). In the end, fine screen recovery increases the number of small artifacts recovered. In this analysis, even though the sample size is small there are new species that were identified and the number of gastropods was greatly increased as compared to Grant Clarke's (1995) thesis (911 compared to ~100)

There were a number of questions that were to be addressed in this study, in regard to the fine screen assemblage: 1) how would using just the available material affect the analysis? 2) how would the different methodologies affect the results? and 3) taking those variables into account, what information could be acquired regarding

the subsistence strategy, season of occupation and the paleoenvironment of the site? The results will also be compared to Clarke's analysis in regards to species identified.

6.2 Available fine screen material

As can be seen from Table 6.1 there were some Units that had many bags of fine screen material available for analysis and other units whose bags should have existed but eluded discovery. Nonetheless, new information was garnered from the available material. Depending on the screening techniques there were some differences in the number of identifiable artifacts.

Table 6.1 The Units and their corresponding fine screen samples available for analysis.

	Lev 3	Lev 4	Lev 5	Lev 6	Lev 7	Lev 8	Lev.9
	10-15 cm B.S.*	15-20 cm B.S.	20-25 cm B.S.	25-30 cm B.S.	30-35 cm B.S.	35-40 cm B.S.	40-45 cm
289N105E			X	X	X	?	
289N106E			X	X	X	X	
290N105E							X
290N106E			X	X	X	X	
290N107E			missing	missing	X	X	
291N105E					X	X	
291N106E			X	X	X	?	
295N112E		X	X				
295N113E		X	X	X	X		
296N112E		X	X	X	X		
296N113E	X	X	X	none	X		
296N114E		X	X	none			

* Below the surface.

Table 6.2 lists which units were analyzed, the levels sampled, the fine screening method that was used and how many specimens were identified per unit. In this instance this is simply the number of faunal specimens that were separated from the bigger sample as being potentially identifiable. It does not include micro-debitage, bone chips, or seeds; these remain in the sample bags (except for the seeds which

were separated but not analyzed).The soil samples were taken from the northeast quadrant of each unit, by 5 cm levels. Consequently each had a volume of 12.5 L. The one exception was Unit 290N105E which was excavated in 1989 by 10 cm arbitrary levels. Therefore, the soil samples from this unit had a volume of 25.0 L.

Table 6.2 Table listing, units analyzed, year excavated, volume of material screened/ sample bag, method used, occupation level and number of specimens identified (excluding gastropods).

Unit	level	occupation	Year exc.	Volume screened	method	# specimens
Hearth one						
289N105E	5-7	24-40 cm	1990	12.5 L	1.6 mm dry	71
289N106E	7/8	30-39 cm	1991	12.5 L	1.6 mm dry	32
290N105E	5?	30-48 cm	1989	25.O L	1.6 mm dry	12
290N106E	5-8	20-40 cm	1990	12.5 L	1.6 mm dry	60
290N107E	7/8	20-42 cm	1991	12.5 L	1.6 mm dry	12
291N105E	7/8	15-40 cm	1992	12.5 L	1.6 mm water	14
291N106E	5-7	20-45 cm	1991	12.5 L	1.6 mm dry	54
Hearth two						
295N112E	4/5	15-30	1992	12.5 L	1.6 mm water	44
295N113E	5-7	15-35	1990	12.5 L	1.6 mm dry	69
296N112E	4-7	20-40	1995	12.5 L	Dry 3 mm	16
296N113E	3-7	15-40	1993	12.5 L	1.6 mm water	82
296N114E	4/5	12-25	1992	12.5 L	1.6 mm water	20

Since the number of available bags from each screening method differed, the utility of each method is difficult to assess. Table 6.3, shows that the number of recovered faunal specimens potentially identifiable per sample bag was the largest for one of the 1.6mm dry screened samples at 27/ bag. This was followed by a sample which was water screened through 1.6mm mesh, which had 22/bag. The next three samples close in number (17,18 and 20) were from units that had either been dry (2) or water screened through 1.6 mm mesh. The dry 3 mm mesh screen had the fewest number of specimens per bag, 4.

Table 6.3 Table listing analyzed units, number of specimens, number of samples available and specimens per sample.

Unit	method	# specimens	# bags	Specimens/ sample
Hearth one				
289N105E	1.6 mm dry	71	3	27
289N106E	1.6 mm dry	32	4	8
290N105E	1.6 mm dry	12	1	12
290N106E	1.6 mm dry	60	4	15
290N107E	1.6 mm dry	12	2	6
291N105E	1.6 mm water	14	2	7
291N106E	1.6 mm dry	54	3	18
Hearth two				
295N112E	1.6 mm water	44	2	22
295N113E	1.6 mm dry	69	4	17
296N112E	Dry 3 mm	16	4	4
296N113E	1.6 mm water	82	4	20
296N114E	1.6 mm water	20	2	10

Some of the water screened samples had to be rewashed in order to discern separate specimens; there were few plant remains in these samples. Many of the dry screened samples contained large numbers of seeds and other plant material. On evaluation of this particular group of samples, the material that was dry screened through 1.6 mm mesh provided the greatest number of specimens per bag on average (27-6). The sample dry screened through 3 mm mesh yielded the fewest specimens per bag (4). The water screened samples also provided a good number of specimens per bag (7-20).There are other variables to take into account when assessing the numbers, such as the volume of material screened (different in only one case) and the human factor at all stages of the process. For the most part all specimens seemed to exhibit equal amounts of fracture/damage regardless of the methodology used.

6.3 Species Comparison between this fine screen assemblage and Clarke's

As expected, the fine screen assemblage showed a bias toward the smaller species. In this fine screen assemblage there are a number of additions to the list of species that Clarke (1995) originally identified at the site. They are the northern grasshopper mouse (*Onychomys leucogaster)* the wood frog (*Rana sylvatica)* or the Northern leopard frog (*Rana pipiens),* the tiger salamander (*Ambystoma trigrinum*), a garter snake (*Thamnophis spp.)*, and three gastropods, *Vertigo binneyana, Fossaria sp. and Catinella sp.*

6.3.1 Subsistence utility

The fine screen analysis provided some additional information regarding subsistence practices. There was supporting evidence for the consumption of Richardson's ground squirrels, leporids and fish.

6.3.1.1 Rodents

The specimens were all evaluated utilizing Morlan's 1994 classification system and bone modification criteria (See section 4.2 above). The bone modifications recorded were: completeness of element, digestive marks, burning, staining, none, rootlet etching and fracture state. Very few specimens in this assemblage had rootlet etching, some had been digested, a few were burned or calcined and a small number had no modification at all. None of the specimens had evidence of cut marks, tooth marks or weathering. Some of the *Spermophilus richardsonii* specimens and other rodent specimens only classified to MSC2, exhibited a burning pattern similar to that which Morlan considers to be indicative of

'food preparation' . The specimens described by Morlan (1994: 139) are from the Tipperary Creek site (FbNp-1) and were from a Richardson's ground squirrel recovered near a hearth. The "bones are intact... [and have] charring on the incisor teeth and the distal phalanges, such charring only on the extremities indicates that the other bones were protected by flesh and skin during exposure to the hearth" (Morlan 1994: 139). Except for the phalanges most of the specimens were fractured.

6.3.1.2 Leporids

The leporid specimens for the most part were burned or calcined and were likely subsistence items. Leporids were procured in North America not only for their meat but also for their skins and bones, the latter for raw materials for tools (Hockett 1991). They also fit in well with Hockett's (1991: 674) contention that human (vs raptor) modified leporid bone along with other characteristics, shows a tendency toward small unidentifiable bone fragments some of which may have charred ends. Some of the phalanges in this assemblage were whole but the teeth were fractured.

6.3.1.3 Fish

For a variety of reasons, it is thought that the fish remains recovered were part of the diet of the site occupants. Firstly, the site is too far from the river for the remains to be randomly deposited there either by other predators or other taphonomic processes. Secondly, many of the fish remains were recovered from within or adjacent to the hearths and many were burned. Also, there is discussion of the utilization of fish as part of the subsistence economy at the Lebret site (EeMw-26) in southern Saskatchewan (Smith 1986; Smith and Walker 1988). The fish species that were recovered from the Avonlea component at the Lebret site (EeMw-26) were either spring or fall spawners and were likely caught in fish weirs or fish traps (Smith and

Walker 1988). Smith and Walker do not mention any possible method of preparation of the fish before consumption. At the Miniota site (EaMg-12), an Avonlea site in western Manitoba, fish remains were also recovered and interpreted as part of the diet (Landals 1994) .

Subsistence Summary

There were no new species added to the list of consumed species because of the fine screen analysis. Rather, previous ideas from Grant Clarke's 1995 thesis were confirmed.

6.4 Paleoecological utility

The gastropods, small mammals, the reptile and the amphibians provided a good framework on which to base the sympatry analysis. These species, many from similar environments, and others that are more adaptable afforded a comprehensive look at the past environment. While at first glance the species present seem to point to a wetter environment than at present, it may be that the area topography, with treed depressions, is conducive to retaining the water necessary to support the species recovered.

6.5 Seasonality utility

Table 6.4 provides information about which taxa were recovered in each Unit. The recovery of specimens from animals that hibernate in the winter has provided additional information regarding the seasonality at the site. Caution is given by Koch (1995:48-55) though, who suggests that the recovery of specimens from a species that hibernates only indicates when the species was acquired; she notes that the

animals may even have been acquired when they were hibernating or they may be intrusive.

Table 6.4 Size class 3 or smaller taxa identified by Unit.

289N105E	Ground squirrels, birds, rabbit/hare, amphibian, fish
289N106E	Ground squirrels, garter snake, rabbit/hare, mice/voles
290N105E	Ground squirrels, frogs, bird, fish
290N106E	Ground squirrel, birds, rabbit/hare, canid, amphibian, mice/voles
290N107E	Ground squirrel, mice/voles, fish
291N105E	Ground squirrels, mice/voles, bird
291N106E	Ground squirrels, mice/voles, frogs, bird
295N112E	Ground squirrels, frogs, salamanders, mice/voles. Rabbits/hares, fish, bird
295N113E	Ground squirrels, mice/voles, bird, fish, frog
296N112E	Ground squirrel, mice/voles, bird, fish
296N113E	Ground squirrel, mice/voles, bird, fish, frogs, salamander
296N114E	Ground squirrel, mice/voles, bird, rabbit/hares

The identified species that hibernate in the winter included a frog *(Rana spp.)*, the tiger salamander *(Ambystoma trigrinum)*, a garter snake *(Thamnophis spp.)* and the Richardson's ground squirrel *(Spermophilus richardsonii)*. Only the ground squirrel was part of the diet of the site occupants and can therefore, be used as an indicator of the season of occupation. The presence of fish remains, which were likely subsistence items points to an occupation that extended into the spring, while the fetal bison bone from Clarke's thesis indicates that at least a part of the occupation was in the winter. However, Clarke (1995:124-125) also recovered species that pointed to a spring and summer occupation (migratory birds, Richardson's ground squirrels and fish) and did not feel that the seasonality of the site occupation had been

firmly established by his analysis. The fish remains in both assemblages likely were from fish that were only available when the South Saskatchewan River was open. Thus, they do not exclude winter. The reptile and amphibian remains do not provide seasonality information because of their intrusive nature.

6.6 Summary

Without a doubt the fine screen analysis provided new information about the site. It is, however, time-consuming in both the initial screening and the sorting of the fine screen material. Fine screen analysis results provide insights not only into the seasonality of the site, but also the subsistence strategies and the paleoecology. This thesis presents additional information regarding the fauna that was present in the area. It addition the research points to a need that exists in the study of fine screen material namely a question of the taphonomical processes that take place at an archaeological site and how they affect the recovery of fine screen material and their final interpretation. An analysis such as this provides researchers with a reminder of the continued call for collaboration with other disciplines, such as biology, and the interdisciplinary nature of archaeology.

The nature of fine screen methodology and analysis, quite naturally produces results which lean toward the smaller faunal species. The occupation of the Hartley site may very well have extended throughout the year as indicated by both the hibernators recovered and the previous identification of fetal bison by Clarke (1995). Subsistence strategies employed would evidently have included the consumption of bison, Richardson's ground squirrels, leporids, birds and fish. There were no new species added to the subsistence menu. As is often the case with small faunal remains,

there were no cut marks on any of the specimens in the fine screen assemblage. Therefore, assessing the remains as having been utilized by humans was based on the context. All specimens were in or adjacent to hearths and many were burned and fractured. If specimens had two of these criteria, it was seen as sufficient to be considered part of the subsistence strategy, in keeping with Morlan's (1994) approach.

The challenge of rodent burrows is a major issue on the Plains. There has been much written on how rodent burrowing may affect a site (Bocek 1986, 1992); Erlandson 1984). It is known that burrowing rodents take things from a site component and bring new things in as well. Much of the site was riddled with rodent burrows, so there was likely mixing of sediments and artifacts to some degree. Exactly how this would affect the assemblage, and the interpretation is not known .

Not all of the artifacts recovered in the fine screen assemblage were cultural including the gastropods. They were very small, not burned, and were evidently part of the background fauna. The amphibian and reptile remains also were not cultural but again, are part of the background fauna. Fine screen analysis provides the clues to the rest of the story, in terms of the paleoenvironment, seasonality and subsistence practices at the site.

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APPENDIX I

Flora and Fauna of the Moose Wood Sand Hills

Table 1 Fauna found at the Moose Wood Sand Hills references Acton et al 1998.

Fauna of the Hartley site		
Common name	***Genus***	***species***
bison	Bison	*bison*
mule deer	*Odocoileus*	*hemionus*
elk	*Cervus*	*elaphus*
white-tailed deer	*Odocoileus*	*virginiaus*
pronghorn	*Antilocapra*	*americanus*
wolf	*Canis*	*lupus*
Coyote	*Canis*	*latrans*
Swift fox	*Vulpes*	*velox*
Red fox	*Vulpes*	*vulpes*
grizzly bear	*Ursus*	*arctos*
porcupine	*Erithizon*	*dorsatum*
skunk	*Mephitis*	*mephitis*
cougar	*Felis*	*concolor*
northern grasshopper mouse	*Onychomys*	*leucogaster*
Gapper's red-backed vole	*Clethrionomys*	*gapperi*
big brown bat	*Eptesicus*	*fuscus*
meadow vole	*Microtus*	*pennsylvanicus*
prairie vole	*Microtus*	*orchogaster*
snowshoe hare	*Lepus*	*americanus*
least weasel	*Mustela*	*nivealis*
white tailed jackrabbit	*Lepus*	*townsendii*
boreal chorus frog	*Pseudacris*	*triseriata*
northern leopard frog	*Rana*	*pipiens*
wood frog	*Rana*	*sylvatica*
tiger salamander	*Ambystoma*	*trigrinum*
red-sided garter snake	*Thamnophis*	*sirtalis*
western garter snake	*Thamnophis*	*elegans*
pike	*Esox*	*lucius*
walleye	*Stizostedion*	*vitreum*
sauger	*Stizostedion*	*canadense*
yellow perch	*Perca*	*flavescens*
burbot	*Lota*	*lota*
goldeye	*Hiodon*	*alsoides*

Table 2 Flora found at the Moose Wood Sand Hills references Acton et al 1998.

Common name	***Genus***	***species***
Northern wheatgrass	*Agropyron*	*dasystachyum*
Pasture sage	*Artemisia*	*campetris*
Porcupine Grass	*Stipa*	*spartea*
Speargrass	*Stipa*	*comata*
Blue grama grass	*Bouteloua*	*gracilis*
Fescue prairie	*Festuca*	*idahoensis*
Hooker's oat grass	*Helictotrichon*	*hookeri*
June grass	*Koeleria*	*macrantha*
Pasture sage	*Artemisia*	*campetris*
Saskatoon berry	*Amelanchier*	*alnifolia*
western snowberry	*Symphoricarpos*	*occidentalis*
choke cherry	*Prunus*	*virginiana var melanocarpa*
prairie rose	*Rosa*	*arkansana*
creeping juniper	*Juniperus*	*horizontalis*
wolf willow	*Elaeagnus*	*commutata*
Bearberry	*Arctostaphylos*	*uva-ursi*
dogwoods	*Cornus sp*	
Manitoba maple	*Acer*	*negundo*
trembling aspens	*Populous*	*tremuloides*
green ash	*Fraxinus*	*pennsylvanica*
cottonwood	*Populous*	*deltoids*
willow	*Salix*	*bebbiana*
Canada wild rye	*Elymus*	*canadensis*
Indian rice grass	*Oryzopsis*	*hymenoides*
Sand dropseed	*Sporobolus*	*cyptandrus*
Little bluestem	*Schizachyrium*	*scoparium*
Sand grass	*Calamovilfia*	*longifolia*
Hairy golden aster	*Heterotheca*	*villosa*
Prairie sunflower	*Helianthus*	*couplandii*
Skeleton weed	*Lygodesmia*	*juncae*

APPENDIX II

Fine Screen Fauna

Table 1 Summary of fine screen fauna recovered at the Hartley site, mammals

Class	Artiodactyla	Lagomorpha	Rodentia
Family	(probable) Bovidae	Leporidae	Muridae
Subfamily			
G/s	**Bison bison**	*Lepus spp.*	*Mus musculus*
Common name	Bison	Rabbits & hares	
	PROBABLE		

Table 2 Summary of fine screen fauna recovered at the Hartley site, mammals

Class	Rodentia	Rodentia	Rodentia
Family	Sciuridae	Cricetidae	Cricetidae
Subfamily		Microtinae	Microtinae
G/s	*Spermophilus richardsonii*	*Clethrionomys gapperi*	*Microtus pennsylvanicus*
Common name	Richarson's ground squirrel	Gapper's red backed vole	meadow vole

Table 3 Summary of fine screen fauna recovered at the Hartley site, mammals, reptile and amphibians

Order	Rodentia	Reptilia	Amphibia	Amphibia
Class	Cricetidae	Squamata	Anura	Caudata
Family	Cricetinae	Colubridae	Ranidae	Ambystomidae
Subfamily				
G/s	*Onchomys leucogaster*	*Thamnophis spp.*	*Rana sylvatica Or Rana pipiens*	*Ambystoma trigrinum*
Common name	*northern grasshopper mouse*	garter snake	wood frog northern leopard frog	tiger salamander

Table 4 Summary of fine screen fauna recovered at the Hartley site, fish

Class	Osteichthyes
Family	
Subfamily	Indeterminate fish
G/s	
Common name	

Table 5 Summary of fine screen fauna recovered at the Hartley site, gastropods

Phylum	Mollusca	Mollusca	Mollusca	Mollusca	Mollusca	Mollusca
Class	Gastropoda	Gastropoda	Gastropoda	Gastropoda	Gastropoda	Gastropoda
Family	Vallonidae	Planorbidae	Lymnaeidae	Lymnaeidae	Vertiginidae	Succineidae
genus	***Vallonia***	***Gyraulus sp***	*Stagnicola* ***or Fossaria sp***	***Stagnicola***	***Vertigo***	*Catinella sp.*
species	*gracilicosta*	*circumstratus* *or* *parvus*	—	*caperata* *Tentative dx*	*binneyana*	
environ	Terrestrial snail	Ramshorn snail	Pond snail	Pond snail	terrestrial	Wetland snail
#	797	3	31	(combined with previous)	49	1
Total 932						