

SPATIAL AND FEATURE ANALYSIS OF THE WHITING SLOUGH SITE (EINs-10): AN AVONLEA
PROCESSING SITE IN SOUTH-CENTRAL SASKATCHEWAN

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Abstract

This thesis discusses the overall function and description of features and activity areas for the Whiting Slough Site (EINs-10). This is done by investigating the spatial relationships between various artifact groups to identify localized densities of activity. These artifact densities were then analyzed and interpreted to be specific activity areas within the larger processing events taking place at the site. The features found at the site were separated into various feature classes based on their attributes. In addition, the spatial relationship of these features to each other was assessed. The spatial analysis of the site employed ESRI's ArcMap to assess and compare artifact density of different artifact groups. This facilitated identification of site function as well as identifying the specific areas of distinct processing events.

As a result of this project the site was identified as an Avonlea processing site. However, this processing site has additional features that have not previously been seen in other Avonlea processing sites. There are a total of 43 different features that were discovered during excavation of the site. These are divided into four different feature types: bone-filled pits (39), hearths (2), a canid burial (1) and a soil stain (1). These features are accompanied by an additional seven potential bone-filled pits that were discovered during construction monitoring following excavation. These individual features combine to form two distinct ovoid feature groups that run parallel to one another. Potentially two more of these feature groups were partially unearthed during excavation and construction monitoring. These features are interpreted to be part of a drying rack. It is hypothesized within this thesis that these bone-filled pit features were created to counteract the difficulties with trying to anchor heavy loads of meat into the very loose sandy sediment that is present at the site.

The Whiting Slough Site appears to be much different than any other Avonlea processing sites. The uniqueness of these features as well as the large amounts of artifacts, both faunal and lithic, make the Whiting Slough Site an interesting and important site for understanding the subsistence strategies and versatility of people within the Avonlea Phase.

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Chapter 1: Introduction

This thesis project consists of a spatial analysis of the Whiting Slough Site (EINs-10). This site is an Avonlea processing site located approximately 26km southwest of the City of Saskatoon, Saskatchewan. Work on the site was carried out from 2007 - 2017 including work conducted by Western Heritage and the University of Saskatchewan. In total 120 1m x 1m units were excavated resulting in 398,329 artifacts being recovered during the project. In addition to the artifacts, a total of 43 features were recorded. This extensive excavation project resulted in the eventual completion of three master's projects, including the current work, each investigating various aspects of this site (Diduck 2018, Thomson 2020).

This thesis will be exploring the spatial relationships of the artifacts and features throughout the site. This will primarily be done using geographic information systems (GIS). There are several objectives to this project. The first is to explain what the purpose of the site is and how it was used. The second is to identify activity areas throughout the site by examining artifact density patterns. The third objective is to attempt to classify and explain the function of various individual features located within the site. The final objective is to look at the feature groupings and explain what they are and their function within the activities that are taking place at the Whiting Slough Site.

This thesis contains mostly original research and is part of three total theses that were completed on different aspects of the Whiting Slough site. All three of these theses are based on the fieldwork and data that were provided by Western Heritage as part of their cultural resource management work on the site as well as a limited amount of our own excavations. The first thesis is by Callie Diduck titled "A Geometric Morphometric Analysis of the Avonlea Projectile Points from the Whiting Slough Site (EINs-10)". In this thesis Diduck primarily studies the projectile points that were uncovered at the site. The second is by Paul Thomson and is titled "A Faunal Analysis of the Whiting Slough Site (EINs-10): An Avonlea Processing Site in South-Central Saskatchewan". In his thesis Thompson looks at interpreting the faunal remains at the site and figuring out the site's seasonality. Lastly is this thesis, which will determine the

function of the site and its elaborate features. This will be achieved by doing the spatial and feature analysis for the site.

1.1 Chapter Outlines

Chapter 2 is an overview of the modern biophysical resources that are available in the Whiting Slough area. This contains information on the landscape around the site, the climatic regime, available water sources and available fauna and flora in the region. It also contains an explanation of the stratigraphy of the site.

Chapter 3 contains a summary of the methods used during the project by Western Heritage and the University of Saskatchewan. This includes information on the survey, excavation, construction monitoring, cataloging and lab methods that were employed. Also included within this chapter are the occupational radiocarbon dates as well as the information on the season of occupation for the Whiting Slough Site.

Chapter 4 consists of an overview of the cultural background of the Avonlea Phase. This includes information on habitation, chronology, subsistence strategies, technology, settlement patterns, lithic and ceramic assemblages and the burial and ceremonial practices of the groups associated within the Avonlea Phase. Additionally, a summary of 19 Avonlea sites found on the Northern Plains is presented.

Chapter 5 provides a very brief summary of the faunal, lithic and ceramic artifacts found at Whiting Slough. It includes information on the different fauna that were represented within the archaeological assemblage as well as a breakdown of the various lithic artifact types found, including projectile points, fire-cracked rock (FCR) and other tools such as scrapers, hammerstones and retouched flakes.

Chapter 6 is the largest chapter within this thesis. In this chapter, each feature classification type found at the Whiting Slough Site is discussed. In addition, each individual feature is classified and discussed with photos of the features provided. This chapter concludes with information and discussion about the feature groupings that are present at the site. The

feature groups are themselves then classified and their roles discussed. Further, the construction of both the individual features and groups of features are discussed.

Chapter 7 presents the spatial analysis of Whiting Slough. Within this chapter the faunal, lithic, pottery and charcoal densities are examined. Each of these categories is subdivided based on inherent attributes such as degree of burning, animal represented, and tool type to name a few. Also included within this section are discussions of potential activity areas throughout the site.

Chapter 8 discusses the site overall. This includes the site designation, activities that would have been occurring around the site, chronology of events taking place at the site, the duration of occupation, discussion of the features found, recording issues and omissions from the excavations and limitations within the dataset.

Chapter 9 consists of a summary of the artifacts and features as well as final interpretations and conclusions reached.

Chapter 2: Biophysical Resources and Site Stratigraphy

2.1 Biophysical Resources

The Whiting Slough Site is located in LSD 1-3-35-8 W3M on NTS 1:50,000 Topographic map sheet 72 O/14 (Western Heritage 2017). This puts the site about 26 km southwest of the City of Saskatoon and almost halfway between the towns of Vanscoy and Delisle, Saskatchewan. At the time of excavation, the site was located several meters north of Highway 7 but is now located under the newly twinned highway's west bound lanes (Figure 2.1).

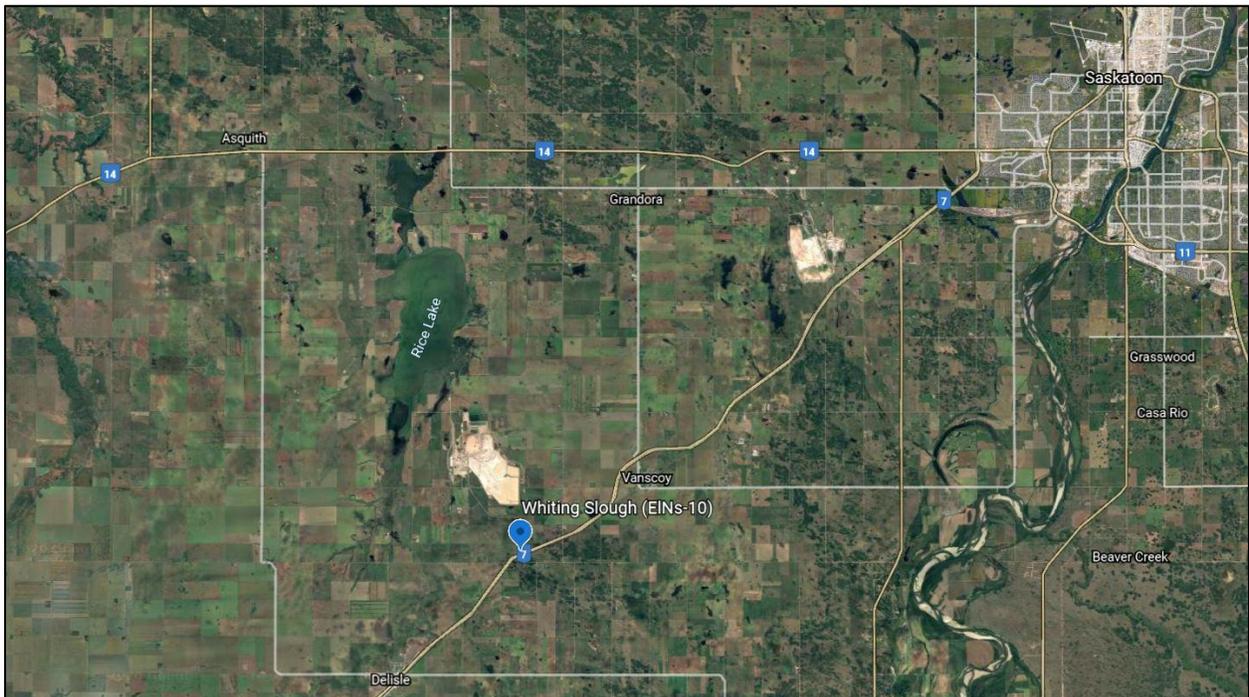


Figure 2.1 Location of Whiting Slough Site (Google Earth 2020)

2.1.1 The Landscape

The Whiting Slough Site is in the Moist Mixed Grassland Ecoregion (Figure 2.2) within the Prairies Ecozone (The SASK Herbarium 2017; Environment Canada 2017). This region is the northern most extent of the open grasslands in Saskatchewan and covers 6.8 million hectares or 11% of the Province of Saskatchewan (Saskatchewan Conservation Data Centre 2017). This area has endured multiple glaciation cycles that have severely affected the landscape that we see today as well as the landscape which was present during the occupation of the Whiting Slough

Site. The glaciers retreated from the Prairie Ecozone about 11,000 years ago leaving a landscape pitted with small ponds, lakes and sloughs. Grasslands came to dominate the large tracts of mostly flat land with some rolling hills (Wilken 2017). In short, the Moist Mixed Grassland

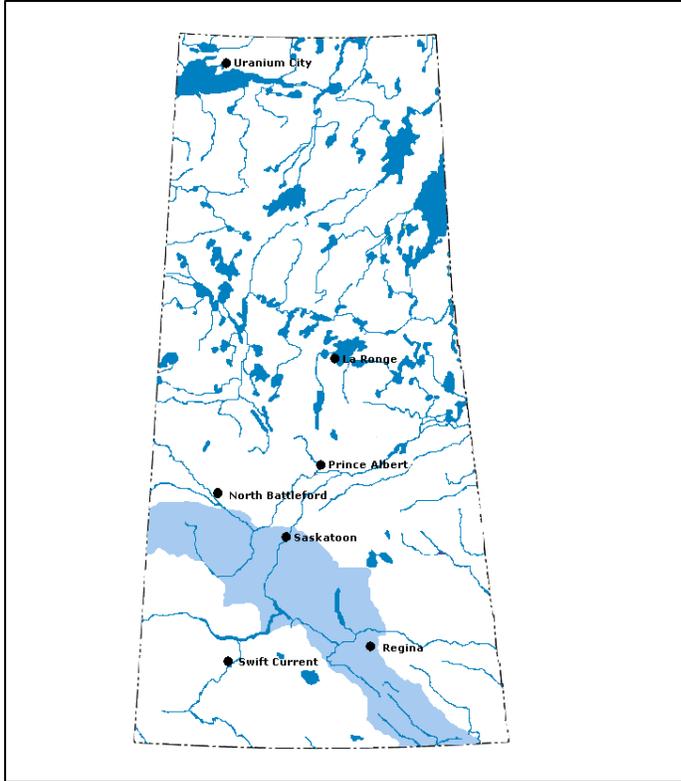


Figure 2.2 Map depicting the Moist Mixed Grassland Ecoregion (The SASK Herbarium 2017)

ecoregion is “composed of upper Cretaceous sediments and covered almost entirely by hummocky to kettled glacial till and level to very gently undulating, sandy to clayey lacustrine deposits” (The SASK Herbarium 2017). Within the Moist Mixed Grassland Ecoregion, dark brown chernozemic soils are the most dominant (The SASK Herbarium 2017). Most of the rivers which are in the Prairies Ecozone have their source within the Rocky Mountains. These rivers flow east across the plains and get their water from rainfall, snowmelt and glacial runoff.

There are also smaller rivers and streams that are scattered around this region. These have variable sources, flows and some can be dry for long periods of the year (Environment Canada 2017). In modern times, the Moist Mixed Grassland Ecoregion is primarily used for agriculture (Saskatchewan Conservation Data Centre 2017).

The area immediately where the site is located is within a sand dune. Whiting Slough is located on northern edge of the Pike Lake Sand Hills. This dune field covers a total area which is about 130 km². The sediments found here can be sourced from the deltaic deposits from Glacial Lake Saskatoon. In modern time these dunes as well as the dunes found at Whiting Slough are vegetated and inactive (Wolfe et al. 2002).

2.1.2 Climate

The modern climate within the Moist Mixed Grasslands Ecoregion fluctuates greatly over the course of the year. Summers are short and warm while winters are long and cold in this region. Within the ecoregion, the mean annual temperature is typically around 2.5°C. This is broken into two with the summer having a mean temperature of 15.5°C and the winter having a mean temperature of -11°C (The SASK Herbarium 2017). This ecoregion is also considered to have semiarid moisture conditions with annual precipitation fluctuating between 350mm and 400mm (The SASK Herbarium 2017). Approximately a quarter of the precipitation occurs during the winter as snow. During the summer months, thunderstorms are common and are often quite severe. High winds are also a major factor in the Moist Mixed Grassland Ecoregion, with a mean annual wind speed between 18 to 21 km per hour. This high average wind speed increases the amount of evaporation from the soil making it drier as well it increases the amount of soil erosion which takes place (Environment Canada 2017).

2.1.3 Hydrology

There are several different water sources within the area of Whiting Slough. In modern times, there are several unnamed sloughs and small bodies of water directly around the site. The closest is approximately 35m to the northeast of the site. There are several larger bodies of water in the area as well. Rice lake is 7 km to the northwest of the site. This is a large semi-permanent freshwater marsh which receives its water from a small creek. In modern times it has been dammed by Ducks Unlimited to protect the wetland from drought (Bird Studies Canada & Nature Canada 2021). The other large source of fresh water near the site is the South Saskatchewan River, approximately 17 km to the east.

2.1.4 Fauna

The fauna that are currently inhabiting the Moist Mixed Grassland Ecoregion would be similar to those that inhabited the area during the occupation of the Whiting Slough site. There are a great number of species that call this area home today. There is, however, one mammal who is no longer native to this ecoregion in modern times but was present in this area during the time of occupation at the Whiting Slough Site: the Plains Bison (*Bison bison*). The Plains

Bison was a keystone species on the Northern Plains. While it is no longer present on the modern landscape, it is most important to remember its place on the landscape in antiquity.

2.1.5 Mammals

There are a great deal of mammals that inhabit the Moist Mixed Grassland Ecoregion. The most common of these are the white-tailed deer (*Odocoileus virginianus*), mule deer (*Odocoileus hemionus*), jack rabbit (*Lepus townsendii*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), american badger (*Taxidea taxus*), moose (*Alces alces*) and richardson's ground squirrel (*Uroditellus richardsonii*) (Nature Conservancy Canada 2017, Saskatchewan Conservation Data Centre 2017 and The SASK Herbarium 2017). Other mammals in this region include american beaver (*Castor canadensis*), striped skunk (*Mephitis mephitis*), cougar (*Puma concolor*), muskrat (*Ondatra zibethicus*), northern pocket gopher (*Thomomys talpoides*), thirteen-lined ground squirrel (*Ictidomys tridecemlineatus*), least chipmunk (*Tamias minimus*), long-tailed weasel (*Mustela frenata*), meadow vole (*Microtus pennsylvanicus*), north american porcupine (*Erethizon dorsatum*), raccoon (*Procyon lotor*) and red squirrel (*Sciurus vulgaris*) (Nature Conservancy Canada 2017). It is important to note the animals that could have a direct effect on the Whiting Slough Site. The first are animals that are more typical food sources for the people that were using the site. Larger mammals within this group include white-tailed deer, mule deer, moose and of course plains bison. The second are animals that could be represented archaeologically by their teeth marks on the bone artifacts. These could include meat eating or scavenging animals such as the coyote. The third group are burrowing mammals who effect the soil and can cause archaeological materials to move, including richardson's ground squirrel, northern pocket gopher, american badger and thirteen-lined ground squirrel.

2.1.6 Birds

Many different species of birds that can be found in the Moist Mixed Grassland Ecoregion. According to Nature Conservancy Canada (2017), there are 129 different bird species in this ecoregion. This list includes american crow (*Corvus brachyrhynchos*), american robin (*Turdus migratorius*), american white pelican (*Pelecanus erythrorhynchos*), barn swallow (*Hirundo rustica*), bank swallow (*Riparia riparia*), belted kingfisher (*Megasceryle alcyon*), black-billed magpie (*Pica hudsonia*), black-crowned chickadee (*Poecile atricapillus*), blue jay

(*Cyanocitta cristata*), bohemian waxwing (*Bombycilla garrulus*), burrowing owl (*Athene cunicularia*), canada goose (*Branta canadensis*), common raven (*Corvus corax*), cooper's hawk (*Accipiter cooperii*), great blue heron (*Ardea herodias*), great horned owl (*Bubo virginianus*), mallard (*Anas platyrhynchos*), prairie falcon (*Falco mexicanus*), ruby-throated hummingbird (*Archilochus colubris*), sharp-tailed grouse (*Tympanuchus phasianellus*), turkey vulture (*Cathartes aura*) and upland sandpiper (*Bartramia longicauda*) to name a few (Nature Conservancy Canada 2017).

2.1.7 Reptiles and Amphibians

Very few reptile or amphibian species are present in this Ecoregion. The reptiles consist of the plains garter snake (*Thamnophis radix*) and the red-sided garter snake (*Thamnophis sirtalis*). The amphibians present in the Moist Mixed Grassland Ecoregion include the boreal chorus frog (*Pseudacris maculata*), the canadian toad (*Anaxyrus hemiophrys*), northern leopard frog (*Lithobates pipiens*) and the wood frog (*Lithobates sylvaticus*) (Nature Conservancy Canada 2017).

2.1.8 Fish

Many fish species can be found in the waters of the Moist Mixed Grasslands Ecoregion. While there is no direct access to fishing areas from the Whiting Slough Site, as noted above there are lakes in the surrounding areas and the South Saskatchewan River is not too distant. These lakes, small creeks, and the South Saskatchewan River have a variety of fish species that could be utilized by groups living in the area, including sauger (*Sander canadensis*), yellow perch (*Perca flavescens*), northern pike (*Esox Lucius*), goldeye (*Hiodon alosoides*), mooneye (*Hiodon tergisus*), white sucker (*Catostomus commersonii*), longnose sucker (*Catostomus catostomus*), lake sturgeon (*Acipenser fulvescens*) and burbot (*Lota lota*) (South Saskatchewan River Watershed Stewards 2017). Most of these fish can make an excellent food source and could have been used by people living in the vicinity of these bodies of water.

2.1.9 Flora

There is a large assortment of plants that can be found in the Moist Mixed Grassland Ecoregion. In modern times, native vegetation is confined to nonarable pastureland. There are

three main categories of plants that are found in this region. The first are grasses. These include spear grass (*Heteropogon contortus*) and wheat grass (*Triticum aestivum*). The second are shrubs, these include: buckbrush (*Ceanothus cuneatus*), chokecherry (*Prunus virginiana*), wolf willow (*Elaeagnus commutata*), saskatoon berry (*Amelanchier alnifolia*), snowberry (*Symphoricarpos albus*), hazelnut (*Corylus avellana*), gooseberry (*Ribes uva-crispa*) and raspberry (*Rubus idaeus*). The third group are trees. These are less common and can occur in shaded slopes of valleys, on river terraces or around sloughs. They include aspen (*Populus tremuloides*), willow (*Salix*), elm (*Ulmus*) and poplar (*Populus*) (Nature Conservancy Canada 2017, The SASK Herbarium 2017, Saskatchewan Conservation Data Centre 2017). Many of these plants could be used by the groups that occupied the Whiting Slough Site, as a food source or for other purposes. The area directly around the Whiting Slough Site contains representatives of all three, including aspen trees, rose bushes and tall grasses (Western Heritage 2013).

2.2 Site Stratigraphy

The stratigraphy of the Whiting Slough site is unique on the Northern Plains. The site is located in a transitional zone between the Pike Lake Sand Hills and the sand plain to the west. Current vegetation suggests a physiographically stable environment while OSL (Optically Stimulated Luminescence) dates suggest that the area was stable for long periods in the past as well. All stratigraphic layers contain over 96% sand with the majority of this sand classified as fine sand. This suggests slow accumulation of sand in the site from the surrounding sand plain (Bowery 2020). The stratigraphy information within this section is comprised of early results from a yet uncompleted master's thesis.

The site stratigraphy is comprised of seven distinct levels (See Figure 2.3). Level one, located approximately 0-10 cm below surface (cmbs), is the modern soil surface. It is very thin, medium brown sediment and is the layer that contains the surface vegetation (10 YR 3/2) (Bowery 2020). Level two (10-25 cmbs) is a grey sandy sediment (7.5 YR 4/1) that is located directly below the sod. This level begins as a darker grey sand and gets lighter the deeper it goes. It has a gradual contact with the sediment in level three. Level three (25-45 cmbs) is a light brown sandy sediment (10 YR 6/2) that mixes with the grey sediment above it and the darker brown sediment that is below it in level four. Level four (45-63 cmbs) is a mottled brown sandy

sediment (10 YR 8/2 – 10 YR 6/2) that appears directly above the occupation level. This sediment appears to be very similar to that of level six (Western Heritage 2015b).



Figure 2.3 Site stratigraphy – north wall of unit 105N 93E. (Adapted from Western Heritage n.d.)

Level five (63-74 cms) is the occupation layer, forming a bowl or shallow depression (see figure 2.4). This level is deepest and thickest in the center and gets thinner and shallower as you move towards the periphery of the site until it eventually disappears. It consists of a dark gray to black sandy sediment (10 YR 4/1 – 10 YR 2/1) that is very distinct from the other layers present at the site (Western Heritage 2015b). This sediment also has a very greasy feel to the touch. During the excavation process this sediment would ball up and stick to artifacts. This black sediment also stained artifacts and hands with a black grease that could only be removed with water or once left to completely dry. This layer likely represents a sediment known as a black mat. This layer exhibits a higher amount of organic carbon percentages than the other

layers present. This is likely the result of the amount of faunal remains present within this layer and is what is causing the greasy feeling sediment (Bowery 2020).



Figure 2.4 Soil profile of Whiting Slough. Note the slightly concave dark black sediment level. Picture taken facing north (Western Heritage n.d.).

There is another sediment that appears intermittently around the site. It only appears around a select few of the features. This consists of a grey sandy sediment that appears as a transition between level five and six and is found at the bottom and around the edges of some of the pit features. There are no pictures or samples of this sediment that were collected so it is difficult to say exactly what it is. It is likely some intermediary layer between the dark black greasy sediment and the brown sediment. Since this layer is only found associated with some of the bone features it may be formed as a result of the shifting water table having an effect on the black greasy sand found in level five. In many cases, these features are the deepest points of the black sediment within the site. As a result of this, these areas would be most likely to be affected by the water table. As this layer is very thin and as a result of the excavation technique being used, this layer would have been easy to miss. As a result of this it is hard to say the number of features where this layer was present.

The last layer is level six (74-unknown cmbs). This layer consists of a brown sandy sediment (10 YR 7/3) (Western Heritage 2015b). This layer contains minimal artifacts within it. Its total depth is unknown as it continued below the water table level at the time of the excavations. There are several other sediment layers that appear throughout the site but only show up intermittently. These include a gray sandy sediment (7.5 YR 4/1) that appear occasionally between the sod an organic root mat near the surface. The second is a yellow brown sand (10 YR 7/4) that appears above the black sediment layer.

Chapter 3: Methods

3.1 Introduction

Archaeological investigation at the Whiting Slough Site was undertaken in stages by several different groups resulting in slightly different methods and many different archaeologists of varying skill levels working at the site. Most of the archaeological investigation was undertaken by Western Heritage, including the initial survey resulting in the discovery of the site as well as the excavation, construction monitoring and much of the cataloguing. The 2017 excavations were undertaken by undergraduate archaeology field school students under the direction of four graduate students and three faculty members from the University of Saskatchewan. This chapter will discuss the methodologies undertaken throughout the different survey and excavation stages as well as the cataloguing and lab work that was undertaken as part of this project.

3.2 History of Archaeological Investigation at Whiting Slough

Western Heritage began their archaeological investigation on the Whiting Slough Site (EINs-10) in 2007. Work at this site was undertaken as part of the Saskatchewan Ministry of Highways twinning project of Highway 7, east of the town of Vanscoy. This initial survey of the highways right of way resulted in the discovery of six new archaeological sites in the area. One of these sites was EINs-10 or the Whiting Slough Site (Western Heritage 2013).

In 2013 Fifteen shovel tests were dug at EINs-10 resulting in the recovery of 372 artifacts. The artifacts found included heavily fragmented bone that was both burned and unburned as well as one Avonlea projectile point and one piece of Swan River Chert (Western Heritage 2013). More testing was carried out in 2015 with an additional 51 shovel tests plus two 1x1m test units. Twenty-five of those shovel tests were positive resulting in 4,986 artifacts being found. As a result of these investigations the site was hypothesized to be a bison kill site (Western Heritage 2015a).

Excavations at Whiting Slough (EINs-10) were performed over several years. This included excavations by a professional cultural resource management (CRM) company as well as graduate students and undergraduate students at the University of Saskatchewan. These

excavations were undertaken in three stages by Western Heritage and a fourth and final excavation stage undertaken as part of the 2017 University of Saskatchewan Field School (See figure 3.1). These excavations began in 2015 and ended in the summer of 2017.

Stage 1 mitigation began on June 24, 2015 and lasted a month. Eight 1m x 1m units were excavated in a northern block of units and an additional 22 units were excavated in a southern block of units (Western Heritage 2017). These excavations uncovered thirteen bone features. Some of these features were excavated in profile (cross-sectioned vertically) while others were excavated within the level (not cross-sectioned) (Western Heritage 2015b). This work also uncovered 85,353 artifacts which included 59 projectile points, 47 of which could be identified as Avonlea with the rest being unidentifiable (Western Heritage 2017).

Due to the significance of the artifacts and features that were located during Stage 1 excavations, more units were excavated. Stage 2 excavations occurred from September 3 to October 16, 2015 and consisted of the excavation of another 50 units. These units joined the two excavation blocks of Stage 1 and focused mostly on the central and southern areas of the site with three exploratory units being placed in the north. This produced another 203,344 artifacts including another 103 projectile points of which 81 are identified as Avonlea style. Stage 2 also included the excavation of another 15 features (Western Heritage 2017).

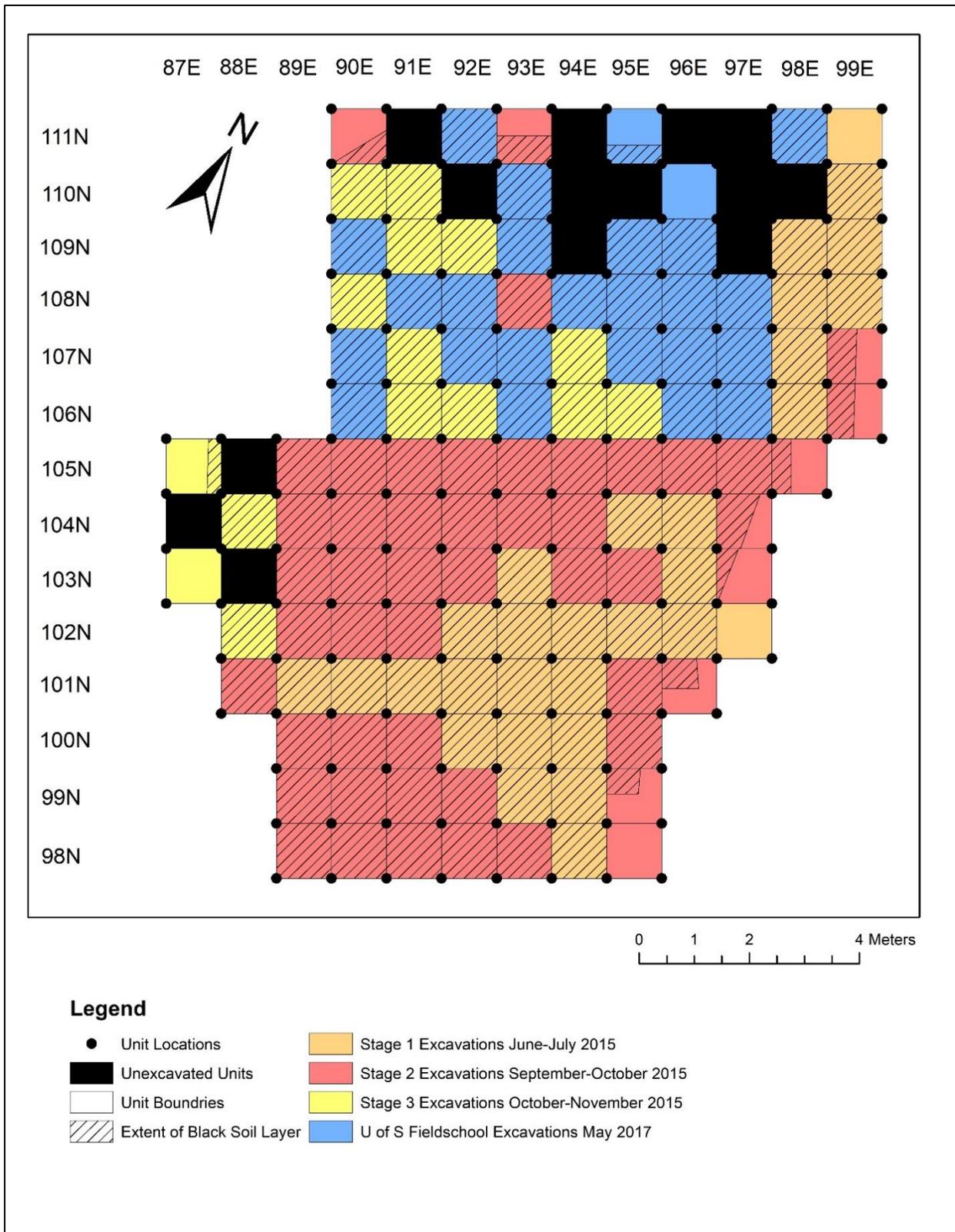


Figure 3.1 Year of excavation map with black soil layer

With Whiting Slough producing so many of these bone features and their rarity on sites in the Northern Plains, Stage 3 excavations then followed. These excavations took place from October 26 to November 3, 2015. This consisted of an additional 15 units being excavated. These units were excavated with the goal of trying to find additional bone features at the site. Eleven of these units were successful in uncovering twelve new bone features. In addition to these features, 56,195 artifacts were also located including 25 projectile points, with 18 being identified as Avonlea (Western Heritage 2017). It is at this point that additional fieldwork was undertaken by the University of Saskatchewan.

The University of Saskatchewan's excavations took place in May of 2017. Twenty-five new units were excavated over five days by the University of Saskatchewan's 2017 archaeological field school, archaeology student volunteers, and the graduate students on the project. These new units focused on filling in the gaps in the northern section of the site. During this stage of excavation three more features were located. Included in these three was Feature CB which is one of the most intriguing features at the site and will be discussed in greater detail in chapter six. The field school excavations resulted in recovery of another 47,967 artifacts, 42 of these being projectile points and 39 of those being identified as Avonlea style.

The last of the field work, consisting of monitoring highway construction, was completed in June of 2017. This work was carried out by Western Heritage and resulted in the identification of six more potential bone features to the southwest and one to the north of the main block of excavation units (figure 3.2). In total, 24 artifact clusters were found during construction monitoring. These clusters were recorded quickly before being destroyed by the construction. These features will largely be omitted from future discussion because of recording limitations and damage from the construction process. Construction monitoring resulted in an additional 4,132 artifacts being found including one Avonlea projectile point.

In total, 120 units were excavated at Whiting Slough resulting in 398,329 artifacts being found. This total includes 393,179 bone artifacts (6,496 are identifiable), 4,245 charcoal fragments, 900 lithics (228 projectile points including 188 Avonlea points two Besant points and one Hanna point) and 4 pieces of pottery. This project also located 50 features, 43 of which

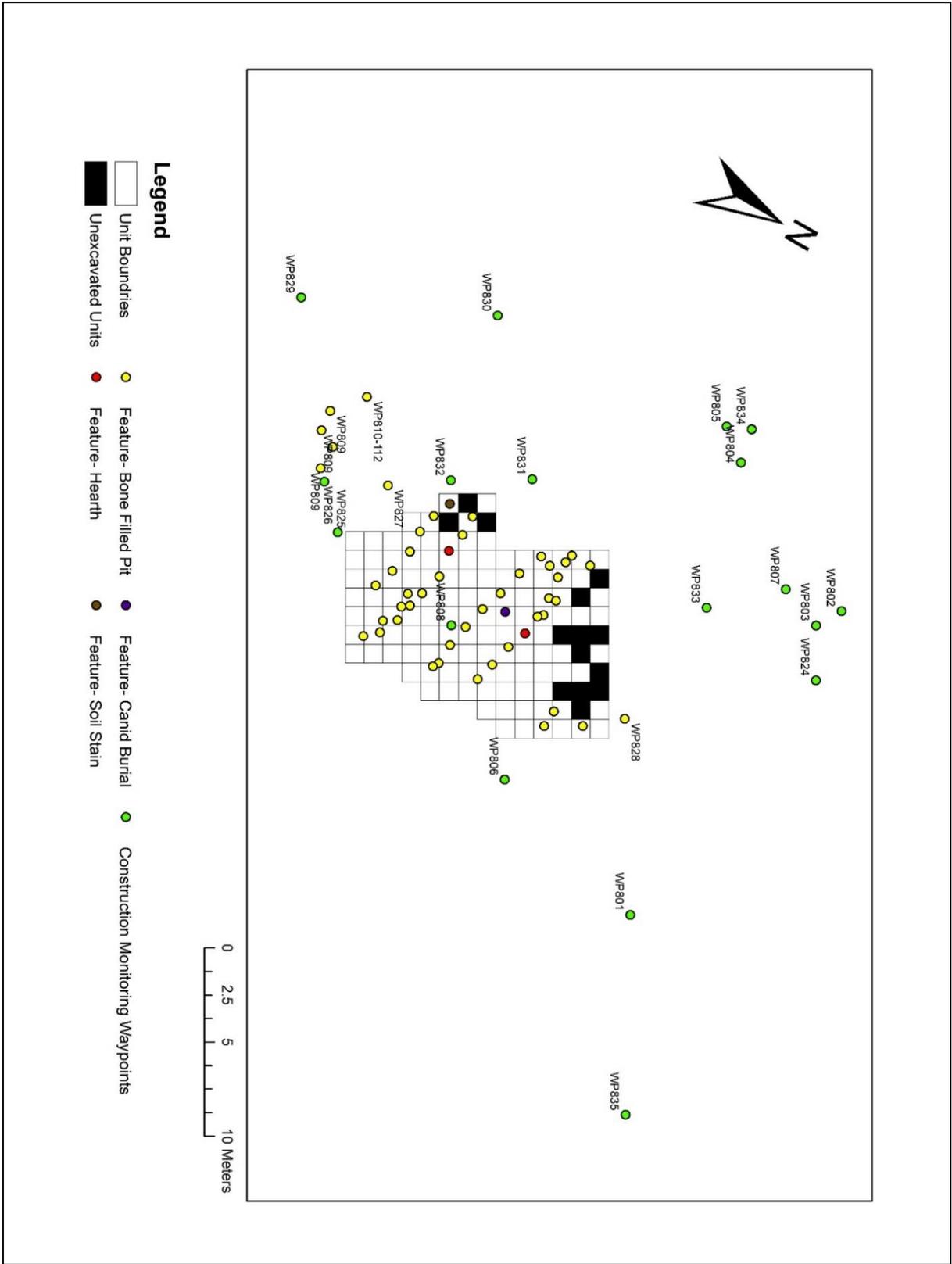


Figure 3.2 Map of features and artifacts found during construction monitoring.

were found during excavation within the excavation block. These 43 features contained 38,349 artifacts. This includes 36,528 bone artifacts, 1,771 charcoal fragments, 49 lithics (12 projectile points, 11 were identifiable as Avonlea) and one piece of pottery which was found in Feature CB.

All the artifact cataloging and analysis for Stages 1-3 was done by Western Heritage and was completed prior to the project being taken on by University of Saskatchewan students. Western Heritage also oversaw processing the OSL (Optically Stimulated Luminescence) and radiocarbon dates from the samples that were collected during their fieldwork.

Cataloging and analysis of artifacts excavated during the field school and the construction monitoring were undertaken by students at the University of Saskatchewan. Cleaning of the artifacts and some faunal identification was undertaken with the help of the 2017 archaeological field school and zooarchaeology classes. The cataloging process was largely undertaken by Paul Thomson and Brandon Halyk, with help from two recently graduated archaeology students Leks Ulan Hohol and Cara Baldwin.

3.3 Survey Methods

Survey of the highway right-of-way was conducted by Western Heritage using pedestrian survey. This was accomplished by walking transects 10 m apart along the construction right of way. Surveyors examined the ground surface and disturbances such as rodent burrows and areas of erosion to document the presence of artifacts. The presence of artifacts on the ground surface or in areas of disturbance may indicate the presence of additional artifacts below the surface. As rodent burrows and other exposures typically provided only limited indications of subsurface deposits, shovel testing was also employed. Shovel tests were placed at the discretion of the surveyor. Each shovel test was approximately 40 cm x 40 cm and was excavated into the subsoil. This sediment was screened through 6mm mesh to discern if subsurface artifacts were present. If cultural materials were found, more shovel tests were excavated radiating outward at 5 and 10 m intervals. The location for each shovel test was recorded using a GPS while sediment profiles, and depths below surface were documented. Any cultural artifacts found were collected (Western Heritage 2013).

3.4 Excavation Methods

3.4.1 Western Heritage Excavation Methods

Three separate stages of excavation were undertaken by Western Heritage. The first stage of excavation was comprised of two separate blocks of units. The northern block consisted of eight units in two overlapping lines while the southern block was much larger and consisted of 22 units. Stage two excavations filled in the area between the northern and southern block while extending the southern block. This stage also included three exploratory units to the north of the block. The final stage of Western Heritages excavations consisted of 15 more units that were placed throughout the unexcavated area. These units were placed in areas where there were most likely to be more of the bone features. This was done with the hope of finding the remaining features at the site in order to understand what their function at the site was (Western Heritage 2015b).

In total, Western Heritage excavated 95 1m x 1m units at the Whiting Slough Site. These units were excavated in four 25cm x 25cm quadrants and excavated in 10cm arbitrary levels. Shovel testing and stage 1 excavations indicated that in most areas the sod layer and upper 10-20 cm of sand were culturally sterile. Consequently, in subsequent excavation stages this sediment was not screened. Within certain areas where the occupation layer was deeper the top 30 cm of sediment was removed without screening. In areas at the periphery of the site where the black layer was near the surface all sediments were screened. All screening employed a 6 mm mesh screen. At the end of each of these 10cm levels level records were recorded and planviews were drawn. Any artifacts that were located were placed in a bag with information on each quadrant and level the artifact came from. Units were excavated one quadrant at a time using the shovel shaving technique of excavation (Western Heritage 2015b).

3.4.2 University of Saskatchewan Excavation Methods

Excavations undertaken by the University of Saskatchewan in 2017 largely employed the same methodologies as those performed by Western Heritage. Units were still 1m x 1m and excavations were performed by digging each quadrant separately by shovel shaving. The biggest difference between excavation methodologies involved screening. As has been mentioned

above, as a result of time constraints and the known lack of artifacts, Western Heritage did not screen many of the sediments above the black occupation layer, while students digging as part of the University of Saskatchewan excavations screened 50% of these sediments. Once the black sediment started to become apparent or artifacts were noted 100% of the excavated sediment was screened. Otherwise, University of Saskatchewan students employed the same paperwork and excavation methodologies used by Western Heritage.

3.4.3 Western Heritage Construction Monitoring Methods

Western Heritage was present at the site during the ground stripping that took place in late 2017 as part of the highway construction process. Pedestrian survey transects were walked between passes by the heavy machinery. Several artifact clusters and potential features were located during this process. These were mapped using a global positioning system (GPS) (Thomson 2020) and the artifacts collected.

3.5 Cataloging Methods

The same cataloging process was employed by both Western Heritage and the University of Saskatchewan. This consisted of first cleaning the artifacts with water and letting them air dry on paper towels. They were then sorted and organized into lithic and faunal remains. Faunal artifacts were further sorted by identifiable and unidentifiable specimens. They were then cataloged based on several attributes including size, weight, modification, species identification (when possible), bone element and state of burning (if present). Attributes recorded for lithic artifacts included size, weight, tool type, heat treatment and several others, such as flake termination, point style and breakage, depending on artifact type. In total 43 different highly specific attributes and measurements were recorded depending on the artifact in question. During this process, artifacts were given a unique catalogue number, bagged and then digitally archived into a Microsoft Excel document.

3.6 GIS Methods

The first task that needed to be completed was to prepare the data so that it would be usable in ESRI's Arc Map program. This meant assigning coordinates to artifacts and organizing the Microsoft Excel data sheet so that it would be easily searchable and could be inputted into

Arc Map. Organizing of the data primarily consisted of going through the data and correcting errors, typos and misplaced data within the spreadsheet. Much of this work was done upfront but errors and omissions within the data resulted in many corrections being required throughout the course of the project.

The next task was to assign each artifact latitude and longitude coordinates. As there was no site datum provided from Western Heritage, other methods were utilized. Luckily, Google Earth had images containing the Stage 1 excavations. From this image we were able to use Universal Transverse Mercator (UTM) coordinates for the site datum using Google Earth's measuring tool. This allowed us to assign each of the artifacts a UTM coordinate. As a result of the way the site was excavated no artifacts were individually measured in using three-point provenience. Thus, artifacts were assigned to the center of the quadrant in which they were located. Some artifacts that had no quadrant designation were assigned to the center of the unit in which they were found. Once all artifacts were assigned UTM coordinates these were converted to latitude and longitude coordinates using a conversion tool created by Steve Dutch (2005).

The artifact catalogue was then inputted into Esri's ArcMap and separated into various categories such as faunal, lithic, pottery and charcoal. Many of these categories were subdivided into more specific sub-categories such as tools, fire-cracked rock, bison bone, canid bone, Avonlea projectile points among others. Once all these categories were formed, they were plotted onto the map as point layers using their assigned latitude and longitude.

An excavation grid and unit corners also needed to be created. This was done by using the site datum in UTM coordinates to create a point class that would contain the four corners of each excavated unit. These corners were then connected to create the unit outlines. Further, all the features and construction monitoring waypoints needed to be placed on the map. As no GPS coordinates were taken of the features, they were manually measured and added to the map based on site paperwork and photos. This was done by using the excavation block grid that was created earlier and creating a feature class in which points could be manually entered into the map and recorded as a new point feature within this new feature class.

As a result of the types of data that were obtained and the questions asked about the site, a density analysis was run for many of the layers that were created in the earlier steps. A few exceptions to this were the layers that contained very few data points such as the pottery map layer. Density analyses were run using both weight in grams as well as number of artifacts depending on the artifact layer in question. Primarily, artifact numbers were used as the measuring metric for some lithics such as tools while weight was used for lithic manufacturing debris and faunal remains. While this was the primary process, there were instances where the number of artifacts was used when analyzing faunal remains as well. This mixing of weight and number was primarily used to see differences within the degree of bone processing within the site. All these densities were run with a search parameter of one square meter. Meaning that a change in colour represents the number or weight of the given artifact type that was found within one square meter of that pixel. These numbers also only represent the artifacts that were found within the occupational layer of the site. Classification ranges were primarily divided into five different ranges. This was done according to Jenks method. This process sets class breaks based on natural gaps within the data and works well with unevenly distributed data (Price 2016). There are a few exceptions to this such as where artifact count was the classification system and where there were low numbers of artifacts. An example of this is in the projectile point maps, where it made more sense to make seven ranges, one for each of the densities that are present on the map (see chapter 7).

3.7 Radiocarbon Dating

Three samples from the occupation layer were collected for radiocarbon dating during the Western Heritage excavations. These samples were processed by the Laboratoire de Radiochronologie in Laval, Quebec and by Keck Carbon Cycle AMS Facility at the University of California, Irvine (table 3.1, see also Appendix A). While it is impossible for two separate lab sample numbers to be obtained from the same sample, that is what was given to Western Heritage. It appears that the Laval numbers (ULA) are the proper lab numbers for the samples that were obtained. In addition to this, no standard deviation was given for these radiocarbon dates. These samples were obtained from three different areas around the site. Sample UCIAMS-173582/ULA-6040 was from a bone sample in the North-East quadrant of unit 105N

93E at a depth of 70-80 cm below surface. The second sample (UCIAMS-173583/ULA-6042) was from a bone sample from feature J1 in the South-East quadrant of unit 111N 90E. The third and final sample from the occupation layer was sample UCIAMS-173584/ULA-6043 from Feature A in the North-West quadrant of Unit 98N 94E. A fourth sample that was submitted, but results were inconclusive because of a low amount of collagen within the sample (The Laboratoire de Radiochronologie and Keck Carbon Cycle AMS Facility 2016). These dates are incredibly tight. They also have small error ranges with the largest being plus or minus 20 years.

University of California #	Université Laval #	Carbon 14 age (B.P.)	Plus/Minus (Years)
UCIAMS-173582	ULA-6040	1325	15
UCIAMS-173583	ULA-6042	1330	20
UCIAMS-173584	ULA-6043	1320	20

Table 3.1 Radiocarbon dates sample for Whiting Slough (ENS-10) (Adapted from The Laboratoire de Radiochronologie and Keck Carbon Cycle AMS Facility 2016)

3.8 Site Seasonality

The season of occupation at Whiting Slough is an important aspect of the site to understand in order to better comprehend what may have been taking place at the site and the natural obstacles, such as weather, with which the people would have been dealing. Thomson (2020) goes into depth about bison herd makeup at Whiting Slough. Using bone size variation as well as bison dentition to determine age of the animals he was able to determine the likely season of occupation at Whiting Slough.

Few complete or nearly complete bison bones were found at Whiting Slough. Nevertheless, by measuring the proximal articular surface and the proximal articular breadth of 13 proximal radii, Thomson (2020) was able to define two clear groupings of 7 female and 6 males (figure 3.3).

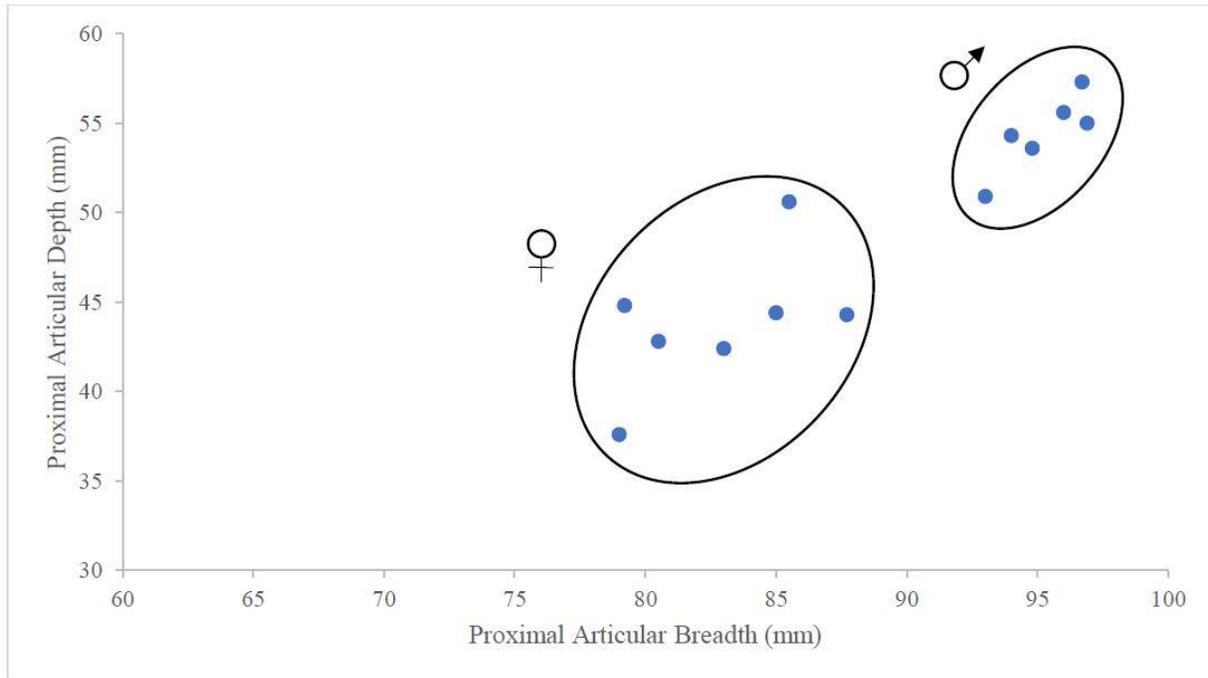


Figure 3.3 Graph of proximal radii articular surface and articular breadth measurements. (Thomson 2020)

To augment Thomson's research, Dr. Ernest Walker of the University of Saskatchewan's Archaeology and Anthropology Department sought to determine the age of the bison (at the time of death) by studying the enamel attrition of bison mandibular dentitions of 12 specimens (table 3.2). Groups 1 through 3 consist of juvenile bison while group 5 is all adult animals (Thomson 2020). Based off both of these lines of evidence, Thomson (2020) ascribed a late fall or early winter occupation of the site, with the kill and processing at the Whiting Slough Site taking place in the months of October or November.

Group Number	Age (Years Old)	Number of Specimens
1	0.6	0
2	1.6	1
3	2.6	0
4	3.6	4
5	4.6	1
5a	5.6	0
5b	6.6	1
5c	7.6	1
5d	8.6	2
5e	9.6	1
5f	10.6	1

Table 3.2 Breakdown of animal age based off enamel attrition. (Adapted from Thomson 2020)

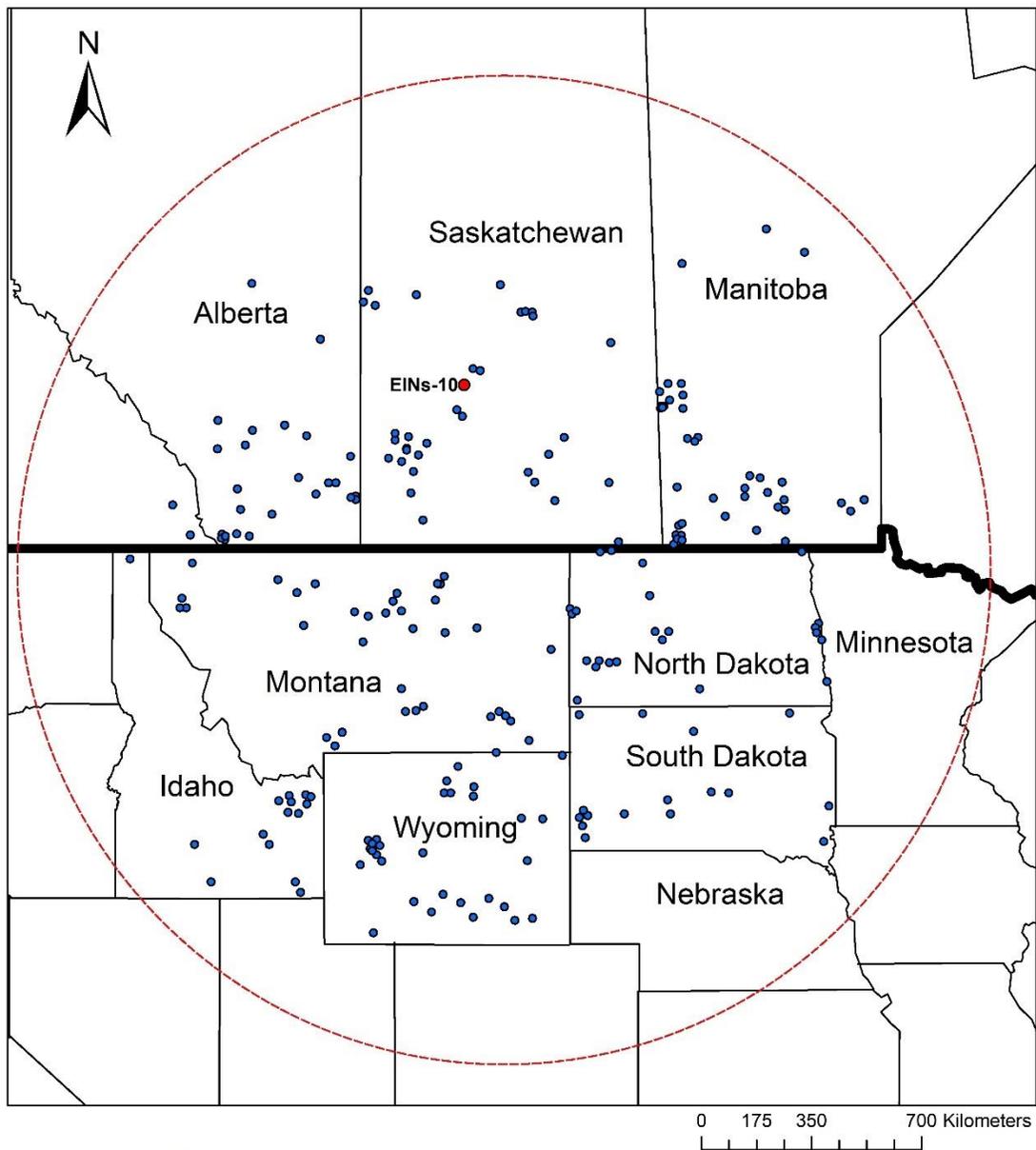
Chapter 4: Avonlea Culture History

4.1 Introduction to the Avonlea Phase

The Avonlea Phase appears on the Northern Plains of Saskatchewan and Alberta around 1800 B.P. and is replaced around 700 B.P. (Dawson and Walker 1988, Peck 2011). These dates can vary slightly depending on the region. This period of time on the Northern Plains is important because it sees new technologies introduced. In addition, the Avonlea Phase is seen as the peak of the bison hunting culture on the Northern Plains (Reeves 1990). During the Avonlea Phase the accumulation of knowledge from previous generations and cultures resulted in the people of the Avonlea Phase being able to fully exploit the bison through advanced hunting techniques such as pounds and jumps as well as advancements in hunting technology with the introduction of the bow and arrow. When these hunting advancements are combined with the processing and food storage systems that are part of the Avonlea Phase and earlier archaeological assemblages, it creates this classic time period for the Northern Plains bison hunting culture. As a result of these advancements, the Avonlea Phase is often used as a cultural horizon marker for the Late Prehistoric Period on the Canadian Plains (Vickers 1994). This phase was first brought to the attention of archaeologists in 1956 at the Avonlea type site in Southern Saskatchewan (Kehoe 1988, Kehoe & McCorquodale 1961).

4.2 Geography and Chronology

Avonlea sites extend throughout the Northern Plains of Canada and the United States. With the core area for Avonlea being located in southwestern Saskatchewan, southeastern Alberta and northern Montana. Avonlea points have also been found in British Columbia, Manitoba, North and South Dakota, and Wyoming (figure 4.1) (Davis et al. 2017, Hudecek 1989, Peck 2011, Reeves 1983, Vickers 1994, Wilson-Meyer & Carlson 1985). In all, the Avonlea Phase extends from the Rocky Mountains out onto the Northern Plains, as far north as the southern limits of the boreal forest and south beyond the Missouri River. The geographic center of the Avonlea home range seems to be northwest of the city of Swift Current, Saskatchewan (Davis 1966).



Legend

- Whiting Slough
- Avonlea Sites
- Canada U.S Border
- Provincial/State Boundaries
- Avonlea Cultural Area

Figure 4.1 Map of North America showing the location of Whiting Slough Site (EINs-10) and other Avonlea sites (Adapted from: Canadian Archaeology 2016; Davis et al. 2017; Diduck 2018; Hall 1998; Hannus 1994; Reeves 1983; Peck 2011; Wilson-Meyer & Carlson 1985)

The Avonlea Phase is believed to have developed from the Pelican Lake Tradition, based on the similarities including lithic material preferences and settlement patterns (Johnson and Johnson 1998). Reeves (1983) argues that the Avonlea Phase is born out of the diffusion of bow and arrow technology from the interior of British Columbia melding with ceramic technology from the east. This dual diffusion of technology leads to this unique cultural group and marks the beginning of the Late Prehistoric Period on the Northern Plains (Vickers 1994). Avonlea is coeval with the Besant Phase. While these two groups do share similarities, technologically there is one major difference. Avonlea is associated only with the bow and arrow whereas the Besant used bow and arrow and the established technology of the atlatl (Peck 2011). Although they do overlap both chronologically and spatially archaeological remains of the two groups are rarely located in the same contexts, and the relationship between these two groups is not fully understood (Johnson & Johnson 1998). The end of the Avonlea Phase is associated with the introduction and rise of a new cultural tradition called the Old Woman's Phase, a process beginning around 1100 B.P. Transitional Avonlea/Old Women's sites are found in Southern Alberta, southwestern Saskatchewan and north-central Montana (Peck 2011).

4.3 Subsistence

As with most Northern Plains archaeological cultures, the people of the Avonlea Phase were hunter gatherers focused on following the large herds of bison as a part of their seasonal rounds, though other food sources such as fish were exploited at specific times of the year (figure 4.2). While other such foods were exploited, it must be emphasized that these groups were heavily dependent on the hunting and processing of the bison (Peck 2011, Meyer & Hamilton 1994; Smith & Walker 1988).

Two major hunting techniques were employed during the Avonlea Phase: jumps and pounds (Reeves 1983), both of which required considerable pre-hunt preparation and organization, and were undertaken communally. Bison jumps required specific landscapes and often had a grazing area where bison would congregate and then could be run through a carefully crafted set of drive lines towards a cliff or steep embankment where they would fall to their death or injury (figure 4.3) (Oetelaar 2014). People would be at the base of the

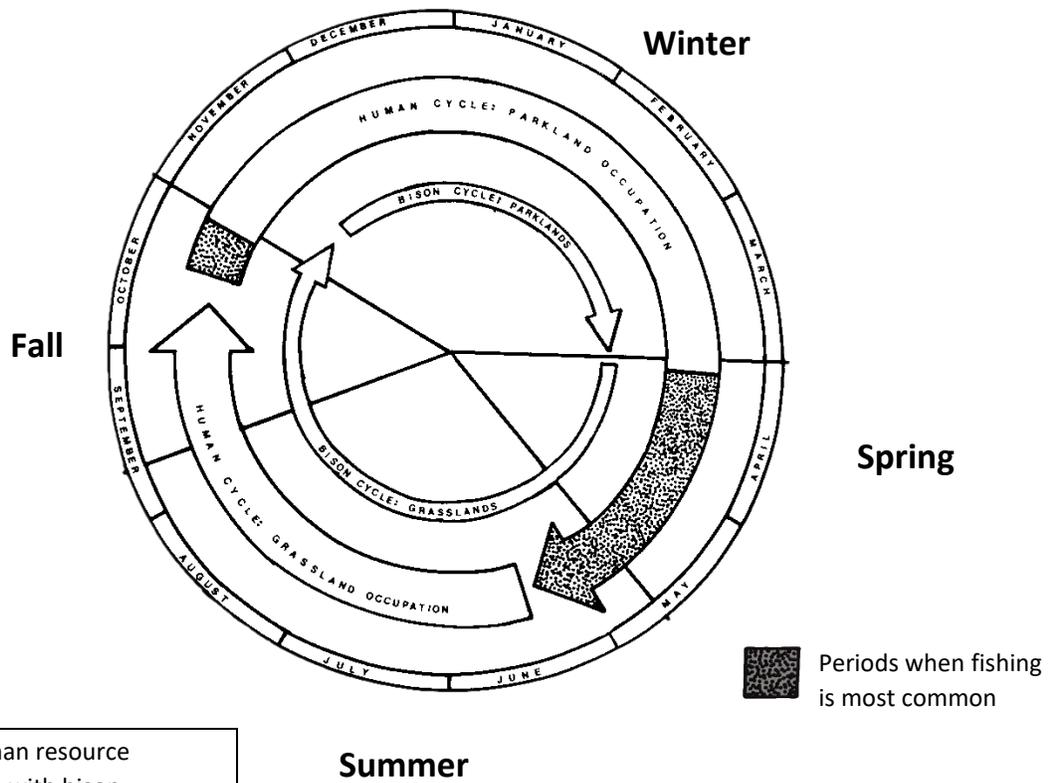


Figure 4.2 Human resource utilization cycles with bison migratory patterns and fishing seasons. (Smith & Walker 1988)

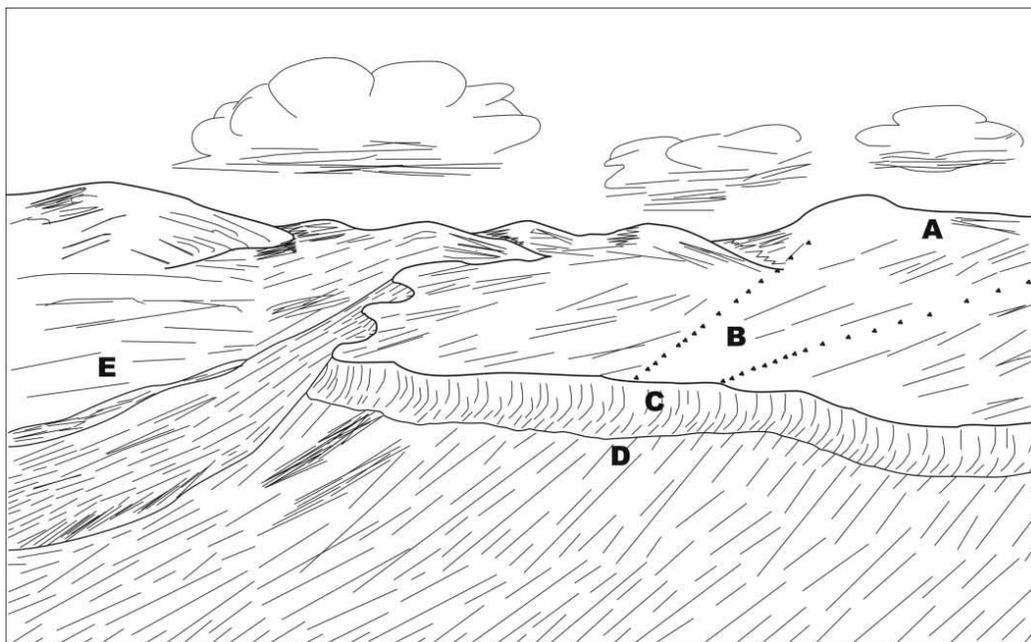


Figure 4.3 Example of a bison jump: A) The gathering basin B) The drive lines C) Cliff/escarpment D) Bone bed and primary butchering location E) Campsite and processing area (Oetelaar 2014).

escarpment to dispatch any survivors and then start the processing of the animals (Walker 2016).

The second hunting technique was to use corral structures or pounds to capture the animals. This process was similar to the jump where there would be drivelines and animals would be chased towards the trap. The differences here are that there was no requirement to have a cliff or steep embankment and smaller groups of bison were targeted (Kornfeld et al. 2010). In this strategy, a fence would be created using wood and brush to trick the bison into thinking they could not get out of the pound (Adams 1977). The animals were then dispatched with arrows from outside of the pound. In figure 4.4 an example of a bison pound can be seen. This would be very similar to what would have been used during the Avonlea Phase, except for the horse in the far right of the image. During the Avonlea Phase hunters would have chased the animals on foot because horses had not yet been introduced onto the Canadian Plains.



Figure 4.4 Example of a bison pound. “A Buffalo Pound” engraving done in London related to the 1819-1822 Franklin Expedition (Back 1820).

This communal bison hunting often occurred on a very large scale resulting in a large number of animals being taken in a single hunting event (Meyer and Hamilton 1994). This combined with the introduction of the bow and arrow made for a time of prosperity. Despite the skill that these groups had in organizing these large bison hunts, they were also quite

flexible in food sources that they were able and willing to exploit (Meyer & Hamilton 1994). Large mammals such as elk, moose and pronghorn were hunted as an additional meat source. Avonlea people also exploited smaller resources such as various canids, rabbits/hairs, beaver, birds, mussels and fish (Hudecek 1989; Reeves 1983; Smith & Walker 1988; Wilson-Meyer & Carlson 1985; Peck 2011; Meyer & Hamilton 1994). Some of these secondary meat sources are restricted to specific geographic locations and consequently only obtained when groups are visiting these specific areas. Examples of this variability include but are not limited to, elk, moose, pronghorn and deer (Hudecek 1989). In addition to hunting animals, groups during the Avonlea Phase also gathered and used plants as part of their subsistence strategy (Reeves 1983). A major subsistence activity that was employed by these hunter gatherer groups was the extraction and use of bone grease. This process was labour intensive and consisted of smashing selected bones into small fragments then boiling the bone in small pits of water by heating rocks and dropping them into the water to cause it to boil. The result of this process was that the grease is extracted from the bone and then can be skimmed off the top of the water (Outram 2001). This grease would then be mixed with dried meat and sometimes berries to produce pemmican. The use of pemmican in the diet allowed them to have a more stable food source through the cold winter months as it lasted longer, was easier to transport, and was a highly concentrated food source (Reeves 1990).

4.4 Technology

The use of the bow and arrow on the Northern Plains intensified during the Avonlea Phase. This shift in hunting technology brings with it a change in hunting strategies and how food sources, especially bison, were exploited. It also had a profound impact on the number of animals that were being harvested in any given hunting event. “The bow and arrow provided the final kick that enabled more effective and efficient exploitation of bison, not only communally, but also by small groups or individual hunters” (Reeves 1990 pg. 170-171). Bow and arrow technology has several advantages over its predecessor the atlatl. The first is that it is easier to manufacture, more versatile, easier to use, has better accuracy, can shoot more projectiles in a given amount of time, has a larger range and can be used in more situations where an atlatl would be too large and cumbersome to be used (Reeves 1990). With this change

in system, bison kill sites became much more substantial. Some of these kill sites contain large bone beds of six or more meters thick. Associated Avonlea sites contain substantial middens of smashed bone and fire-cracked rock (FCR), multiple hearths and boiling pits (Reeves 1990). These appear in a much greater scale and show this intensification of hunting techniques with the introduction of the bow and arrow. This allowed the bison herds to be hunted both communally and individually by the Avonlea people. Bow and arrow hunting technology when combined with the assembly-line style of processing that is seen at some sites, and other technologies such as food storage, is why some refer to the Avonlea Phase as the classic expression of bison hunting culture on the Northwestern Plains (Reeves 1990).

Another aspect that can be seen within the Avonlea Phase is the manufacturing techniques used to create their projectile points. Reeves (1990 pg. 187) describes the Avonlea flintknapping as “the finest since Paleoindian times”. This can definitely be seen when examining the craftsmanship and level of detail that is present in the Avonlea tool kit. This is especially evident when you compare it to the level of craftsmanship that can be seen in many of the other lithic technologies that were present on the Northern Plains prior to the introduction of the Avonlea bow and arrow technology.

4.5 Settlement Patterns

Avonlea settlement patterns are not well understood, but the site locations indicate that the Avonlea people were moving across the landscape following bison herd movement (Peck 2011). A large proportion of known Avonlea sites are kill and processing sites with few known habitation sites. Many of these kill sites are on a large-scale and can be found throughout the Avonlea habitation range (Meyer and Hamilton 1994). The other type of prevalent site is processing sites. These sites are located near the kill site and are used as a staging area to further process the kill into usable sections of meat and is the area where grease extraction can take place (Kornfeld et al. 2010; Walker 2016). During the Avonlea Phase, these processing sites become larger than what was seen in earlier cultural periods (Reeves 1990). Many of these processing sites consist of large amounts of smashed bone, fire-cracked rock, and often have features such as hearths, boiling pits, stone-lined pits and rock filled hearths (Kornfeld et al.

2010; Reeves 1983). Not much is known about the Avonlea habitation sites. The few that have been found seem to be located on stream terraces and in some cases caves (Reeves 1983).

4.6 Avonlea Lithic Assemblage

Avonlea projectile points are highly distinctive (Peck 2011). With the introduction of the bow and arrow on the Northern Plains, there is a stylistic and size difference compared to the projectile points of previous cultural periods. They are very small and thin giving them a delicate look. They are typically very well made with well thought out and executed flaking. Flake scars are shallow and usually parallel. Avonlea points are side notched with small wide notches placed very low toward the base of the projectile point. The corners of the base are often rounded with small “ears” and bases can range from flat to heavily concave. (Davis 1966, Johnson and Johnson 1998, Kehoe and McCorquodale 1961, Morrow n.d., Vickers 1994). Points measure on average 21 mm long with a width that averages 13 mm (Vickers 1994). In 1966, Kehoe (1973) divided the Avonlea projectile points into four styles, Gull Lake, Timber Ridge Sharp-Eared Avonlea Classic and Carmichael Wide-Eared, based on visual differences (Diduck 2018; Kehoe 1988; Reeves 1970). These differences can be seen in figure 4.5. Kehoe’s classification was later updated by Reeves in 1970. By using metric analysis Reeves discarded the four sub-types and came up with his two distinct sub-types, Timber-Ridge Side Notched and Head-Smashed-in-Corner Notched. These distinctions were based on shoulder shape with the Head-Smashed-In points having acute or barbed shoulders and the Timber-Ridge Side Notched having obtuse shoulders (Meyer and Walde 2009; Reeves 1970; Diduck 2018). The Avonlea projectile point sub-types were reconsidered and updated by Diduck in 2018, based primarily on her work with the Whiting Slough assemblage. Diduck identified two sub-types by using a landmark-based geometric morphometrics approach to understand shape variation. Group A is similar to those identified at the Avonlea type site and consist of points that have a long narrow blade with primarily concave bases. Group B consists of points that have a short and stubby blade with a primarily straight base (Diduck 2018).



Figure 4.5 Example of Avonlea projectile points as classified by Kehoe in 1966 (From Left to Right)- Gull Lake, Carmichael Wide-Eared, Timber Ridge Sharp-Eared. (Adapted from Kehoe 1973)

Within the Avonlea lithic assemblage there are also unnotched points found in some assemblages. These are thought to be arrowhead preforms that could be finished and then used later or they could be used to trade with other groups (Vickers 1994). While there are minor differences across the subtypes, the typical Avonlea shape, thinness and excellent level of manufacture remain consistent. Avonlea projectile points are created very uniformly, and their manufacture represents a cohesive lithic tradition. It is hypothesized that because of this uniformity, the production of Avonlea projectile points might have been controlled by a small group of specialized and highly skilled flintknappers (Reeves 1990). This would explain why the Avonlea Phase was able to keep producing these almost perfect points with very little differences in style and manufacturing precision across the Northern Plains.

Another component of the Avonlea lithic assemblage are bifaces. Asymmetric bifaces are found in many Avonlea sites and are considered to be a characteristic artifact in the Avonlea assemblage (Reeves 1983; Wilson-Meyer and Carlson 1985). These may be time sensitive during the Avonlea Phase, as the asymmetric bifaces are altered slightly. They start out as an ovate shape and slowly change to a more lanceolate shape, and there is a general reduction in size over time (Reeves 1983; Wilson-Meyer and Carlson 1985). In addition to the asymmetrical bifaces, there are also diamond shaped bifaces, pointed unifacial flakes, cores, flakes, choppers, bifacial and unifacial cobbles, end scrapers, uniface and chipping hammers (Reeves 1983; Wilson-Meyer and Carlson 1985). The Avonlea lithic assemblage and projectile points are made

from a variety of different materials. While being heavily dependent on local lithic sources, the people of the Avonlea Phase did, in some cases, use other imported fine-grained lithic materials.

4.7 Avonlea Ceramic Assemblage

Within Avonlea sites, there are several types of pottery with different vessel shapes and decorations that are commonly found. Generally, Avonlea pottery can be net or fabric impressed, smooth surfaced, have a simple form, are normally conchoidal or bag shaped, of uniform grit-temper, and can be decorated by one or more rows of punctates below the rim (Johnson & Johnson 1998; Meyer and Hamilton 1994; Meyer & Walde 2009; Reeves 1983; Vickers 1994).

Meyer and Walde (2009) argue that there are four distinct types of Avonlea pottery: (1) Rock Lake Net/Fabric-Impressed, (2) Truman Parallel-Grooved, (3) Ethridge Cord-Roughened and (4) Plain Ware (figure 4.6). Rock Lake Net/Fabric-Impressed pottery is a very common pottery style within Avonlea ceramic assemblages. It employs, as the name suggests, a net or fabric impressed construction method. It can be found anywhere from the eastern Woodlands to central Minnesota and northwest towards southern Alberta and is especially common in Saskatchewan and Alberta. Truman Parallel-Grooved is an Avonlea pottery style that consists of horizontal lines and troughs that circle the entire vessel. This pottery can be found in northeastern Montana, southern Alberta and Saskatchewan. Ethridge Cord Roughened consists of a cord-roughened finish on the outside of the ceramic vessels. This pottery style is restricted to a relatively small locale along the Montana and Alberta border. The last of the styles is the rare Avonlea Plain Ware. These wares are coiled vessels that are finished with a smooth surface and are considered to reflect interaction between the Avonlea people and the Laurel Culture of the Boreal Forest (Meyer & Walde 2009).

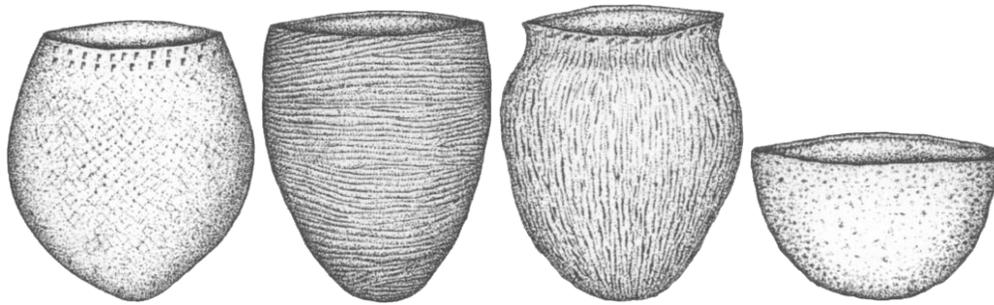


Figure 4.6 Example of Avonlea pottery (From left to right)- Rock Lake Net/Fabric-Imprinted Ware, Truman Parallel-Grooved Ware, Ethridge Cord-Roughened Ware, Plain Ware. (Adapted from Meyer & Walde 2009)

4.8 Avonlea Burial and Ceremonial Practices

Avonlea Burial practices are characterized by primary flexed or extended pit burials containing large quantities of utilitarian and ornamental grave goods (Reeves 1983). In the example of the Bethune Site in south-central Saskatchewan, multiple individuals were buried on the high ground of the area. The graves were then covered with rocks which were likely piled into a stone cairn. In this example, the burials represented old and young individuals as well as both male and female. The Bethune site also contained both primary and secondary burials (Dawson and Walker 1988).

Other spiritual activities can be seen in some Avonlea sites. An example of spiritual or ceremonial activities can be seen in some pound sites which have bison skulls buried in association with the pound such as at the Hardisty Bison Pound (FdOt-31) (Moors 2017). Here, an elongated pit that contained one adult and two calf bison skulls aligned with the inside of the pounds' fence. There was also a small hearth associated with the entrance of the pound, interpreted to have some spiritual or ceremonial significance (Moors 2017). The presence of these skulls associated with large kill sites suggests that they were an important part of the site and were likely used to ensure continued success of the bison pound (Moors 2017). An additional spiritual or ceremonial component that can be found in Avonlea sites is the presence

of canid bone. At the Yellow Sky Site, burned canid bone found in association with a basin shaped hearth was interpreted to reflect ceremonial activity (Wilson-Meyer and Carlson 1985).

4.9 Summary of Avonlea Sites

As noted, Avonlea sites occur throughout the Northern Plains. While they are present in higher frequency in Saskatchewan, they can also be found with less frequency in both Manitoba and Alberta as well as in Montana, North and South Dakota and Wyoming (Davis et al. 2017; Hannus 1944; Hudecek 1989; Reeves 1983; Wilson-Meyer & Carlson 1985). The following compendium includes the Avonlea type site as well as Avonlea Phase bison jumps, bison pounds, warm and cold weather campsites, processing sites and burial sites. Figure 4.7 and table 4.1 document some of the site locations that will be discussed and their Avonlea occupation radiocarbon dates.

4.9.1 The Avonlea Type Site in Saskatchewan (EaNf-1)

The Avonlea type site is located about 50 km southwest of Moose Jaw and 5 km east of the town of Avonlea Saskatchewan, in the Avonlea Creek Valley (Kehoe 1988). This site was excavated in October of 1956 by McCorquodale and A.E. Swanston results of which were subsequently published by Kehoe and McCorquodale (1961). It was again excavated in 1984 (Kehoe et al. 1988). The site was determined to be a kill site (Kehoe and McCorquodale 1961, Kehoe 1988). The first radiocarbon date from the Avonlea type site was obtained from the remains of a charred bone from a bone-filled boiling pit and returned a date of 1500±100 B.P. (Kehoe 1988). The site contained what would eventually be referred to as Avonlea projectile points. In the 1956 excavation, they were able to recover 57 projectile points and 100+ ceramic body sherds. In the 1984 excavation, there were 23 projectile points found, 12 of which could be identified as Avonlea. Only one small ceramic sherd was found during this second round of excavations. There were 28 bone tools found during the 1984 excavations, including 10 awls, 13 skinning knives, 4 bone flakers and one broad-end bone implement. The bone remains of both the 1956 and 1984 excavations were poorly preserved and can contribute little information to the understanding of the Avonlea type site (Kehoe et al. 1988).

Site Name	Site Designation	Radio Carbon Dates (B.P.)	Province/State	Lab Number	References
Hardisty Bison Pound	FdOt-31	1170±40	Alberta	Beta-272350	Canadian Archaeology (2016)
Head Smashed In Buffalo Jump	DkPj-1	1860±120 & 1000±110	Alberta	GAK-1475 and RL-256	Peck (2011)
Larson Site	DlOn-3	1140±90 & 1420±150	Alberta	AECV-300C & GX-9395 A	Milne (1988)
Manyfingers Site	DhPj-31	1180±85	Alberta	S-866	Quigg (1988)
Miniota Site	EaMg-12	1340±90 & 870±90	Manitoba	Beta-58908 & Beta-58907	landais et al. (2004)
Lost Terrace	24CH68	1190±60 & 2240±90	Montana	Beta- 123151 & Beta-14150B	Canadian Archaeology (2016)
Timber Ridge Site	24BL101	980±110	Montana	GX-1195	Peck (2011)
Fantasy Site	24PH1324	1040±100	Montana	RL-1717	Tratebas and Johnson (1988)
Evans	32MN301	1200±85 & 1360±85	North Dakota	I-7565 & I-7566	Schneider and Kinney (1978)
Gull Lake	EaOd-1	1740±60 & 1290±60	Saskatchewan	S-255 & S-254	Kehoe (1973)
Bethune	EeNg-6	1389±40	Saskatchewan	S-1575	Dawson and Walker (1988)
Sjovold	EiNs-4	1380±200	Saskatchewan	S-1762	Peck (2011)
Yellowsky	FjOd-2	720±135 & 340 ±140	Saskatchewan	S-2299 & S-2300	Wilson-Meyer & Carlson (1985)
Newo Asiniak	FbNp-16	915±70	Saskatchewan	S-2533	Kelly (1986)
Avonlea	EaNg-1	1500±100	Saskatchewan	S-45	Kehoe (1988)
Lebret	EeMw-26	1635±105 & 1260±115	Saskatchewan	S-2797 & S-2691	Peck (2011)
Garrett site	EcNj7	1450±70 & 1290±60	Saskatchewan	S-406 & S-408	Morgan (1979)

Table 4.1 Radiocarbon dates of some of the sites discussed during this chapter.

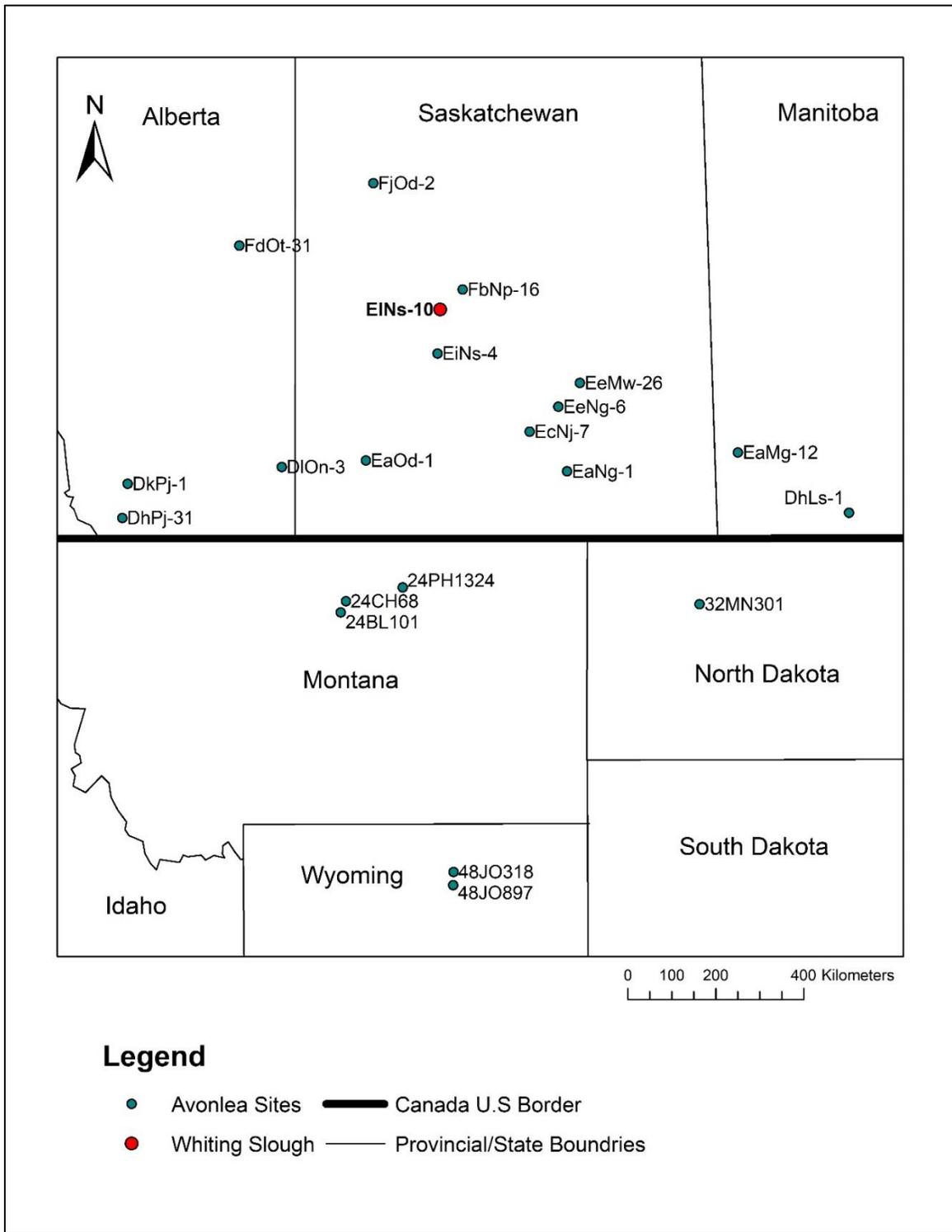


Figure 4.7 Map of North America Showing the location of Whiting Slough Site (EINs-10) and other Avonlea sites discussed (Adapted from: Canadian Archaeology 2016; Davis et al. 2017; Diduck 2018; Hall 1998; Hannus 1994; Reeves 1983; Peck 2011; Wilson-Meyer & Carlson 1985)

4.9.2 Other Avonlea Sites in Saskatchewan

There are many Avonlea sites located in Saskatchewan. **The Gull Lake Site (EaOd-1)** is a multiple component site that contains several Avonlea occupations. The Avonlea layer dates to 1290±60 B.P. (S-254) (Kehoe 1973) and contains both an earlier Avonlea campsite and, in later occupations, a large-scale bison drive system. This site evidences the first use of a bison drive system which continues into other later archaeological contexts. Within the Gull Lake Sites artifact assemblage, there are a total of 333 projectile points. Intriguingly, one of the occupation layers had been completely burned over presumably after the group was finished with the occupation of the site. Further, one human mandible was uncovered within the Avonlea context. This was the remains of a nine-year-old child, the only human remains found at the Gull Lake site in any context (Kehoe 1973).

The Yellowsky Site (FjOd-2) is located on a flat clearing along the eastern shore of Turtle Lake in west-central Saskatchewan. It is radiocarbon dated to 720±135 B.P. (S-2299) (Wilson-Meyer & Carlson 1985) and is a short-term warm weather Avonlea occupation. The Yellowsky Site contained several features including a basin shaped hearth and a surface hearth. The basin shaped hearth contained small amounts of burned bone and fire-cracked rock (FCR). Also located in the basin shaped hearth were several pottery fragments and calcined phalanges of a small canid. The lithics at the site consist of a large amount of FCR (6142g) and 1182 lithic artifacts, which includes 18 tools. Ceramics are also prevalent within the site. There are 1339 ceramic sherds (1971g) which included rim, near-rim and body sherds. These fragments suggest coiled net-impressed pottery that for some vessels was decorated with one row of punctates. The faunal assemblage at the Yellowsky Site contains both mammals, such as bison, as well as fish remains (Wilson-Meyer and Carlson 1985).

The Bethune Site (EeNg-6) is located in south-central Saskatchewan, northeast of the town of Bethune. This site is an Avonlea burial site that contains seven individuals. The site is situated on a knoll in an area that has frequently been exposed by cultivation. Five of these individuals were buried in secondary bundle burials with the other two individuals being primary flexed burials. There are minimal amounts of cultural materials found at this site, consisting of 5 chipped stone items (1 Avonlea projectile point, biface, endscraper, drill and retouched flake), 1

worked bone (pronghorn bone stained with red ochre and polished), turtle carapace fragments and a scattering of bison bone located around the burials (Dawson 1987; Dawson & Walker 1988).

The Sjovold Site (EiNs-4) is a multi-component site which also contains multiple Avonlea occupations. This site is located in south-central Saskatchewan on the western side of the South Saskatchewan River across from the town of Outlook. The Avonlea layer at Sjovold is layer six. This layer is thought to most likely reflect an outdoor work area or kitchen. It was composed of several features including hearths, hide smoking pits and concentrations of lithic and cooking materials. This occupation layer occurred between 1200-1400 B.P. and was likely a short term, warm season occupation. It contained 916 potsherds, nine stone tools, two bone tools, faunal remains which includes bison, dog, rabbit, hare, muskrat, fisher, toad, fish, snail (*Gastropoda*), and freshwater clam (*Corbicula fluminea*). The subsequent layer (layer seven) also has Avonlea pottery, but there are questions about what group is represented within this cultural layer (Dyck & Morlan 1995).

The Newo Asiniak Site (FbNp-16) can be found in the northern section of Wanuskewin Heritage Park along the western edge of Opimihaw Creek. Wanuskewin Heritage Park is located in south-central Saskatchewan just north of the city of Saskatoon. Newo Asiniak is a multi-component bison procurement site with the Avonlea horizon (915±70 B.P.) (Kelly 1986) appearing at level two or 10-18 cm below surface. There were 20 tools recovered from this level including Avonlea projectile points, preforms, bifaces, unifaces, endscrapers, retouched flakes, a grooved maul and one drill. Two types of ceramics were also found, a dark black net-impressed pottery and a thicker orange ceramic decorated with a single row of punctates with internal bosses and fabric finger woven impressions plus parallel impressions on two of the rim fragments. The faunal assemblage of this level consists of heavily fragmented bison. Two hearth features were also located within the Avonlea component at Newo Asiniak (Kelly 1986).

The Lebret Site (EeMw-26) is located in southeastern Saskatchewan just outside of the town of Lebret. This site is a multi-component processing and manufacturing site which contains an Avonlea component (1635±105 B.P. and 1260± 115 B.P.) (Peck 2011). There are three

separate areas around the site that were excavated. During the Avonlea occupation of this site, activities took place such as hide processing and working, lithic tool manufacturing, food preparation, cooking, fishing and ceramic production. Within the Avonlea component of these three areas, 1499 pieces of lithic material were found which included 53 stone tools. Of these 53 stone tools there were fifteen projectile points, six bifaces, ten endscrapers, three side scrapers, one hammerstone, one spokeshave, one grooved maul, one grinding stone and fourteen retouched flakes. There are also large amounts of FCR present and in one of the areas 51 ochre pebbles were found. There were several faunal tools found at the site, including fleshers, needles, fish spears and a shell spoon. There were 403 ceramic artifacts which were also located within the three locations of the Lebret site representing a minimum of seven vessels including full sized cooking pots and a small bowl-shaped vessel. These ceramics are smoothed over net-impressed pottery with some showing decoration such as punctates and bosses (Smith 1986, Smith & Walker 1988).

Garratt Site (EcNj-7) is a winter campsite that is in the southern section of the city of Moose Jaw, Saskatchewan (Morgan 1979; Peck 2011). Limited excavations were performed which resulted in nine Avonlea points and 29 preforms being found. In addition, net-impressed, plain and incised pottery was discovered some of which was decorated with punctates (Peck 2011).

4.9.3 Avonlea Sites in Alberta

The Manyfingers Site (DhPj-31) is located in southwestern Alberta 12 km east of the Rocky Mountains and 32 km north of the Canada-U.S. border. This site represents a campsite and processing area. It contains an extensive number of faunal remains including at least 33 bison, two dogs, one coyote and one rabbit. Within the faunal assemblage there were 14 bone tools. The lithic assemblage of the Manyfingers Site includes 205.4kg of FCR, 190 pieces of lithic debitage and 41 tools including 11 Avonlea projectile points. There were also ceramics present represented by 13 ceramic sherds including one rim sherd and two body sherds with decoration, one with punctates and the other a drilled hole (Quigg 1988).

The Larson Site (DIOn-3) is a late winter occupation Avonlea campsite. It is in southeastern Alberta approximately 30 km east of the city of Medicine Hat. There are several features that have been uncovered at the Larson Site, including stone boiling pits, hearths and roasting pits. These features and the surrounding area also contain a substantial amount of FCR totaling just over 57,700 grams, likely reflecting a high degree of bone processing taking place at this site. Bone preservation at the Larson site is relatively poor as remains are heavily weathered. The remains of six bison (including one fetal calf), one pronghorn, one dog, one fox and one mink were found at the Larson Site. It is from the evidence of the fetal bison calf that seasonality is inferred. The fox remains at the site are also of interest. This is because the fox bones are burned and may have been used as a food source by the inhabitants of the Larson Site. The site also produced 1130 lithics including 51 tools with 22 projectile points. Four bone tools were also found: two bone awls, one bone punch and one miscellaneous bone tool. Pottery was also found at the Larson Site but in very low numbers; only five small body sherds were located (Milne 1988).

Head-Smashed-In Buffalo Jump (DkPj-1) is in southwestern Alberta 20 km west of the town of Fort Macleod (Brink 2008). This is a very large multi-component jump site with a prolonged history of use, including during Avonlea times. Lithics found here included projectile points, asymmetrical ovate and diamond ovate bifaces, end scrapers, retouched flakes, cobble choppers, anvils and hammerstones. This site was heavily used by Avonlea groups as evidenced by the bone beds being between 3-4.5 meters deep (Peck 2011).

The Hardisty Bison Pound (FdOt-31) is located across the river from the town of Hardisty, in eastern Alberta. The site consists of a multi-component campsite and an Avonlea pound. The Hardisty site was likely occupied multiple times during the Avonlea Phase, and it is thought to be a fall or winter occupation. This site has many Avonlea projectile points as well as dozens of hearths and boiling pits. The Hardisty Bison Pound site also contains within it some unique features. The first is a presence of bone uprights and bone pits that represented the fence line of the bison pound. The second intriguing feature can be found on the inside of the fence at the entrance to the pound. It consists of a large, elongated pit feature that contained one adult and two calf bison skulls arranged in a line (Moors 2017).

4.9.4 Avonlea Sites in Manitoba

The Avery Site (DhLs-1) is an Avonlea campsite in south-central Manitoba. It is a multi-component site that is located on a wooded terrace overlooking Rock Lake. The Avonlea occupation of the Avery Site is a late fall early winter occupation. There is an assortment of animal species that are represented within the faunal assemblage including 13 mammals, three bird, two fish and one amphibian species. While there is this great assortment of faunal species, bison are still prominent in faunal remains with 65% of bones at the Avery Site belonging to bison. In addition to the faunal remains 39 Avonlea points were found. Of these 39 projectile points two thirds of them are manufactured from brown chalcedony. In addition to these points other tools were found such as endscrapers, drills and bifaces. Two types of ceramics were also found at the Avery Site with 200 fragments of parallel grooved pottery was as well as fabric-impressed pottery (Joyes 1988).

The Miniota Site (EaMg-12) is in southwestern Manitoba near the town of Miniota. Archaeologists found 65 Avonlea projectile points and 38 unnotched points at this single component Avonlea occupation site. A minimum of four ceramic vessels were also found, including one that was net impressed with square headed punctates while other vessels that had round hollow punctates, keyhole punctates, or round pointed punctates. This site included the regular assortment of bison bones, but also included faunal remains of canid, deer, beaver, fox, rabbit, muskrat, bird and a fair number of fish bones (Peck 2011).

4.9.5 Avonlea Sites in Montana

The Timber Ridge site (24BL101) is the type site for the Timber Ridge Avonlea projectile point sub-type in Montana. The site is in north-central Montana approximately 115 km south of the Canadian border. It is a single occupation Avonlea bison pound site. Excavation first took place in the 1950's and the site has seen subsequent excavations by looters which has destroyed a portion of the site. Numerous points have been found at the site with thousands of them being excavated by both archaeologists and looters. The bison at this site were likely driven upslope and forced to divert over the ridge where they would have been forced into the pound (Davis 1966).

The Fantasy Site (24PH1324) is a bison pound, processing site and campsite found in north-central Montana. The pound site is in a drainage coulee with drive lines extending to it from the southwest. There is no clear separation of occupations seen in the bone bed within the coulee. The campsite and processing site are located near the pound. Within the archaeological assemblage of the campsite multiple occupations can be seen. Both pottery and lithics were found within the three areas of the site. These artifacts include 38 ceramic body sherds and 350 complete or broken Avonlea projectile points (Tratebas & Johnson 1988).

The Lost Terrace site (24CH68) is in north-central Montana and is a unique site compared to the sites previously discussed as it is a pronghorn utilization site. It contains numerous Avonlea points with many made from exotic materials (Peck 2011). As many as 90 distinct lithic materials were found (Greiser 1988). This site evidences the flexibility in subsistence that the Avonlea had.

4.9.6 Avonlea Sites in Wyoming

The Leath Burial Site (48JO897) in northern Wyoming is located on the top of a small butte. This was not a subsurface burial, instead the 6-12 individuals were placed in a gap in the rocks and then covered with a mixture of rocks, dirt and associated grave goods. The latter included 24 Avonlea projectile points, 72 tubular bone beads, two shell pendants and a collection of bifaces, knives and lithic flakes (Galloway 1962; Dawson and Walker 1988).

The Billy Creek Site (48JO318) is in northern Wyoming and contains the burials of three individuals who were interred on the top of a hill. In association with the burials were 110 Avonlea projectile points, 23 tubular bone beads, six shell pendants as well as other lithics such as bifaces and flakes (Galloway 1968; Dawson and Walker 1988).

4.9.7 Avonlea Sites in North Dakota

The Evans Site (32MN301) is located north of New Town in the northwestern part of North Dakota. It is a multicomponent Avonlea site that contains Avonlea points and preforms. The lithic material is dominated by Knife River Flint, likely due to the site's proximity to the Knife River Flint Quarry. The site also contains smooth unthickened flat lip pottery (Peck 2011).

Chapter 5: The Whiting Slough Site Cultural Assemblage

5.1 Introduction

An assortment of different types of artifacts were unearthed during the excavations at the Whiting Slough Site. The collection of artifacts from the site consists of 398,329 artifacts. While most of these artifacts consist of bone processed to varying degrees, many other artifacts were found as well. Here a brief overview of these artifacts is presented.

5.2 Faunal Artifacts

The overwhelming majority of artifacts found at the Whiting Slough Site are faunal remains, representing 98% of the total artifact assemblage in both weight and by number. These remains are heavily fragmented and many exhibit some burning. They also include several different species of animals including bison, indeterminate canid, indeterminate rodent, wolf, deer, northern pocket gopher, snowshoe hare and indeterminate Sciuridae (squirrel family). Burned, unburned and calcined bone are all present, the locations and densities of which will be discussed in chapter 7.

5.2.1 Bison

Bison makes up the majority of the identifiable faunal remains at Whiting Slough (see figures 5.1 and 5.2 for examples). These bison remains are either minimally or heavily processed with the latter being far more common. They also appear in great number throughout the site. Their density and locations will be discussed in greater detail within subsequent chapters.



Figure 5.1 Right distal bison humerus from unit 180N 90E. Example of larger/ less processed bone found at E1Ns-10.



Figure 5.2 Example of highly processed burned bone found at E1Ns-10. From Feature CB in unit 106N 93E.

5.2.2 Canid

Canid bone (figures 5.3 and 5.4) makes up the second most prevalent category of faunal remains represented at the Whiting Slough Site. While canid bones were found throughout the site the majority were found within feature CB, which accounts for 77% of all canid bone found. This feature is also one of only two features (Feature CB and V) to contain canid bones. There are 17 other units that contain at least one canid bone. Canid bone concentrations will be discussed in chapter 7.



Figure 5.3 Canid mandible (Thomson 2020)



Figure 5.4 Canid remains from Feature CB (Thomson 2020)

5.2.3 Other Animals

There are several other animals that are represented within the faunal assemblage at Whiting Slough, including indeterminate rodent, indeterminate medium sized carnivore, indeterminate deer, indeterminate Sciuridae rodent, northern pocket gopher and snowshoe hare. These animal remains appear in very low frequency within the site. Many of these animals are burrowing animals and likely reflect intrusive post-depositional occurrences. Animals such as the northern pocket gopher and the indeterminate rodents are commonly found within archaeological assemblages. Within Whiting Slough there are many examples of rodent tunnels

crossing through units. Some of the non-burrowing animals such as the deer and the Snowshoe Hare could be used as a food source but their extremely limited numbers throughout the site could suggest natural occurrences.

5.2.4 Faunal Tools

There are two faunal tools that were found during the excavations at Whiting Slough. These are both fragmented and are parts of what would have been a larger tool. These tools would have been used during the processing event that took place at Whiting Slough. Figure 5.5 is one of these tool fragments. It consists of an abraded point with abrasion on the right side of the artifact. This pointed surface also exhibits polishing. As a result of the fragmented state of these tools, it is difficult to say what their purpose was with any amount of certainty.



Figure 5.5 Bone tool fragment from Unit 104N 92E

5.2.5 Other Notable Faunal Artifacts

There are several bones within the Whiting Slough assemblage that exhibit other notable features. These include both rodent and carnivore chewing marks, and several bones with pathologies or abnormalities.

There are several bones within the assemblage that exhibit some level of chewing (figure 5.6). In total there are 15 bones that exhibit carnivore chewing, with the majority of these being discovered during construction monitoring. The presence of these marks on some of the bones



Figure 5.6 Rib fragment with carnivore chewing. From WP830



Figure 5.7 Double rib head. From unit 102N 95E



Figure 5.8 Bison atlas. From unit 102N 95E

at the site shows that either portions of the site had been scavenged or that the people inhabiting Whiting Slough had interactions with carnivorous animals, likely canids.

Within the faunal assemblage of whiting slough there are also several bones that exhibit pathologies and abnormalities. Figure 5.7 displays a bison rib that has two rib heads while figure 5.8 depicts a bison atlas with major deformities. Further, several canid vertebrae evidence a degenerative joint disease (Thomson 2020).

5.3 Lithic Artifacts

The lithic assemblage of Whiting Slough consists of 900 individual artifacts, including projectile points, bifaces, cores, flakes, choppers, scrapers, hammer stones, fire-cracked rock, knives, retouched flakes and shatter. The lithic artifacts account for 2% of the total artifact assemblage by weight. Lithic material types observed includes agate, agatized wood, andesite, avon chert, basalt, banded chalcedony, beige chalcedony, brown chalcedony, clear chalcedony, dark brown chalcedony, white chalcedony, cat head chert, black chert, unidentified chert, conglomerate, gabbro, gronlid Siltstone, jasper, limestone, mudstone, oolitic chert, pebble chert, petrified wood, porcellanite, quartz, quartzite, sandstone, siltstone, silicified peat, swan river chert, tongue river silica and white quartzite (Diduck 2018).

5.3.1 Projectile Points

Projectile points account for 232 of the 900 lithics that were found at the Whiting Slough Site. Of these, five were unidentifiable, one was a preform three are non-Avonlea and the remaining 223 are identified as Avonlea style projectile points (Diduck 2018) (figures 5.9-5.12). The high density of Avonlea points is reflected in the fact that just under two projectile points were found per unit excavated. These points appear in several different shapes and sizes but are all Avonlea style with the exception of three points. Of the three non-Avonlea projectile points that were found two of these are Besant points and the third is a Hanna point. The two Besant points include a complete (figure 5.13) and an incomplete point. While the Hanna point that was found is broken and only consists of a base (figure 5.14).



Figure 5.9
Avonlea
projectile point
found in unit
106N 96E.

Figure 5.10 Avonlea
projectile point found
in unit 109N 96E.



Figure 5.11 Avonlea
projectile point
found in unit 108N
96E.

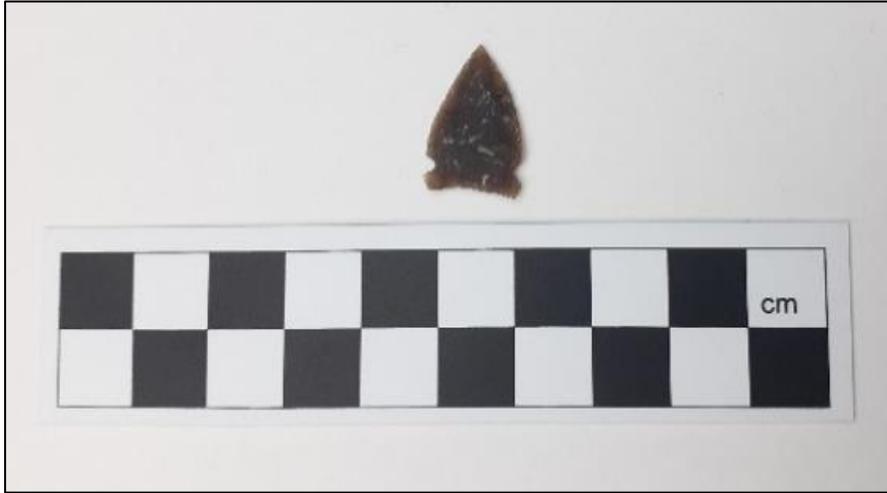


Figure 5.12 Avonlea projectile point found in unit 110N 93E.



Figure 5.14 Besant projectile point found in unit 101N 88E.



Figure 5.13 Hanna projectile point found in unit 105N 91E.

5.3.2 Other Lithic tools

In addition to projectile points 36 other stone tools were found, including bifaces, choppers, end scrapers, end/side scrapers, hammer/anvil stone, knives, preforms, several retouched flakes and one indeterminate tool (figures 5.15-5.17). Many of the large flakes present exhibit some amount of retouch on at least one of the sides. These tools are all likely associated with bison processing.

5.3.3 Lithic Manufacturing and Debitage

A total of 427 lithic artifacts, including one bipolar core fragment, bipolar flakes, microdebitage, primary and secondary decortication flakes, reduction flakes, resharpening flakes and lithic shatter. There are not many examples of lithic manufacturing found throughout Whiting Slough. While 427 lithics is not a small number in itself, if there was large scale lithic manufacturing taking place at the site, we would expect to see larger numbers reaching the thousands, especially when considering the 232 projectile points found at the site.



Figure 5.15 Hammer stone found in unit 103N 96E.



Figure 5.16 Retouched flake found in unit 107N 92E. (retouched edge at the top of photo)

Figure 5.17 End scraper found in unit 104N 96E.



5.3.4 Fire-cracked Rock (FCR)

FCR (figure 5.18) was found throughout the site with 205 individual pieces of FCR weighing a total of 5171.3g. Large quantities of FCR are indicative of areas of bone grease extraction and bison processing. These rocks are heated and placed in water-filled pits. As discussed in Chapter 4, bone grease is an essential part of the pemmican making process and is an important winter food source (Reeves 1990). As a result of heating and rapid cooling, these rocks break apart and can be found throughout areas where this process is taking place. While no boiling pits were encountered during excavation the areas with higher amounts of FCR may reflect the nearby presence of boiling pits.



Figure 5.18 Example of fire-cracked rock found in unit 108N 97E.

5.4 Charcoal

There were 4,245 pieces of charcoal collected weighing a total of 179.83 grams. Charcoal concentrations are very important for discerning the location of hearths at Whiting Slough as the dark black sediment layer makes it very difficult to see the dark ash and charcoal filled sediment that is usually used to identify a hearth. This is likely why no hearths were identified in the field during excavation. It was only after excavation that the high charcoal counts and analysis of the features allowed for the identification of possible hearths at Whiting Slough.

5.5 Pottery

There were only 4 pieces of pottery found during excavation with three being quite small and unidentifiable while the fourth piece was a small fabric impressed body sherd (figure 5.19). This larger piece was found within Feature CB. Therefore, not much can be discerned other than the fact that the people that used Whiting Slough did use and break some ceramic vessels at the site.



Figure 5.19 Example of fabric impressed pottery found in Feature CB unit 106N 93E.

Chapter 6: Whiting Slough Feature Description and Analysis

6.1 Introduction

In total 43 features were uncovered during the excavations at the Whiting Slough Site. There were also an additional 7 potential features found during construction monitoring. These features are comprised of four different feature types and form four distinct feature groupings. In this chapter, each feature is individually described and discussed. In addition, the types of features, feature groups, what these groups are comprised of and what their purpose or function will also be discussed.

6.2 Types of Features Found at Whiting Slough

The four different types of features range from simple soil stains to the much more complex series of bone-filled pits. Many of these features combine to create several larger oval features that cover much of the site. These larger features or structures will be discussed in greater length. Such features have mixtures of both identifiable and unidentifiable bone, as well as both burned and unburned bone. Apart from the canid burial (feature CB), the features are primarily comprised of bison bones with many of the bones exhibiting at least a minimal amount of burning.

6.2.1 Feature Classification System

The four feature classes are soil stains, bone-filled pits, hearths and a canid burial pit. Attempts were made to sub-divide these features, the process of which and issues encountered are discussed in Chapter 8.

6.2.2 Soil Stains

There is only one feature of this type, and it is located on the western edge of one of the feature groups, interpreted and defined as drying rack 1. This soil stain consists of a continuation of the dark black or grey sediment that extends into the lower stratigraphic layers. With the presence of the dark black sediment at the site there are many more instances of this dark sediment continuing below the black layer, but only one was given feature designation. This soil stain feature has minimal artifacts present within it. While many of these soil stains are not recorded as formal features by Western Heritage, the one feature that was recorded is

relatively insignificant within the context of the site and could potentially be unimportant to the interpretation of the large feature groups present at the site. As a result of the recording techniques employed during the excavations done by Western Heritage information from these features is limited. Therefore, it is impossible to make many comments or interpretations on the soil stains at Whiting Slough.

6.2.3 Bone-filled Pits

By far the most prevalent of features found at Whiting Slough are bone-filled pits accounting for 39 of the 43 features or 91% of the features. In addition, seven more of these features were identified during construction monitoring. A bone-filled pit feature consists of a pit that is filled with a mixture of bones exhibiting different levels of processing and burning. Within these features there is a clear divide between the sediment that is in the pit and the sediment that is outside of the pit. Especially once below the black sediment there is a clear demarcation between the dark black soil of the pit and the tan sand that is around it. This clear divide is visible in both profile and planview.

These pit features have substantial amounts of bone in both number and volume. The bones of some of these pits are heavily processed with minimal numbers of larger more substantial bones. Other pits have much higher numbers of large identifiable bone. There also appears to be no preferred selection of bone types that are included within the bone-filled pits. This feature type contains almost exclusively of bison or unidentifiable bone except for four bone-filled pit features that contained intrusive rodents (Features H, X, F1 and H1), one (B1) that contained a large bird bone, and Feature V that contained one canid bone. Within the bone-filled pits, bone orientation does not seem to matter to the builders. While there are some of these pit features that exhibit vertically oriented bones, the builders do not appear to be doing this on purpose. Even within the features that contain vertical bones, there are only a small number of bones that could be interpreted as being vertical. It is far more likely that the bones that do appear vertical are placed that way because of the randomness that would occur when placing sometimes hundreds of bones into these pits. In total only 13 of the 36 bone-filled pit features contain any evidence of vertically oriented bones and even within these 13 features the number of vertical bones is minimal.

6.2.4 Hearths

Hearths are also found at Whiting Slough. There are two hearths that were identified at the site through the analysis of the excavation data. Due to the black sediment layer, identifying these features in the field was difficult. As a result, none of these hearths were identified as hearths during field excavations. As such, they were identified after the field work when examining the charcoal counts and images of the features. These features consist of a pit of dark black sediment that has a circular shape. Feature D1 has a basin shape profile to it while the profile shape of feature J is unknown. Within these features there are substantial amounts of both heavily processed bone and charcoal. There is a mixture of burned and unburned bone with most faunal remains being heavily burned. These two hearths contain almost exclusively bison and unidentifiable bone except for intrusive rodent bone being found in feature D1.

6.2.5 Canid Burial Pit

The last feature type is the canid burial pit. There is only one of this type of feature at the site. In its simplest explanation, this feature contains the interment of a canid and a bison skull under a thick layer of burned and highly processed bone fragments. It will be discussed in greater detail under the Feature CB section following.

6.3 Individual Feature Descriptions

The following section presents the information that was gathered from the individual features, including information about known feature depths and artifact inclusions as well as percentages of identifiable artifacts, feature identification, and pictures of the features. Full artifact composition and percentages for the features can be seen in Appendix B.

6.3.1 Feature A- Bone-filled Pit - 98N 94E & 99N 94E – 396 Artifacts.

Feature A is one of the most visually impressive features on site as it is one of the largest and has some of the most substantial bone within it. This bone-filled pit crosses two units 99N 94E and 98N 94E. This feature was encountered at 40 cm below surface (cmbs) and continues to a depth of 105cm. One of the most intriguing aspects of this bone feature are the bones which have been placed in vertical orientation. An example of this within feature A is the appearance of three articulated vertebrae. This feature is found on the eastern edge of drying rack 1. Within



Figure 6.1 Feature A in 98N 94E. Facing south. 40-50 cm depth. Trowel points north. (Western Heritage n.d.)



this feature there is an assortment of different bison bones with vertebrae dominating the assemblage, accounting for 58% of the assemblage of this feature by weight.

Figure 6.2 Feature A in 98N 94E. Top-down view 50-60 cm depth. Trowel points north. (Western Heritage n.d.)

6.3.2 Feature B- Bone-filled Pit- 99N 94E – 604 Artifacts.

Feature B is a bone-filled pit that is located at the northeastern end of Drying Rack 1. The feature was encountered at a depth of 50 cm and continues to a depth of 90 cm. Sediment in this feature is dark black fading to a gray sediment in spots. Three of the included bones have vertical or near vertical orientation. The first is a vertically placed humerus. There is also a metacarpal and radius that are nearly vertical but have a slight angle to them. The last of the intriguing inclusions within this feature are two bison rib fragments that exhibit cut marks.



Figure 6.3 Feature B in 99N 94E. Facing North. 80 cm depth. Trowel points north. (Western Heritage n.d.)

6.3.3 Feature C- Bone-filled Pit- 99N 93E & 100N 93E – 1064 Artifacts.

Feature C is a bone-filled pit that is located on the northeastern edge of Drying Rack 1. It occurs in units 99N 93E and 100N 93E. It first appears at 50 cm below surface and continues to a depth of 110 cm. Feature C is approximately 10cm wide when it first appears. This feature like many of the other features consists of large amounts of bone both identifiable and fragmented. With vertebrae (60%) and unidentifiable bone fragments (15%) making up most of this feature's faunal assemblage. One aspect to note is the inclusion of lithic material. Within this feature there is one Avonlea projectile point, two pieces of fire-cracked rock, one lithic flake and one

piece of lithic shatter. While these numbers in themselves are not all that impressive, they are more numerous than what is seen in many of the other features that are present at Whiting Slough.



Figure 6.4 Feature C in 99N 93E. Picture taken from east side of unit. 50-60cm depth. Trowel points north. (Western Heritage n.d.)



Figure 6.5 Feature C in 99N 93E. Picture taken from east side of unit. 70-75 cm depth. Trowel points north. (Western Heritage n.d.)

6.3.4 Feature D- Bone-filled Pit -100N 93E – 1207 Artifacts.

Feature D is located in the northwest quadrant of 100N 93E and is one of the three features that were found within this unit. This feature is a bone-filled pit and was encountered at a depth of 60cm and continues to 112 cm below surface. This feature, like many others, contains the dark black sand that changes to a lighter gray colored sand in some areas.



Figure 6.6 Feature C in 100N 93E. 60-70 cm depth. Trowel points north. (Western Heritage n.d.)

Unidentified bone fragments account for a major portion of this feature totalling 1119 of 1207 artifacts from the feature as well as 16% of the total weight.



Figure 6.7 Feature D in 100N 93E. Feature D in northeast quadrant and part of Feature E in northwest quad. 70-78 cm depth. Trowel points north. (Western Heritage n.d.)

6.3.5 Feature E- Bone-filled Pit - 100N 92E, 100N 93E, 101N 92E and 101N 93E – 162 Artifacts.

Feature E is a bone-filled pit feature that is located within four units (101N 92E, 101N 93E, 100N 92E & 100N 93E). The feature was encountered at a depth of 60cm and concludes at a total depth of 114cm below the surface. This feature has a mix of both the dark black as well as the grey sediment and exhibits some signs of rodent disturbance throughout the unit. This



Figure 6.8 Feature E in 100N 92E. 60-70 cm depth. Trowel points north. (Western Heritage n.d.)



Figure 6.9 Feature E in 100N 93E. Northeast quad, 60-70 cm depth. Trowel points north. (Western Heritage n.d.)

feature is heavily dominated by vertebrae accounting for 71.6% of the total weight of the artifacts within Feature E.

6.3.6 Feature F- Bone-filled Pit - 101N 92E and 101N 93E – 804 Artifacts.

Feature F is a bone-filled pit feature which is located on the northern edge of Drying Rack 1. This feature is found across two units: the eastern edge of 101N 92E and the western edge of 101N 93E. The feature was encountered within the black sediment layer at 60 cm depth and continues below the black sediment layer to a total depth of 113 cm below the surface. It contains within it several nearly vertical bones and articulated vertebrae. As can be seen in figure 6.10, the sediment within the feature changes color below the black sediment lens. While it is not the same as the dark black layer, it is still a much darker brown than the surrounding



tan colored sand. Also within Feature F are two lithic artifacts, a piece of FCR and one chalcedony flake.

Figure 6.10 Feature F in 101N 93E. West Profile. (Western Heritage n.d.)



Figure 6.11 Feature F in 101N 92E. Top-down view. 70-80 cm depth. Trowel points north. (Western Heritage n.d.)

6.3.7 Feature G – Bone-filled Pit- 101N 92E – 445 Artifacts.

Feature G is a bone-filled pit that is in unit 101N 92E, on the north central edge of Drying Rack 1. As can be seen in figure 6.12, Feature G is on the western side of the unit with Feature F being barely visible on the eastern edge of this unit. The feature was encountered at a depth of 60 cm below surface with bone present within the feature up to a depth of 70 cm and soil staining continuing to a total depth of 84 cm. The feature is primarily made up of small unidentifiable bone fragments. It also includes a concentration of bison rib fragments and one chalcedony flake.



Figure 6.12 Feature G in 101N 92E. Top-down view. 60-70 cm depth. Trowel points north. (Western Heritage n.d.)

6.3.8 Feature H- Bone-filled Pit- 101N 92E and 102N 92E – 509 Artifacts.

Feature H can be found at the intersection of the southwestern edge of 102N 92E and the northwestern edge of 101N 92E. It has been designated as a bone-filled pit. The feature first appears within the black layer at a depth of 60 cmbs. This continues to a total depth of 125 cm below surface. Within Feature H the bones begin to disappear after 70 cm, and after 105 cm the sediment of the feature becomes more rounded (figure 6.13 and 6.14) until it eventually disappears. This feature, like many of the others, begins in the black layer and continues down

into a lighter grey sand that encompasses the bone contained within the feature. The majority of the bones in this feature are comprised of vertebrae and unidentifiable bone fragments. Within the faunal assemblage of this feature is one bison calcaneus that exhibits cutmarks.



Figure 6.13 Feature H in 102N 92E. Top-down view. 60-70 cm depth. Top of picture is north. (Western Heritage n.d.)



Figure 6.14 Feature H in 102N 92E. Top-down view. 105 cm depth. Top of picture is north. (Western Heritage n.d.)

6.3.9 Feature I- Bone-filled Pit- 102N 91E & 103N 91E – 1803 Artifacts.

Feature I is a bone-filled pit feature and is located on the north/south boundary between units 102N 91E and 103N 91E. This feature begins within the black layer at a depth of 65 cmbs and continues in black sediment until the feature ends at a depth of 90 cmbs. Feature I has very straight walls until it tapers inward to a point at the bottom of the feature. This can be seen in figure 6.15. This feature is primarily composed of unidentifiable bone fragments and vertebrae.



Figure 6.15 Feature I. North wall profile of 102N 91E. Old test pit to the left of feature (Western Heritage n.d.).

A potentially interesting associated artifact is the presence of one of only five scrapers found at Whiting Slough and is located in the northwest quadrant just above the top of the pit feature. There are also two inclusions within this feature that are of interest. The first is the only lithic artifact within this feature, one piece of FCR. The second is the presence of charcoal within the feature. The charcoal count is still quite low but is higher than that seen in many of the features already discussed.



Figure 6.16 Feature I in 103N 91E. Top-down view from 70 cm depth. Trowel points north (Western Heritage n.d.).

6.3.10 Feature J – Hearth – 103N 89E & 103N 90E – 1687 Artifacts.

Feature J is a hearth feature located in both units 103N 89E and 103N 90E with the majority of it being located in the latter. The feature begins within the black layer at a depth of 60 cmbs and continues to a total depth of 100 cmbs. The feature is comprised of dark black



Figure 6.17 Feature J in 103N 90E. Top-down view from 50 cm depth. Trowel points north (Western Heritage n.d.).



charcoal-filled sediment that turns to a lighter grey sediment towards the bottom of the pit. The feature is highly circular and contains an upright innominate in the northern section of the feature. Charcoal counts (921) within this feature are very high compared to other features at Whiting Slough.

Charcoal in this feature accounts for just under 55% of the total number of artifacts found in this feature.

Figure 6.18 Feature J in 103N 90E. Top-down view from 70 cm depth. Trowel points north (Western Heritage n.d.).

6.3.11 Feature K – Bone-filled Pit- 104N 89E – 161 Artifacts.

Feature K is a bone-filled pit that is located within the southwest quadrant of 104N 89E. This feature can be found towards the western tip of Drying Rack 1. It is both very shallow and quite small compared to many of the other features. The feature was encountered within the black layer at 30 cmbs and ends at 60 cm depth. Most of the artifacts found in Feature J are unidentifiable bone fragments with the identifiable bones being clustered on the eastern edge of the pit feature.



Figure 6.19 Feature K in 104N 89E. Top-down view from 40 cm depth. Trowel points north (Western Heritage n.d.).

6.3.12 Feature L – Bone-filled Pit- 104N 88E – 10 Artifacts.

Feature L is a bone-filled pit. This feature is not located within the black sediment layer

that is found throughout the site. The pit is comprised of a grey sandy sediment that goes from a depth of 30-72 cmbs. This feature is very small in circumference and several of the bones are tightly packed together and are placed vertically into the ground. This feature is the northwestern most point in Drying Rack 1.



Figure 6.20 Feature L in 104N 88E. Top-down view from 40 cm depth. Trowel points north (Western Heritage n.d.).



Figure 6.21 Feature L in 104N 88E. Top-down view from 50 cm depth. Trowel points north (Western Heritage n.d.).

6.3.13 Feature M- Bone-filled Pit -99N 91E – 151 Artifacts.

Feature M is a bone-filled pit in 99N 91E. This feature is on the southern edge of Drying Rack 1. Feature M first appears within the black sediment layer at 50 cm and continues to a total depth of 80 cm with the sediment surrounding the bones changing to lighter grey sand at the greater depths. This is one of the more visually impressive features. It is comprised of mostly identifiable bone tightly packed together. This is unlike many of the other features that



Figure 6.22 Feature M in 99N 91E. Top-down view from 60 cm depth. Top of photo points north (Western Heritage n.d.).

contain very large amounts of heavily processed bone fragments. One silicified peat flake was found at the top of the feature.



Figure 6.23 Feature M in 99N 91E. Top-down view from 70 cm depth. Top of photo points north (Western Heritage n.d.).

6.3.14 Feature N -Bone-filled Pit- 100N 90E & 100N 91E – 755 Artifacts.

Feature N is a bone-filled pit that is located within units 100N 90E and 100N 91E. It contains mostly unidentifiable fragmented bone. The top of this feature was first encountered within the black layer at 60 cm and continues into a grey sediment layer to an unknown total depth of greater than 100 cmbs (figure 6.24). It appears that the darker sediment is 'pulled' down into the grey sediment where it then expands into a larger area. This could be explained by the rodent disturbance that is present around the feature.



depth of greater than 100 cmbs (figure 6.24). It appears that the darker sediment is 'pulled' down into the grey sediment where it then expands into a larger area. This could be explained by the rodent disturbance that is present around the feature.

Figure 6.24 Feature N in 100N 91E. West wall profile. (Western Heritage n.d.).



Figure 6.25 Feature N in 100N 91E. Top-down view from 60 cm depth. (Western Heritage n.d.).

6.3.15 Feature O - Bone-filled Pit - 101N 89E & 101N 90E – 1451 Artifacts.

Feature O is a bone-filled pit feature located on the southern edge of Drying Rack 1. It begins within the black sediment layer at a depth of around 40 cm and continues to a total depth of 90 cm. This feature contains an assortment of identifiable bison bone as well as one

Avonlea projectile point at the top of the feature.



Figure 6.26 Feature O in 101N 90E. Top-down view from 60 cm depth. Trowel points north (Western Heritage n.d.).



Figure 6.27 Feature O in 101N 90E. Top-down view from 30-40 cm depth. Trowel points north (Western Heritage n.d.).

6.3.16 Feature P- Bone-filled Pit- 101N 89E – 2234 Artifacts.

Feature P is a bone-filled pit that is located on the southern edge of Drying Rack 1. It was encountered at a depth of 40 cm and continues to a depth of 90 cm. This feature contains a high percentage of unidentifiable bone fragments when compared to many of the other features. One interesting aspect of this feature is that the upper bones within the feature appear to be heavily burned while bones that are further down are unburned. This feature also contains a substantial number of lithics compared to other features. Within Feature P there are six pieces of FCR, one flake and 3 projectile points (2 Avonlea and one unidentifiable). As is typical with



Figure 6.28 Feature P in 101N 89E. Top-down view from 40 cm depth. North half of unit. Trowel points north (Western Heritage n.d.).

lithics inside of these features most of them appear at the top of the feature. However, there is a difference within this feature as one complete Avonlea Projectile Point was found at the bottom of the feature at a depth of between 80-90 cmbs.



Figure 6.29 Feature P in 101N 89E. Top-down view from 50-60 cm depth. North half of unit. Trowel points north (Western Heritage n.d.).

6.3.17 Feature Q- Bone-filled Pit- 102N 88E – 406 Artifacts.

Feature Q is a bone-filled pit that is in unit 102N 88E and can be found on the southwestern edge of Drying Rack 1. It first appears at a depth of 20 cmbs and is contained within a dark grey sediment layer. The feature continues to a total depth of 83 cmbs. Within this space, the sediment goes from the dark grey, that is present at the top, to a black sediment and then to a grey sediment at 50 cmbs and continues with this sediment color until the feature ends. At the beginning of the feature (30 cm) it consists of a circular stain that measures approximately 27 cm in diameter. It retains this size until 50 cm depth where it begins to shrink in diameter until it eventually disappears around 83 cm below surface. Most of this feature is made up of unidentifiable bone fragments with some larger fragments of identifiable bison

bone. There is also one piece of FCR and a projectile point found towards the top of the feature.



Figure 6.30 Feature Q in 102N 88E. Top-down view from 50 cm depth. Trowel points north (Western Heritage n.d.).

6.3.18 Feature R- Soil Stain- 103N 87E – 3 Artifacts.

Feature R is one of the smallest features found at Whiting Slough. It is a soil stain feature that is located in unit 103N 87E. It is the western most feature in Drying Rack 1, as well as being the western most feature in the site. This unit has no evidence of the black layer except for the feature itself which consists of a grey stain with bones that was encountered at a depth of 30 cm. There are three bones that can be found in this feature including one rib head and two long bone shaft fragments. Only the one rib fragment was collected in the field while the two other artifacts are referenced in the paperwork for the unit. It is possible that this feature could be three bones placed vertically to act as tent pegs. However, because of collection and data recording methods in use, this is only speculation as some of these bones were not collected and pictures and plan views are inadequate or non-existent.

6.3.19 Feature S- Bone-filled Pit- 102N 96E, 102N 95E & 103N 96E – 204 Artifacts.

Feature S is a bone-filled pit feature that is located within the corners of three units (102N 96E, 102N 95E & 103N 96E). This feature appears within the black layer at 50 cm and continues to a total depth of 70 cm below the surface. Feature S is also one of two features that

can be found in close association at the southeastern end of Drying Rack 2. It is circular in shape and has a mixture of unidentifiable bone fragments as well as various fragments of bison vertebrae. One lithic artifact, a piece of Swan River chert shatter, was found at the bottom of the feature.



Figure 6.31 Feature S in 103N 96E. South wall profile. Feature can be seen in bottom right corner (Western Heritage n.d.).



Figure 6.32 Feature S in 103N 96E. Southwest corner profile. (Western Heritage n.d.).

6.3.20 Feature T- Bone-filled Pit- 103N 94E and 103N 95E – 520 Artifacts.

Feature T is a bone-filled pit that in both units 103N 94E and 103N 95E. It first appears at a depth of 50 cmbs and starts within the black sediment layer. Bone ends within the feature at 120 cmbs with the grey sediment -staining ending at 136 cm below the surface. This feature consists of a very tightly packed group of bones with at least one nearly vertical bone that can be seen protruding through the 'bottom' of the feature (Figures 6.33 & 6.34). There were also two lithics found within this feature, one flake and one piece of shatter, both found toward the bottom of the unit at a depth between 60-140cm.



Figure 6.34 Feature T in 103N 95E & 103N 95E. West wall profile. (Western Heritage n.d.).



Figure 6.33 Feature T in 103N 95E & 103N 95E. West wall profile. (Western Heritage n.d.).

6.3.21 Feature U- Bone-filled Pit- 104N 93E & 104N 94E – 188 Artifacts.

Feature U, in units 104N 93E and 104N 94E, is a bone-filled pit feature that is part of the southern line of Drying Rack 2. The sediment within the pit is a black and grey sandy sediment that changes from black to a light grey and then to a darker grey. This soil staining appears as a circle around the bones. The feature was first encountered at 70 cm and continues to a depth of



Figure 6.35 Feature U in 104N 94E west wall profile. 100 cm depth (Western Heritage n.d.).

150 cm, making it one of the deepest features found at Whiting Slough. This feature also shows much less diversity in the different types of bone that were used with most being cranial or cervical vertebrae.



Figure 6.36 Feature U in 104N 94E west wall profile. 100 cm depth (Western Heritage n.d.).

6.3.22 Feature V- Bone-filled Pit – 105N 92E & 105N 93E – 2061 Artifacts.

Feature V is a bone-filled pit located in the southern side of Drying Rack 2 in units 105N 92E and 105N 93E. It was encountered within the black sediment layer at a depth of 70 cm. Bone within the feature continues to a depth of 120 cm with the feature eventually ending at a total depth of 140 cm below the surface. This feature consists of a tightly packed cluster of identifiable and unidentifiable bone that forms an inverted cone. There is one artifact inclusion within Feature V that is particularly interesting, a canid phalange. Other than Feature CB, discussed below, this is the only feature that contains canid bones. This is of particular interest because of the close spatial association of Feature V with Feature CB. There is also one lithic



within the feature, a small Avonlea point found toward the bottom of the feature at a depth of between 90-140 cmbs.

Figure 6.37 Feature V in 105N 93E. The trowel points north. (Western Heritage n.d.).



Figure 6.38 Feature V in 105N 93E. Photo of west wall in southwest quadrant. Depth of 118 cm (Western Heritage n.d.).

6.3.23 Feature W- Bone-filled Pit - 106N 92E – 4102 Artifacts.

Feature W is a bone-filled pit feature located in unit 106N 92E. This feature is comprised of a circular shape approximately 10 cm wide at the top. Contained within it is mostly burned (70%) unidentifiable bone fragments (67%). It was first encountered in the black sediment layer and continues as a dark black soil stain to a depth of 70 cm where the sediment then changes to a grey sand until the feature disappears at a depth of 130 cmbs. Within the black sediment portion of the feature there is a concentration of heavily processed bone that appears to form a pattern of blackened burned bone in the middle of the feature with pockets of unburned bone lining the exterior of the pit feature. At the interface between the black and grey sediment (70 - 80 cm depth) there are several vertically oriented unburned bones, including a bison rib and a mandible (figure 6.40). These vertical bones are situated within the grey sediment while being



Figure 6.39 Feature W in 106N 92E. Trowel points north. Depth of 70-80 cm (Western Heritage n.d.).

placed directly under the black layer towards the southern edge of the feature. There are also three bison bones within this feature that exhibit cut marks: one rib, one mandible and one unidentifiable bone fragment.



Figure 6.40 Feature W in 106N 92E. In southwest quadrant. Depth of 90 cm. (Western Heritage n.d.).

6.3.24 Feature X- Bone-filled Pit- 107N 91E – 1308 Artifacts.

Feature X is a bone-filled pit feature in the western section of Drying Rack 2 in unit 107N 91E. It first appears within the unit at 52 cm depth which is right at the top of the black sediment. At this point it is a circular feature that measures approximately 30 cm in diameter. This dark black section of the feature contains a large amount of unidentifiable burned bone fragments. At 70 cm depth the sediment changes to a lighter grey while the feature retains its general shape. From this point the number of bone artifacts diminishes greatly until the feature



Figure 6.41 Feature X in 107N 91E. In southwest quadrant. Depth of 70 cm. (Western Heritage n.d.).

ends at a depth of 130 cm below surface. Overall, this feature is primarily made up of burned (83%) and unidentifiable bone fragments (71%).



Figure 6.42 Feature X in 107N 91E. In southwest quadrant. Depth of 80 cm. (Western Heritage n.d.).

6.3.25 Feature Y- Bone-filled Pit- 108N 90E – 11 Artifacts.

Feature Y is a bone-filled pit located in the southeast corner of Drying Rack 2. It is one of the more basic features that is found at the Whiting Slough Site, consisting of a circular black soil stain that contains within it only 11 bones, all unburned. With depth the feature matrix shifts from the black sediment to a grey sediment. It was encountered in the black layer at a

depth of 50 cm and ends at a depth of 78 cm.



Figure 6.43 Feature Y (white arrow) in 108N 90E. Trowel points north. Depth of 50 cm. (Western Heritage n.d.).



Figure 6.44 Feature Y in 108N 90E. In southern half. Depth of 65 cm. Trowel points north. (Western Heritage n.d.).

6.3.26 Feature Z- Bone-filled Pit-108N 90E – 43 Artifacts.

Feature Z is a Bone-filled Pit in 108N 90E. It starts at a depth of 40 cm and continues to a total depth of 102 cm. This feature consists of a tight association of bones stacked together with black sediment encasing the bones. This black sediment is circular and is directly adjacent to Feature Y. This feature consists mostly of identifiable bison bone though has very low bone fragment counts compared to other Whiting Slough features. There are two lithics within this feature, an Avonlea projectile point and a flake, both found between 65 and 102 cm below

surface.



Figure 6.45 Feature Z (white arrow) in 108N 90E. Trowel points north. Depth of 50 cm. (Western Heritage n.d.).



Figure 6.46 Feature Z in 108N 90E. In northeastern quadrant. Depth of 65 cm. Trowel points north. (Western Heritage n.d.).

6.3.27 Feature A1- Bone-filled Pit- 104N 96E & 105N 96E – 37 Artifacts.

Feature A1 is a bone-filled pit that is located on the northeastern edge of Drying Rack 2 in units 104N 96E and 105N 96E. This feature was encountered at a depth of 40 cm and continues to a depth of 96 cm below surface. It consists of bones placed within a pit that contains black sediment at the top that eventually turns into a lighter grey sediment toward the bottom of the feature. The orientation of the bones within this feature are the most interesting aspect of Feature A1. At the top of this feature there are several bones that are placed horizontally across the top. There are also three vertical bones, the first is a long bone shaft fragment (64-83 cm depth), the second is a rib (73-96 cm depth) and the third is a mandible with teeth (56-81cm). The mandible was found between the other two bones and these three

bones run vertically through the majority of this feature.



Figure 6.48 Feature A1 in 105N 96E. In southeastern quadrant. Depth of 60-70 cm. Trowel points north. (Western Heritage n.d.).



Figure 6.47 Feature A1 in 105N 96E. In southeastern quadrant. Depth of 60-70 cm. Trowel points north. (Western Heritage n.d.).

6.3.28 Feature B1 – Bone-filled Pit- 105N 95E & 105N 96E – 471 Artifacts.

Feature B1 is a bone-filled pit located on the northeastern edge of Drying Rack 2. The feature was first encountered in the black sediment layer at 60-110 cm depth below surface. The sediment within the feature consists of a black sandy sediment that goes from the beginning of the feature to a depth of about 92cm, where the sediment then changes to a grey sediment and continues to a depth of 110 cm. The faunal contents of this unit are heavily processed and 56% of the assemblage consists of unidentifiable bone fragments. One artifact of



Figure 6.49 Feature B1 in 105N 96E. In northwestern quadrant. Depth of 60-70 cm. Trowel points north. (Western Heritage n.d.).

interest within feature B1 is a complete Avonlea projectile point found at the interface between the dark black and grey sediment layers.



Figure 6.50 Feature B1 in 105N 96E. In northwestern quadrant. Depth of 80-90 cm. Trowel points north. (Western Heritage n.d.).

6.3.29 Feature C1 – Bone-filled Pit- 106N 95E – 452 Artifacts.

Feature C1 (white arrow in figure 6.51 and 6.52) is a bone-filled pit that is located on the north-central edge of Drying Rack 2 in unit 106N 95E. It was encountered at a depth of 70 cm and continues to a depth of 120 cm below the surface. This feature did not contain the normal black sediment, instead containing the grey sediment that began below the black lens. This feature does not have a well-defined circular shape like many of the other features, instead it has an elongated diamond shape. It may also be tightly associated with an undesignated feature (yellow arrow in figure 6.51). A potential second feature associated with C1 is a circular stain to the northeast. As no information was recorded about this potential feature it is difficult to say

whether it is a second distinct feature or is part of feature C1. There are two artifact inclusions of interest. The first is a flake appearing towards the top of the feature and the second is a section of bison rib that has cut marks on it.



Figure 6.51 Feature C1 in 106N 95E. In northwestern quadrant. Depth of 80 cm. Trowel points north. (Western Heritage n.d.).



Figure 6.52 Feature C1 in 106N 95E. In northwestern quadrant. Depth of 90 cm. Trowel points north. (Western Heritage n.d.).

6.3.30 Feature D1- Hearth - 107N 94E – 4495 Artifacts.

Feature D1 is a hearth feature in the northcentral section of Drying Rack 2 in 107N 94E. This feature first appears at a depth of 70 cmbs where large bones were found at the top of the



Figure 6.55 Feature D1 in 107N 94E. top-down view. Depth of 70 cm. Trowel points north. (Western Heritage n.d.).



Figure 6.54 Feature D1 in 107N 94E. top-down view. Depth of 105 cm. Unburned section in the southern half of feature is a fragmented bison horn core. Trowel points north. (Western Heritage n.d.).

Figure 6.53 Feature D1 in 107N 94E. Feature profile. Depth of 85-105 cm. Facing north. (Western Heritage n.d.).

feature. This then shifts into the rest of the feature which consists of small heavily processed burned bone fragments (77%) suspended in a basin-shaped feature that contains a black/grey sandy sediment with large amounts of charcoal. The bone found within the feature continues to a depth of 124 cm and the black/grey sediment continues to 137 cm below surface. This feature also contains large amounts of charcoal and some rodent bones.



6.3.31 Feature E1- Bone-filled Pit- 108N 93E – 98 Artifacts.

Feature E1 is a bone-filled pit located on the northeastern edge of Drying Rack 2 in the southern half of unit 108N 93E. It was first encountered at a depth of 70 cm and continues to a depth of 110 cm below surface. Within the upper portion of the feature (70-80cm) two vertical ribs occur. This feature consists of a tightly packed cluster of bones that is contained within a

black/grey sandy sediment.

As can be seen in figure 6.56, Feature E1 (white arrow) is directly associated with Feature F1 (yellow arrow) located directly north of it.



Figure 6.57 Feature E1 in 108N 93E. Depth of 70 cm. Trowel points north. (Western Heritage n.d.).



Figure 6.56 Feature E1 in 108N 93E. Depth of 100 cm. Southwest Quad. Unknown orientation (Western Heritage n.d.).

6.3.32 Feature F1- Bone-filled Pit- 108N 93E – 81 Artifacts.

Feature F1 (white arrow) is a bone-filled pit that is located within the northern half of unit 108N 93E. The feature was encountered at a depth of 60 cm and continues to a depth of 105 cm below surface. It consists of a mixture of mostly identifiable bison bone in a black/grey sandy sediment. This feature is relatively small compared to other features found at Whiting Slough, containing a small number of bones as only 81 bones were found within the feature.



Figure 6.58 Feature E1 in 108N 93E. Depth of 70 cm. Trowel points north. (Western Heritage n.d.).

6.3.33 Feature G1- Bone-filled Pit- 109N 92E – 73 Artifacts.

Feature G1 is a bone-filled pit feature located in 109N 92E. This was one of the most difficult features on site to understand. Paperwork and pictures are vague or nonexistent for this feature. It appears to be a circular pit feature that begins somewhere around 50-70 cmbs and end at a depth that was below the water table. Excavation of this feature was halted at 131cm below surface because of the presence of water.

6.3.34 Feature H1- Bone-filled Pit- 109N 92E – 174 Artifacts.

Feature H1 is a bone-filled pit located on the northwestern edge of Drying Rack 2 in unit 109N 91E. It consists of a large oval soil stain that measures 18 cm x 15 cm. The feature was encountered within the black sediment layer at a depth of 50 cm and continues to a depth of 145 cm below the surface. This feature has a mixture of identifiable and unidentifiable bones, with two lithics and small amounts of charcoal also being found. One interesting inclusion in



Figure 6.59 Feature H1 in 109N 92E. Planview at a depth of 60 cm. Trowel points north. (Western Heritage n.d.).

Feature H1 is a lumbar vertebra with a broken Avonlea point located directly under it.



Figure 6.60 Feature H1 in 109N 92E. Planview at a depth of 60 cm. Trowel points north. (Western Heritage n.d.).

6.3.35 Feature I1- Bone-filled Pit – 109N 90E & 110N 90E – 126 Artifacts.

Feature I1 is a bone-filled pit located on the western most tip of Drying Rack 2 on the border of units 109N 90E and 110N 90E. It was encountered at a depth of 30 cm and continues



Figure 6.61 Feature I1 in 110N 90E. Planview at a depth of 30 cm. Trowel points north. (Western Heritage n.d.).

to a depth of 90 cm below surface. From 30-50 cmbs the feature consists of a dark black sediment that changes to a lighter grey sediment at 50 cmbs and continues like this until a depth of 90 cmbs. Much of the feature consists of bison skull elements and cervical vertebrae. It also contains small amounts of charcoal and one piece of lithic material.



Figure 6.62 Feature I1 in 110N 90E. Profile of south wall at a depth of 90 cm. (Western Heritage n.d.).

6.3.36 Feature J1 -Bone-filled Pit- 110N 90E & 111N 90E – 28 Artifacts.

Feature J1 is a bone-filled pit feature located at the northwestern tip of Drying Rack 2 in units 110N 90E and 111N 90E. It was first encountered at a depth of 20 cm and ends at a depth of 50 cm below the surface. This unit is located on the most northwesterly edge of the black sediment layer. Therefore, the black layer in this unit is closer to the surface than in other units. This feature does not have the same kind of soil staining that is seen in many of the other features. This feature is relatively small when compared to others at Whiting Slough, containing only 28 bones. There is one bone that is of interest within this feature, a vertical long bone shaft fragment (figure 6.63).



Figure 6.63 Feature J1 in 110N 90E. Profile of south wall at a depth of 50 cm. Trowel points north (Western Heritage n.d.).

6.3.37 Feature K1- Bone-filled Pit- 108N 98E & 109N 98E – 555 Artifacts.

Feature K1 is a bone-filled pit in Feature Group 2 and is located in unit 108N 98E and 109N 98E. It was encountered within the black layer at a depth of 30 cm and continues to a total depth of 105 cm below surface. Feature K1 consists of a dark black sand that changes to a dark brown sand before the feature eventually ends at a depth of 90 cmbs. This feature contains a mixture of burned and unburned bone and consists of many unidentifiable bone fragments. This feature also contains small amounts of charcoal and lithics including one nearly complete

Avonlea projectile point.



Figure 6.65 Feature K1 in 109N 98E. Feature in south wall at a depth of 40-50 cm. Trowel points north (Western Heritage n.d.).

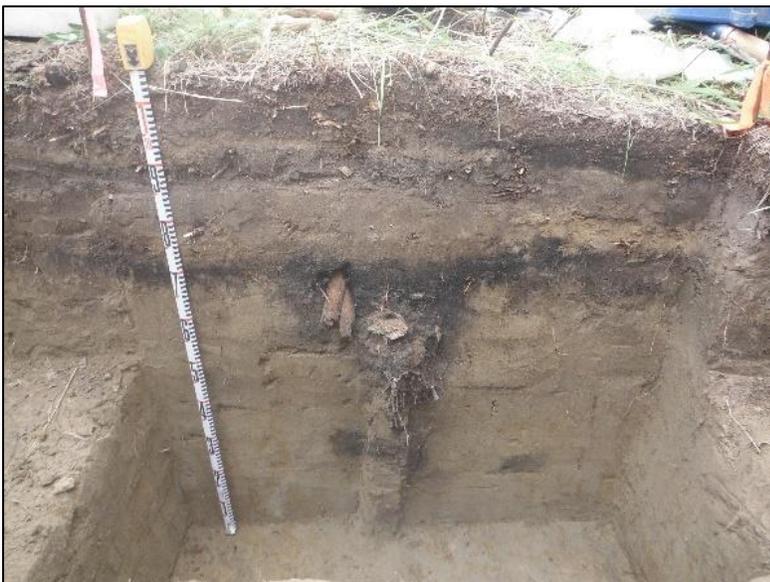


Figure 6.64 Feature J1 in 109N 98E. Profile of south wall at a depth of 100 cm. (Western Heritage n.d.).

6.3.38 Feature L1- Bone-filled Pit - 110N 99E – No Assigned Artifacts.

Feature L1 is a bone-filled pit located in Feature Grouping 2 in unit 110N 99E. This feature was encountered at a depth of 18 cm and continues to a depth of 40 cm below the surface. This feature consists of an atlas on top of a vertically oriented rib within a dark brown circular stain. It does not exhibit the dark black staining that is seen in most other features. As well, this feature had no individual artifacts assigned to it during the Western Heritage excavations. The reason for this is unknown. As a result, it is hard to discern what other elements were a part of this feature.



Figure 6.66 Feature L1 in 110N 99E. 20-30 cm depth. Planview of unit. Trowel points north (Western Heritage n.d.).

6.3.39 Feature M1- Bone-filled Pit- 102N 96E – No Assigned Artifacts.

Feature M1 is a bone-filled pit located in the southeastern section of Drying Rack 2 in unit 102N 96E. Feature M1 is directly associated with Feature S which can be seen to the northwest of Feature M1 (white arrow) in figure 6.67 and 6.68. Feature M1 was encountered at the bottom of the black layer at a depth of 50cm and continues to a depth of 90 cm below the surface. The feature is circular in shape and consists of black sandy sediment that eventually turns to a lighter grey sand before eventually dissipating. Contained within this feature are two



Figure 6.67 Feature M1 in 102N 96E. Planview of unit. 50-60 cm depth in northwest quad Trowel points north (Western Heritage n.d.).



Figure 6.68 Feature M1 in 110N 99E. North half of unit. 70-80 cm depth. Trowel points north (Western Heritage n.d.).

bison mandibles, a rib concentration and lithic debitage remains. This feature, like a few of the others, has no assigned artifacts in the catalogue from the Western Heritage excavation. Therefore, little more can be said about other artifacts contained within this feature.

6.3.40 Feature N1- Bone-filled Pit - 108N 99E – No Assigned Artifacts.

Feature N1 is a bone-filled pit feature in unit 108N 99E and is part of Feature Group 2. It was first encountered at the bottom of the black sediment layer at 30 cm depth and continues to a total depth of 50 cm below surface. The feature consists of a black circular stain containing bones. The nature and quantity of artifacts contained within feature N1 is unknown because they were not collected separately in the field during the Western Heritage Excavations.



Figure 6.69 Feature N1 in 108N 99E. Planview of unit. 30-40 cm depth. Trowel points north (Western Heritage n.d.).

6.3.41 Feature O1- Bone-filled Pit- 108N 92E – 111 Artifacts.

Feature O1 is a bone-filled pit in unit 108N 92E in the northwestern section of Drying Rack 2. It was encountered at the bottom of the black layer at a depth of 60 cm and continues to a depth greater than 106 cm. This termination depth is difficult to conclusively determine because of the high-water table (around 90 cm below surface). This feature was comprised of tightly packed bones in a circular stain that consisted of black sandy sediment that turned into a grey sandy sediment stain. The main portion of this feature consisted of a broken distal left humerus and broken proximal right humerus. These two bones were stacked on top of one another with articulating surfaces touching and broken shaft ends pointing upwards and downwards.



Figure 6.70 Feature O1 in 108N 92E. Feature in northern half of unit. 30-40 cm depth. Arrow points north.

6.3.42 Feature P1- Bone-filled Pit -109N 90E – 4 Artifacts.

Feature P1 is a bone-filled pit located on the eastern end of Drying Rack 2 in unit 109N 90E. This is one of the smaller features, consisting of a small cluster of bones that began within the black layer at about 30 cm and continued to a total depth of 60 cm below surface. It consists of a dark black sediment that measures approximately 50 cm by 30 cm. This feature is the start of the small 'tail' that appears on the western edge of Drying Rack 2.



Figure 6.71 Feature P1 in 109N 90E. Feature in northern half of unit. 30-40 cm depth. Arrow points north. (Paul Thomson n.d.)

6.3.43 Feature CB- Canid Burial- 106N 93E – 9323 Artifacts.

Feature CB is an animal burial feature centered in the southwestern portion of unit 106N 93E. This feature, in the author's opinion, is by far the most intriguing discovered at Whiting Slough. It began at a depth of around 50 cm and ended at a depth around 160 cm. A final depth was difficult to accurately discern because of the high-water table encountered slightly before 100 cmbs. Excavation continued into the water and ended when bone was no longer encountered. A depth for the termination of the black sediment was not able to be determined. The feature begins with a large volume of crushed bone. It was difficult to determine the upper terminus of the feature, but it begins within the black sediment; no discernible outline to the feature could be observed. The feature appears to push inward toward the south. The bone fragment density appears uniform. Towards the bottom of the pit burned bison cranium frags mixed with burned canid remains were encountered. As a result of the high-water table, the orientation of these items was not discernible as they were not encountered until below the waterline. The high-water table also made it impossible to take good photos of the feature as the feature and unit walls collapsed before photos could be taken.

This pit contains substantially more bone than can be seen in any other feature on site. In total, there were 9,323 artifacts recovered from this pit, including bison, rodent and canid bone as well as small amounts of lithic material and one pottery fragment. The bone found in this feature mostly consists of small fragments of what is likely bison bone. It has been heavily processed and is mostly burned. There are two intriguing faunal inclusions in this pit and that is the bison skull and the canid remains. The bison skull is fragmented and appeared to be mixed-in with the canid bones towards the bottom of the pit. Both the bison skull fragments and canid remains seemed to be distributed throughout the bottom of the pit. The canid remains exhibit breaking and burning (figures 6.72 and 6.73).



Figure 6.72 Canid Remains from Feature CB in 106N 93E. (Thomson 2020)



Figure 6.73 Canid remains from Feature CB in 106N 93E. Laid out in anatomical position. (Thomson 2020)

6.4 Construction Monitoring Features – WP809, WP810-112, WP827 and WP828

A total of seven additional features were found during the construction monitoring that took place during land stripping, an early stage of highway construction. Six of these were in the south and one was in the north (figure 6.74). As The features were damaged as a result of being unearthed by heavy machinery, archaeological excavation of the features was not possible. Consequently, little data on these features could be obtained.

6.5 Feature Groups

6.5.1 Drying Rack Features

With the extensive number of bison that were killed during the large-scale bison hunts of the Avonlea Phase, all the meat could not be consumed immediately and needed to be preserved for consumption later. To preserve the meat, it was cut into thin strips and hung on racks to dry in the sun. This dried meat could then be made into a great winter food source, pemmican (Thomas 1999). Given that the season of use for the Whiting Slough site is late fall to early winter (Thomson 2020) it can be assumed that the people inhabiting this site are preparing for the long winter ahead.

Another interesting aspect with these features is their orientation. With the late fall early winter occupation, the orientation of these features runs almost perfectly east west when accurately placed in a true north orientation. This would allow for the southern sun of this time of year to get full access to the south side of the drying racks while also allowing the good airflow with the prevailing western wind. What are interpreted to be drying rack features form two distinct ovoid feature arrangements. There is also potential for a third and fourth feature though complete outlines for such features were not obtained during the course of the field work. The two features that were fully exposed consist of very straight lines of pit features oriented in an east-west direction that are relatively parallel to each other. While the individual features (labeled features A-P1) differ greatly in their construction, in combination they form these larger feature groups (figure 6.74).

6.5.2 Drying Rack 1

Drying Rack 1 is comprised of features A-R and consists of eighteen distinct features, sixteen bone-filled pits, one hearth and one soil stain feature. This feature measures 8.6m long at its longest point and is between 1.3-2m wide. Within the ovoid arrangement of features there is an apparent gap on the eastern edge of the feature, facing south. This feature, along with Drying Rack 2 are the most complete of the four potential drying rack features that are found at Whiting Slough.

6.5.3 Drying Rack 2

Drying Rack 2 is the grouping of features S-Z, A1-J1, M1, O1, P1 and CB, a total of 22 different features: 20 bone-filled pits, one hearth and one canid burial feature. Within the main ovoid section of the feature (excluding I1, J1 and P1) the longest portion is 8.2m long. If you include the little 'tail' on the western end of the drying rack the total length is 9.9m. At its widest point drying rack 2 is 2.8m. This drying rack is directly to the north of and parallel to Drying Rack 1. Like Drying Rack 1 it is ovoid in shape and is oriented from east to west. Drying Rack 2 also has a gap in the features. For this feature the gap is also on the eastern edge with the opening facing slightly more to the north than Drying Rack 1. There are several additions to Drying Rack 2 that are not seen in Drying Rack 1. The first is the three extra features on the western edge of the drying rack. These three features form a small 'tail' that curves up to the north. The other addition is very significant. In the center of Drying Rack 2 is a large pit feature that contains a potentially ceremonial burial of a canid skeleton and bison skull (Feature CB). This feature is also flanked by a hearth (Feature D1) that is part of the ovoid portion of the feature.

6.5.4 Feature Group 1

Feature Group 1 consists of six bone-filled pits at the southern most edge of the site outside of the excavation block. They were located during construction monitoring when a grader scraped over them. This feature group consists of six features four of which were labeled WP809 and the other two are WP810-112 and WP827. These features are all bone-filled pits. These pit features could be part of another drying rack but given the limited amount of information that was able to be collected, this can only be speculated.

6.5.5 Feature Group 2

Feature Group 2 consists of a small cluster of features to the northeast of Drying Rack 2. This feature group contains four features, K1, L1, N1 and WP828, all of which are bone-filled pits. It appears to be a portion of another ovoid drying rack feature, but pertinent units that would allow the spatial patterning to be properly ascertained were not fully excavated.

6.5.6 Drying Rack Construction

The drying racks at Whiting Slough would likely have been constructed from wood and bone. The bone would have been used as a base to support the poles of the drying rack. The construction of this aspect will be discussed in a later section when discussing the bone-filled pits. The other construction material would have certainly been wood. Aspen groves occur in the area today and very likely would have also existed at the time of the Avonlea occupation. Wooden poles would have been lashed together to create a structure similar to those that can be seen in figure 6.75 and 6.76. There is one major change between the drying racks pictured and the drying racks found at Whiting Slough, this is the robustness of the racks. There are many more supports at Whiting Slough than there are legs pictured within the structures seen in these figures. There are two possible explanations for this. The first is that the Whiting Slough features were constructed in a more robust manner so that the drying racks would be able to



Figure 6.75 Cree women smoking beside racks of drying meat-
Waterhen River, Northern Saskatchewan (Coze 1931).



Figure 6.76 Painting titled “Metis Drying Buffalo Meat”. White Horse Plains (Armstrong 1899). Depicts Metis drying bison meat.

survive longer periods of time. Further, given that this site was occupied during the late fall early winter and is located on the open prairies, strong winds would have been an issue. It is probable that there were multiple events that took place at this site over a period of several years. So, by building these structures with a more substantial frame, it would increase the likelihood that they would survive intact from year to year. The second explanation is that the loose sandy sediment of the site was unable to support a rack that only had a few legs. By adding more legs to the structure, the downward force that the meat placed on the legs would be more evenly dispersed on the loose sediment, limiting the chances of the legs slipping and the structure collapsing.

6.5.7 Drying Rack Purpose

Drying racks were used to dry large volumes of meat (figures 6.75 and 6.76) as part of the process of pemmican manufacturing to preserve meat for later consumption. Given the season of site use discussed earlier, it is likely that in this instance these drying racks were being used to aid in the preparation of food for the winter. Dried meat weighs approximately one tenth of the weight of fresh meat, therefore it could be transported more easily (Quigg 1997). It

could be mixed with berries and bone grease to create pemmican which is a staple of the Avonlea hunter gatherer diet on the Northern Plains (Reeves 1990).

6.5.8 Bone-filled Pit Features

It is difficult to ascertain the functional purpose of the bone filled pits. As a result of their excavation and research, which occurred prior to the current work, Western Heritage identified three different types of features: Bone Uprights, Crushed Bone Pits and Bone Concentrations with grey circular staining (Western Heritage 2015d). Their identification of some of the features as being bone uprights seems slightly inaccurate. The use of the name 'Bone Upright' elicits the idea of features where all or at least most of the bones contained within it are oriented vertically. As research continued it became clear that this does not accurately describe features at Whiting Slough. While there are definitely vertically oriented bones within some of the features there were also, in many cases, large amounts of bone within the feature that appeared to just be thrown into the pit. There is a great amount of variability within these features with some being very large in size with large bones and others containing less and smaller bones. However there does not appear to be a pattern to feature form that would allow delimiting all features to one of the three categories suggested by Western Heritage. Yet, while their makeup is different from feature to feature, it is believed that they all shared the same purpose.

6.5.9 Bone-filled Pit Construction

Based on the evidence that was uncovered during excavation it is believed that these features were built within the processing area of the site. Their construction began after most of the processing had taken place and in preparation for the construction of meat drying racks. Construction began with the digging of several small pits in an ovoid shape within the area where the drying racks were to be placed. This digging process would have been relatively easy to undertake because of the sandy sediment and could have even been done by hand. It was at this point that a mixture of bones was placed in the pit. These bones would have been scattered throughout the site as refuse from the other processing activities that were taking place in the area. This was followed by then filling the pit back in with sand. This process of digging a conical shaped hole and placing bones within it can explain why the size, type and number of bones

within the features appears to be somewhat random. It also explains why some of the features do have some vertical oriented bones. As a result of this, processed bone would be thrown into these pits and because of the conical shape of the pit the natural position for the longer bones to sit would be vertical or near vertical.

It is highly likely that not all these features were constructed as part of the same event. The separate individual drying racks could have been built during these separate events. In addition to this, it is also possible that more of the bone-filled pit features could have been added within each of the drying rack structures during these different occupational events. These new features could have been later added to the drying racks to gain more structural integrity and therefore hold more weight. New bone-filled pits could have also been added to replace older features that were no longer viable because they were no longer supporting weight or features that had become buried or hidden within the sandy sediment. These different scenarios could explain why there appears to be a great over abundance of bone-filled pit features within the drying racks when compared to the drying racks that are seen in figures 6.75 and 6.76.

6.5.10 Bone-filled Pit Usage

While there is great variability within these features, they all appear to serve the same function. This function is to create a firm base in which a leg of a drying rack can be placed. As a result of the loose sandy sediment at this site it can be hypothesized that it was difficult to get the legs of the drying rack to stay in place and not slide out under the weight of the drying meat. This was resolved by creating a larger surface area of bone deeper in the ground from which a wooden pole could be propped up against to prevent the drying rack from collapsing. Figures 6.77 and 6.78 illustrate the force that would be exerted on the sediment and how the introduction of these bone features would increase the surface area and better the weight distribution of the drying racks on the sediment. This process could have also been solved by using several large rocks behind and underneath the wooden poles. However, given that there is no readily available source of large rocks in the area and there is an abundance of bone from the nearby kill site, it makes sense that they chose to use bone as the main construction material. The variability within the different features is also quite interesting. There does not

appear to be a set blueprint that is used to resolve this problem. This could suggest that this was a quick solution to an issue that presented itself at this site. Given the unique sand dune sediment present at Whiting Slough, this could be an example of a new technique being used to overcome an issue that would not be present in other areas with a firmer sediment or an abundance of large anchoring rocks.

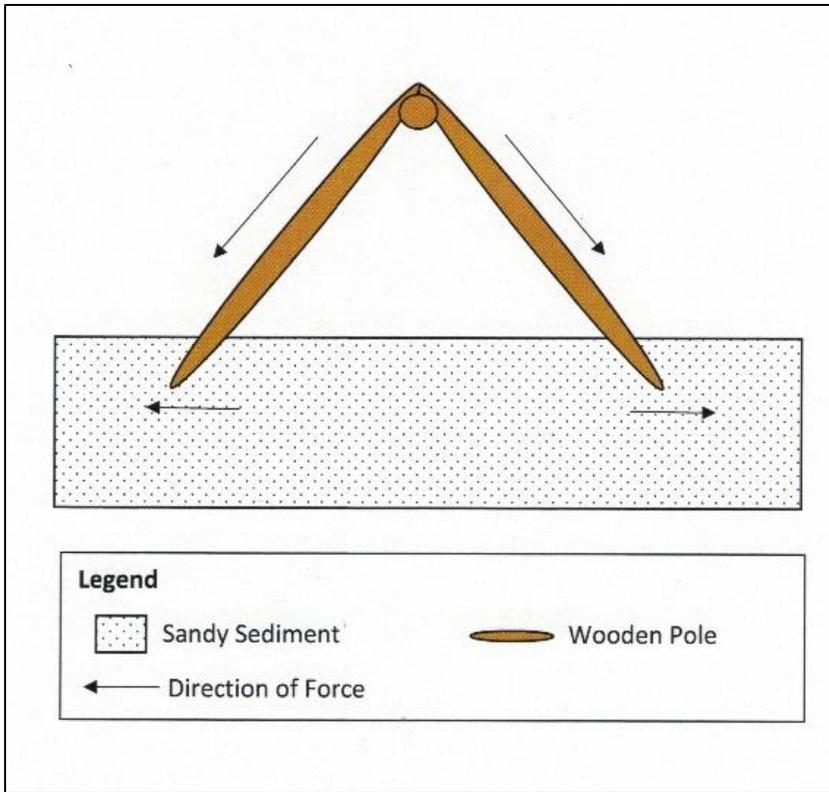


Figure 6.77 Cross-section of drying rack without bone-filled pit feature.

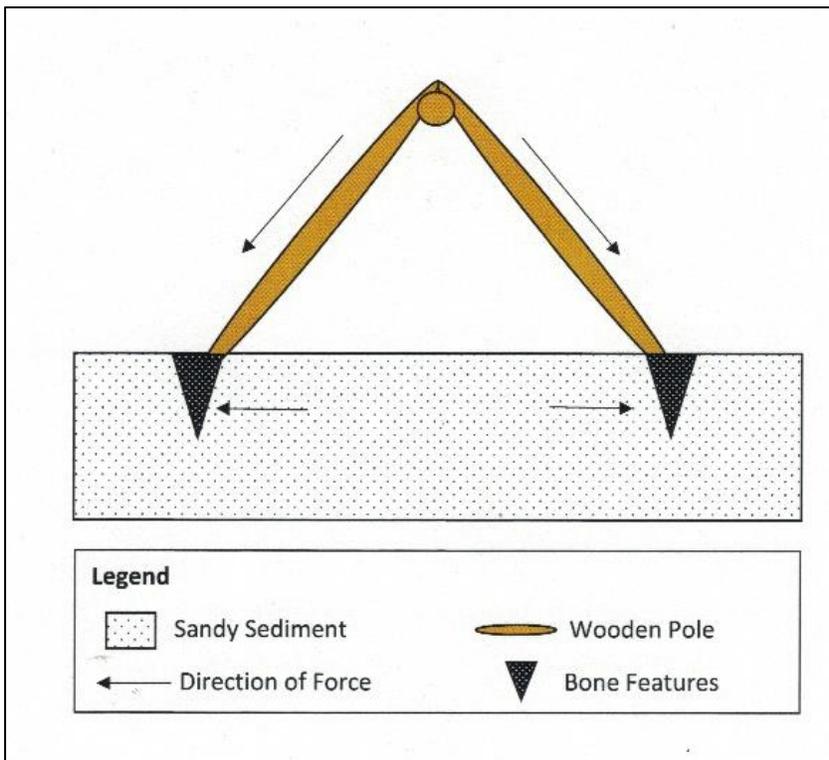


Figure 6.78 Cross-section of drying rack with bone-filled pit feature.

Chapter 7: Spatial Analysis of Whiting Slough

There were 43 features located during excavation and an additional seven features that were found during the archaeological monitoring of the highway construction project. In this chapter, the spatial distribution of faunal, lithic, charcoal and pottery artifacts will be discussed and analyzed. From this information work areas and areas of interest will be identified. In all, there were a total of 398,329 artifacts weighing 395,718.84g found throughout the four stages of excavation and construction monitoring at the Whiting Slough Site. These have been divided into faunal, lithic, pottery and charcoal remains. Both faunal and lithic artifacts are subdivided to see if more specialized use of specific areas for distinct tasks can be determined. There are two main densities that will be looked at throughout this chapter. These are weight and count densities. In both of these instances these calculations are based off of the number or weight (g) within one square meter of a given pixel. This reading will determine what color is assigned to that given pixel. This results with a red color for high density, yellow for medium density and green for low density. As stated in chapter 3 these categories were broken up using natural breaks within the data.

7.1 Faunal Densities and Activity Areas

The faunal processing areas of the Whiting Slough Site can be quite complex and difficult to differentiate. With the likely probability of multiple uses of this site and the overwhelmingly vast number of faunal artifacts present, it is difficult to see specific activity areas within the faunal assemblage that occurred within one of the occupational events that took place at the site. Therefore, the faunal remains will be analyzed assuming that the group used the site in similar ways during their multiple visits. There are also several different species of animals present at the Whiting Slough Site. Two of these, bison and canid, appear in great numbers throughout the site. While other animals such as deer, rodent and bird appear in small numbers and likely represent intrusive remains in the archaeological record.

7.1.1 Bison Processing Areas

It is hypothesized that the entirety of Whiting Slough is a processing site for a nearby kill site. However, different areas within the site may reflect different processing events. As can be

seen in figure 7.1 and 7.2 there are changes in density when comparing bison bone weight versus the number of bison bone fragments. These differences show areas where bone was being more thoroughly processed into smaller pieces, probably to extract grease from the bones. One activity area is based on bison bone weight density (white circle on figures 7.1 and 7.2). This circled location depicts the primary processing area of the site. The bones found within this white circle are larger and less processed than the densities seen within figure 7.2. In figure 7.2 there is a different bone density that appears. This section is highlighted by the black circle. This area depicts an increase in the number of bison bone fragments. It is by examining the differences between figure 7.1 and 7.2 that we can understand the different tasks that took place in these different locations. The southern bone processing area, highlighted by the white circle, is comprised of larger bone fragments and more complete bones. It is within this southern area that less intensive preliminary processing of the bone may have taken place. This likely represents the area where butchering and some bone marrow extraction occurred. The location of this preliminary processing area is also of importance to our understanding of the greater landscape around the site and how the group was utilizing it. Based on the topography of the area, it is hypothesized that the associated kill site was likely located to the south of Whiting Slough either underneath the existing highway or, more likely, south of the highway. The appearance of this preliminary processing area in the south of the site further affirms this idea.

The second processing area at Whiting Slough appears closer to the center of the site, as depicted in figures 7.1 and 7.2 and by the black circle. This location contains a large assemblage of heavily fragmented bison bone. The substantial amounts of bone present in this area suggests that heavier processing of the bone was taking place here. As previously stated, within the Avonlea Phase we see the use of boiling pits and bone grease extraction. This is likely what we are seeing here. This bison bone is being heavily broken into smaller and smaller pieces to effectively extract as much bone grease as possible. This process would have required boiling of water to extract the grease from these bone fragments. While no boiling pits were found during the excavation, it is assumed that they are likely present nearby and located somewhere just outside of our excavation grid. Another interesting aspect of the heavy processing area is its

proximity to Feature CB. The large amount of bison bone within Feature CB definitely affects these densities. It is impossible to discern which artifacts within the pit were not part of the processing event taking place here with the exception of the bison skull and canid remains which are unlikely to be part of this event. The likely explanation is that the fragmented bone that we see within the top portions of Feature CB is a direct result of the pit being refilled with the bone filled sediment that was present around the pit.

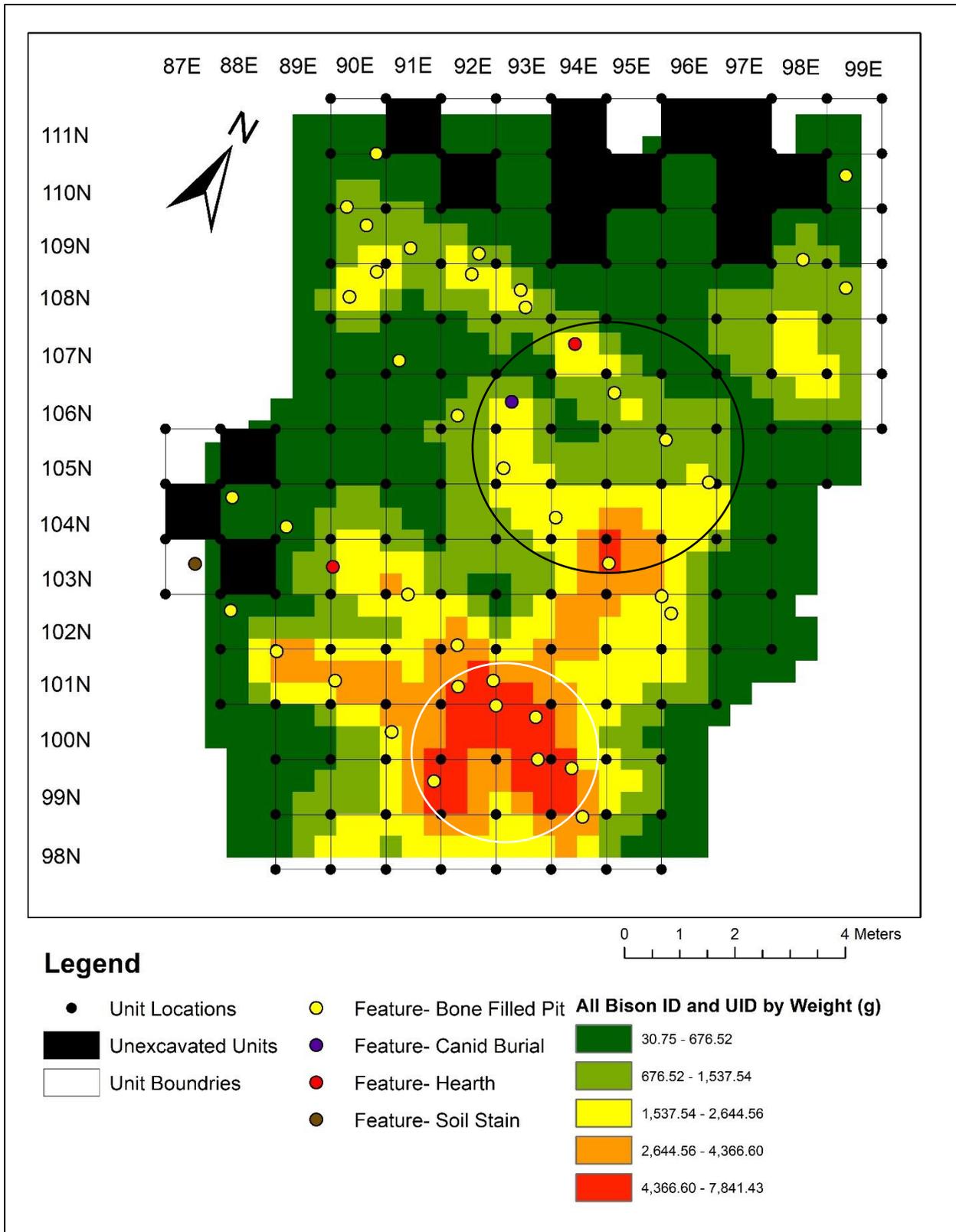


Figure 7.1 Identifiable bison bone by weight (g)

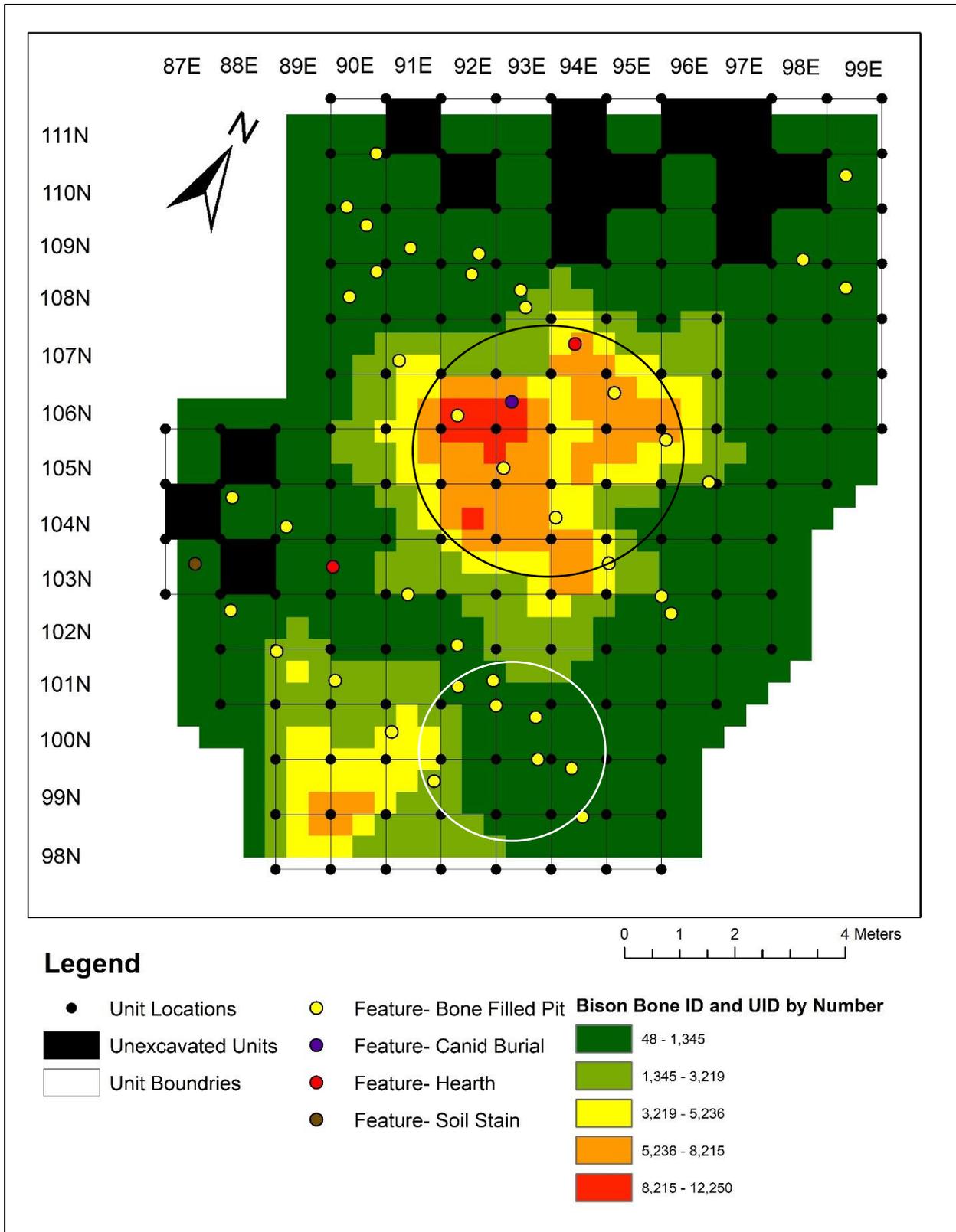


Figure 7.2 Identifiable bison bone by number

7.1.2 Canid Bone Concentrations

The amount of canid bone that is found at Whiting Slough is quite outstanding and is one of the components that makes this site so different than what is seen at other Northern Plains Avonlea sites. In total 168 canid bones were identified at Whiting Slough. These are dispersed throughout the site with one major concentration being located within Feature CB. Within the site there are at least two individual canids present (Thomson 2020). One located within Feature CB and one that appears to be scattered throughout the rest of the site. Feature CB aside, there does not appear to be any organization or concentration to the canid bones that are found around the site. Some of these bones could potentially be canids that are intrusive to the archaeological record and are a result of the natural scavenging tendencies of these animals. However, Feature CB is definitely a deliberate human constructed feature that was created within the site and intentionally included the remains of a canid. A second feature, Feature V, contains the second phalanx of a canid. This feature is located directly south of Feature CB so the canid bone could have been introduced into Feature V during the construction of Feature CB. There are only marginal concentrations of canid remains at the site aside from the concentration located within Feature CB (figure 7.3).

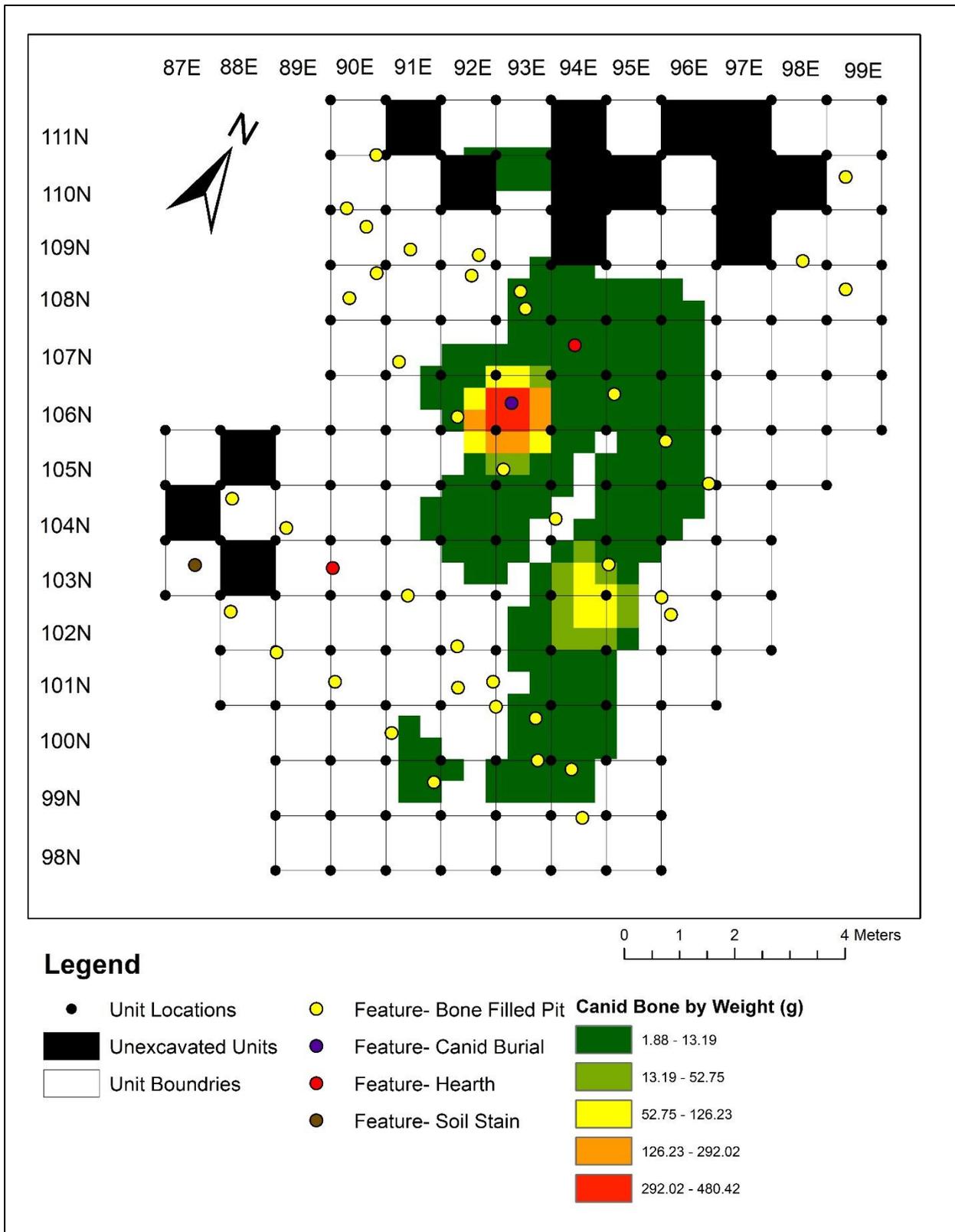


Figure 7.3 Identifiable canid bone by weight (g)

7.1.3 Other Animals

Faunal remains from several other animal species were found at the Whiting Slough Site, including indeterminate rodents, bird and deer as well as northern pocket gopher and snowshoe hare. These animals account for a very small percentage (<1%) of the bone found at the site. This collection of faunal remains contains only 56 bones weighing 37.6g, with the majority of these being rodent bones. As most of the animals represented within this section are burrowing animals, these bones likely reflect disturbance within the site and not human use.

As can be seen in figure 7.4 rodent remains were found throughout the site. This, combined with the burrows found during excavation, shows the extensive presence and movement of rodents at the site since its occupation. Deer and hare bones were also found at the site. These animals could be part of the diet but given the low number of bones found and their location within the site, it is more likely that they are not part of the archaeological material at the site.

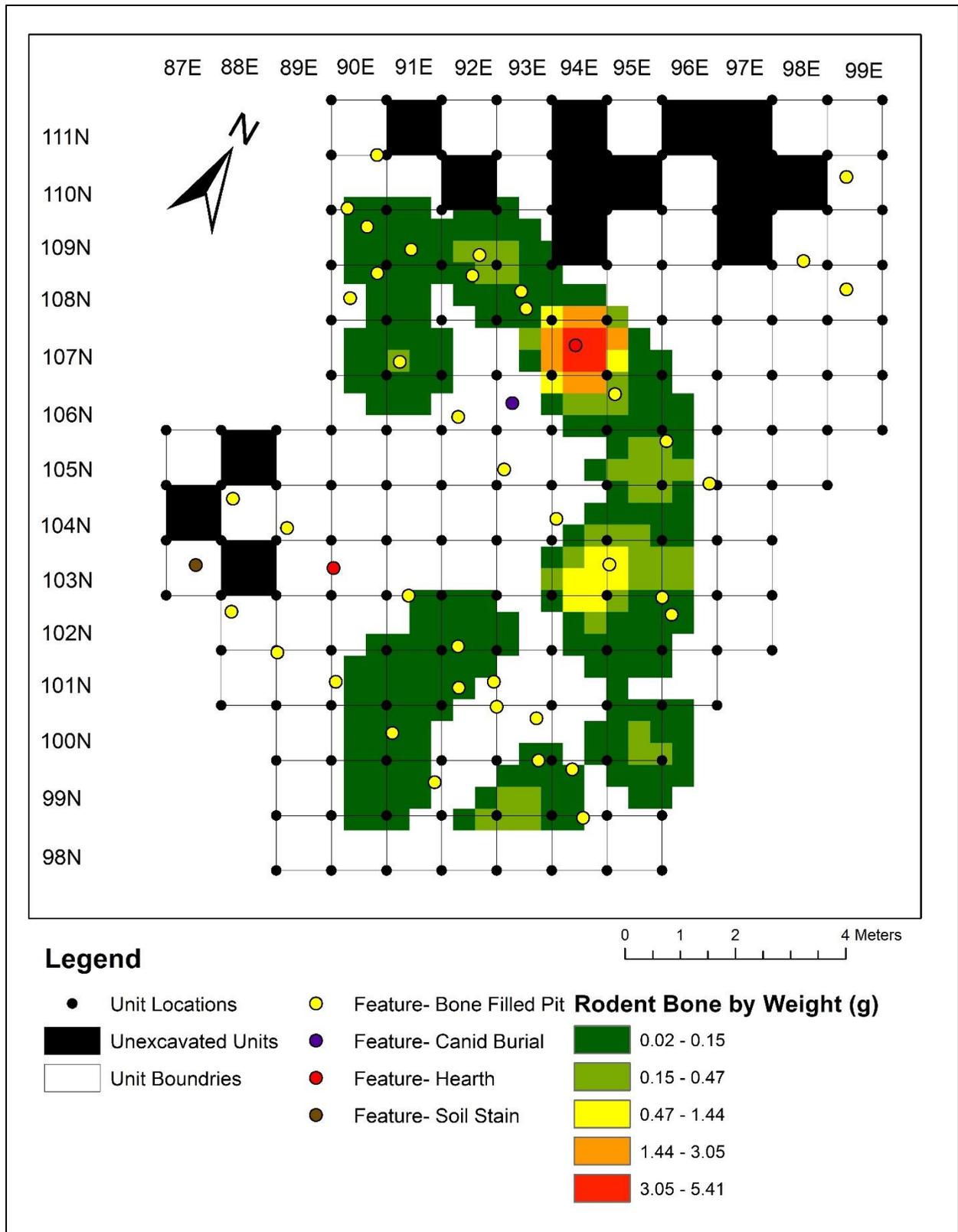


Figure 7.4 Rodent bone by weight (g)

7.1.4 Unburned Bone Densities

Unburned bone makes up 73.86% of the total bone weight at the site. Unburned bone is present throughout the site, but appears in greater amounts by weight around the southeastern edge of the site (figure 7.5). This bone is primarily made up of bison and unidentified bone which is also likely bison. This density of unburned bone appears to correspond to the primary processing area that is shown in the white circle of figure 7.1. This further supports the idea that this area of the site was likely the location where early processing of the bone was taking place, while further processing as well as the burning of the bone was taking place elsewhere. Another interesting aspect is the association of the unburned bone with the bone-filled pits and drying rack 1, such that the areas of bone concentration overlap with these structural features. Their proximity to one another suggest a short travel distance from the processing area to the pit features during the construction phase of the site. It also shows the large amount of unburned bone that is part of the bone filled pit features within this section of the site.

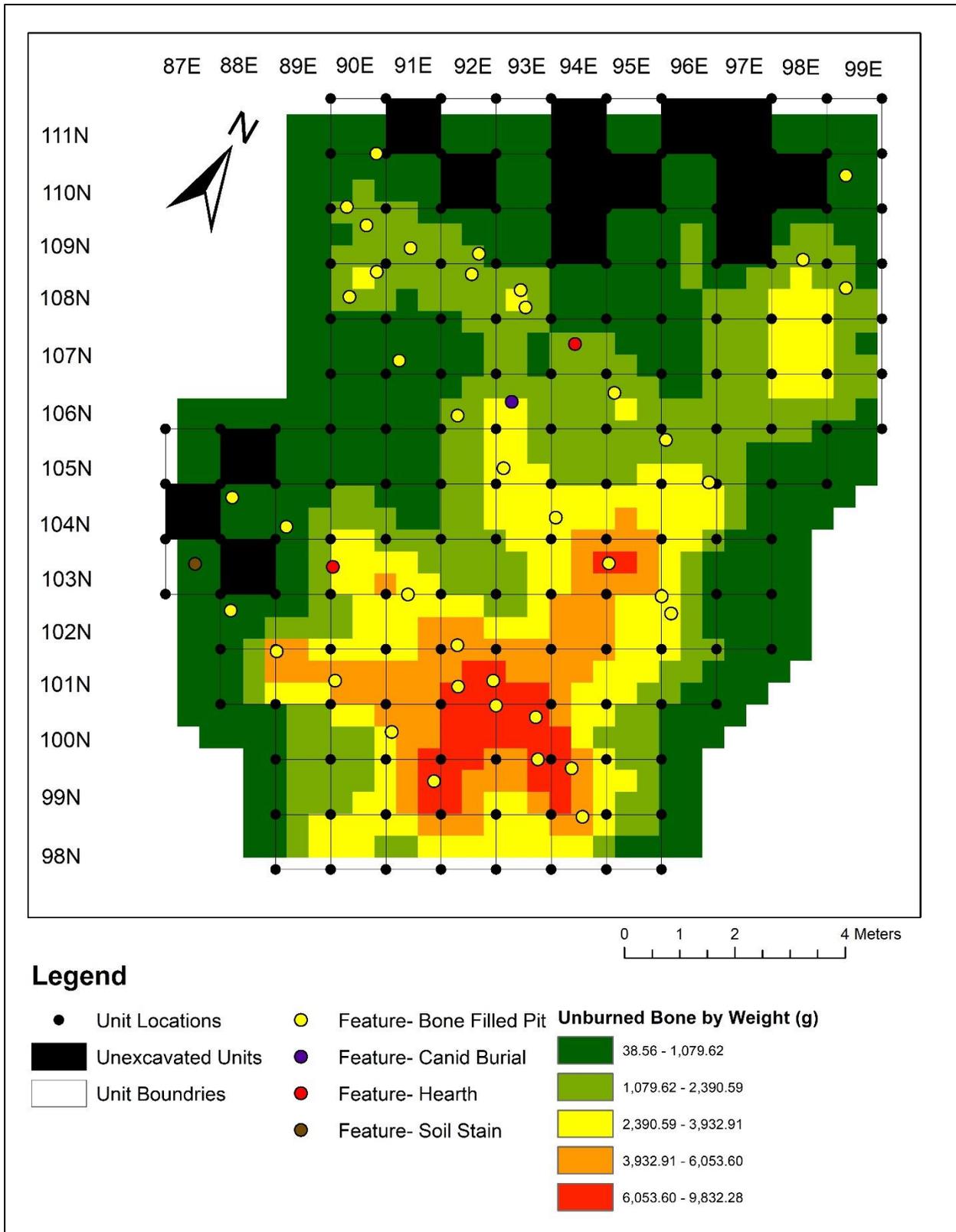


Figure 7.5 Unburned bone by weight (g)

7.1.5 Burned Bone Densities

Large amounts of burned bone are also present at the site. These bones are a result of fires burning at temperatures of around 600 °C (Thomson 2020). This bone accounts for only 26.14% of the bone by weight but accounts for 57.8% of the bone by number. These differences arise from two different factors. The first is that the burning process lightens the bone, therefore, it appears that there is less of it by weight when compared to the unburned bone. The second factor is that much of the unburned bone found at Whiting Slough is far less processed than the burned bone. This again supports the hypothesis that the primary and secondary processing of bones were happening within different areas of the site. As shown in figure 7.6 the majority of burned bone at the site is clustered around Feature CB in the central area of the site. This is also the area that was previously hypothesized to be the secondary processing area as seen in figure 7.2. It is no coincidence that these areas overlap one another as both highly fragmented and burned bone are both signs of a higher level of processing.

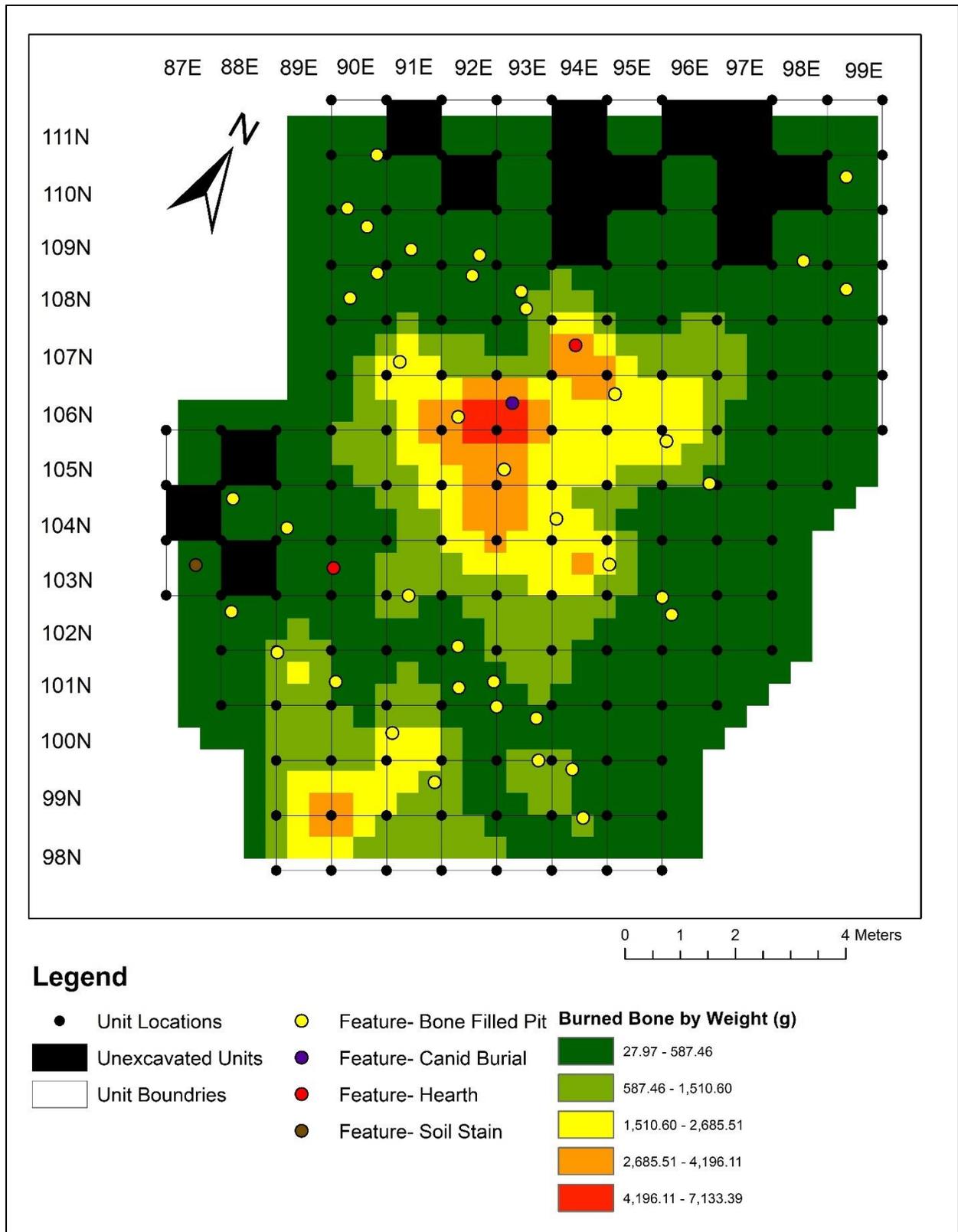


Figure 7.6 Burned bone by weight (g)

7.1.6 Calcined Bone Densities

Calcined bones make up a very small percentage (<0.1%) of the faunal assemblage at Whiting Slough. These bones reflect burning at temperatures as high as 800°C (Byers 2011). It has been argued that the extremely high temperatures required to produce calcined bone could mean that the bones can be used as an indicator of anthropogenic fires (Brink 2008). Brink (2008) also suggests that there could be multiple ignition sources, thus allowing for a fire that would be more intense. This is what can be seen at Whiting Slough (figure 7.7) as there are several areas where we see clusters of this calcined bone. Each one of these are possible areas where fires could have been started at the site. The areas where we have large amounts of unburned bone are the same areas where we see low counts of calcined bone (compare figures 7.5 and 7.6 to figure 7.7). As expected, the areas where we see higher amounts of burned bone also have higher amounts of calcined bone. Within Whiting Slough there appears to be four main clusters of calcined bone, depicted in figure 7.7 as red or orange areas. As stated above, these higher amounts of calcined bone by weight correlate nicely with the areas where there is a larger volume of burned bone at the site, with the northwest cluster an exception.

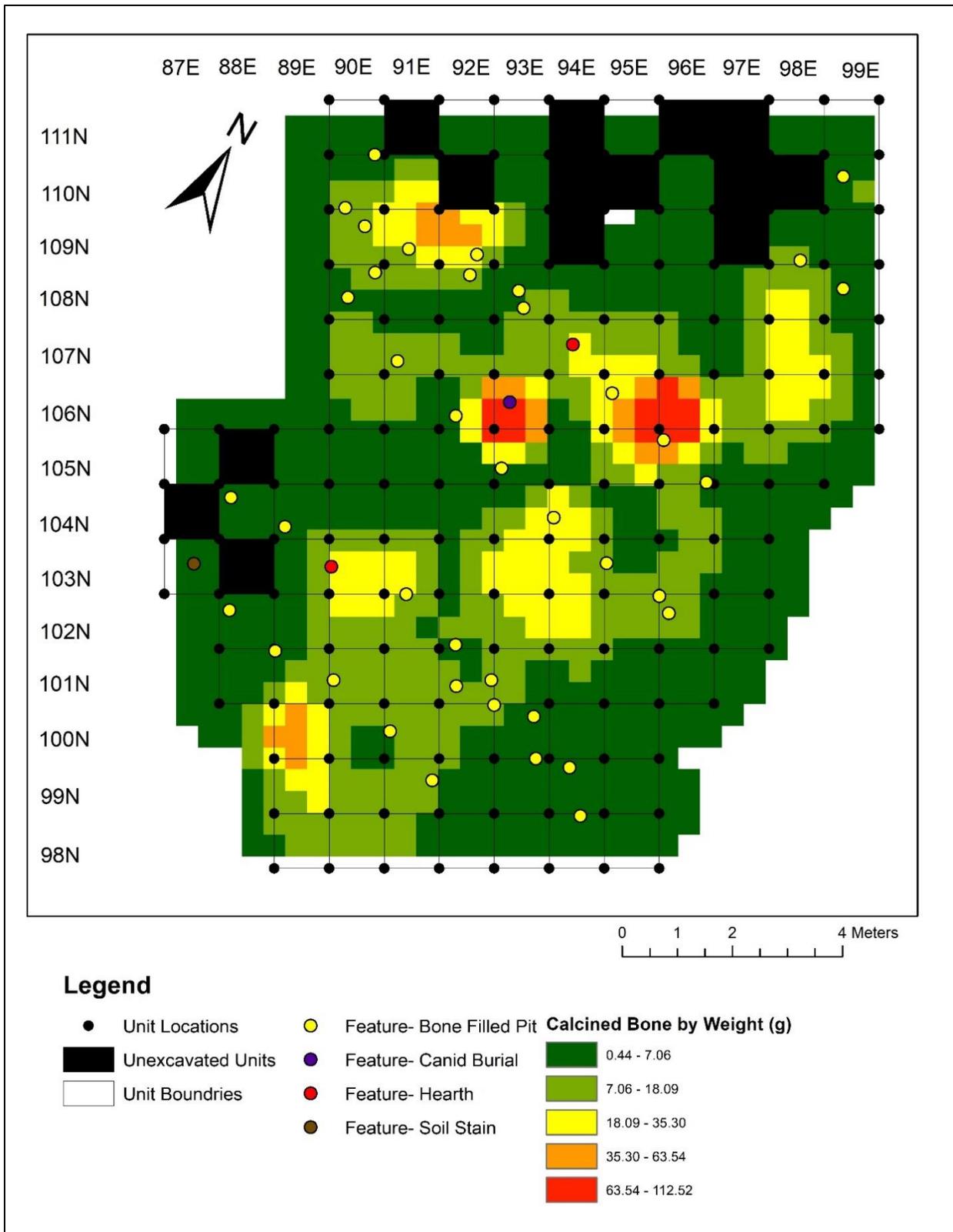


Figure 7.7 Calcined bone by weight (g)

7.1.7 Bone Tools

Two potential bone tools were found in the excavations at Whiting Slough, but both are only fragments of what would have been larger processing tools. These tool fragments appear in units 104N 92E and 102N 92E (figure 7.8) roughly in the centre of the processing area. Unfortunately, there is little that can be learned from these artifacts spatially as two artifacts do not present much of a spatial pattern. Yet, the inclusion of these types of artifacts in the archaeological assemblage further supports the idea of Whiting Slough being the processing area within a larger kill event that took place in the area. It also shows that there were other tools being used within the processing event at Whiting Slough that may not have been preserved.

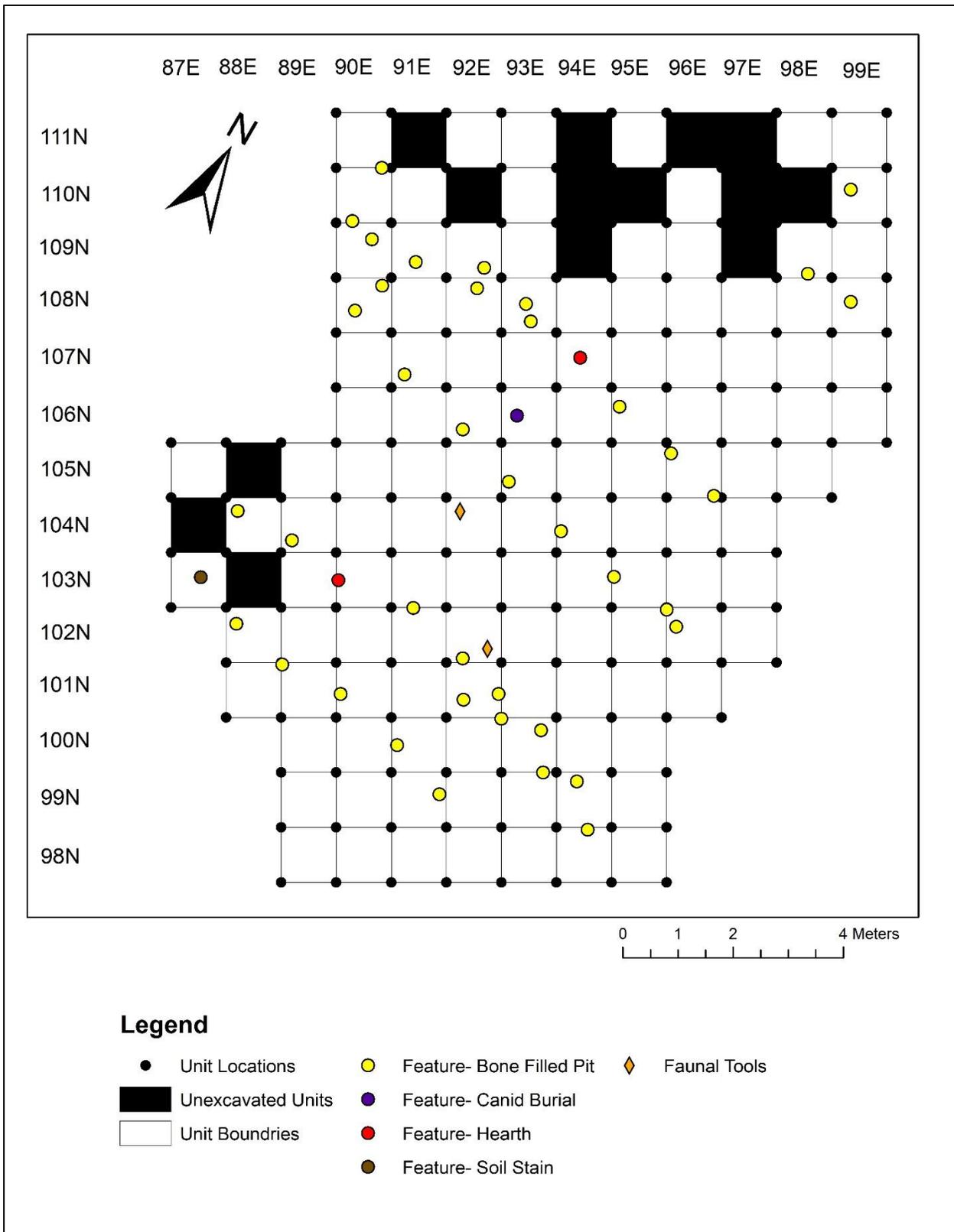


Figure 7.8 Faunal tools

7.2 Lithic Activity Areas and Densities

Lithic artifacts of various types were found at the Whiting Slough Site. These artifacts primarily consist of projectile points (232) with smaller amounts of other lithics such as fire-cracked rock (205), other lithic tools (36) and lithic debitage (427). This section will discuss the lithic activity areas and densities that were found at Whiting Slough. In total 900 lithics weighing 7903.8g were uncovered during the excavation of the Whiting Slough Site.

7.2.1 Projectile Points

Many projectile points were found at the Whiting Slough Site. A total of 232 projectile points or partial projectile points were found at the site with most of them being identifiable as belonging to the Avonlea type. Figure 7.9 shows the distribution of these complete and incomplete projectile points, revealing many small clusters of points spread throughout the site. Most units excavated at the site contained at least one projectile point with many of the zero count units occurring on the peripheries of the site.

The dispersed nature of these projectile points can tell us several things. The first is that there does not appear to be any caching of points. Given the large number of complete points (62) within the lithic assemblage it was thought that there might be some caching or collections of points, but this does not appear to be the case. Figure 7.10 indicates there are only small clusters of complete points, with only three complete points appearing within one square meter of each other. This low number of proximate complete points suggests that there are no point caches present at Whiting Slough. Instead, it seems likely that projectile point distribution is quite random. This seemingly random distribution is likely a result of the bison processing event and the relatively small size of the Avonlea points. It is probable that the projectile points were removed as they were exposed within the meat during the bison processing event. Thus, resulting in their removal and disposal during different tasks and in different areas of the site during the processing event.

There are three non-Avonlea projectile points, consisting of one nearly complete and one fragmented Besant point plus the base of a Hanna point (Figure 7.11). The Besant points were found on the southern periphery of the site in units 101N 88E and 105N 87E. The Hanna

point base was found towards the center of the site in unit 105N 91E. This base was found at a greater depth than most of the other points found at the site.

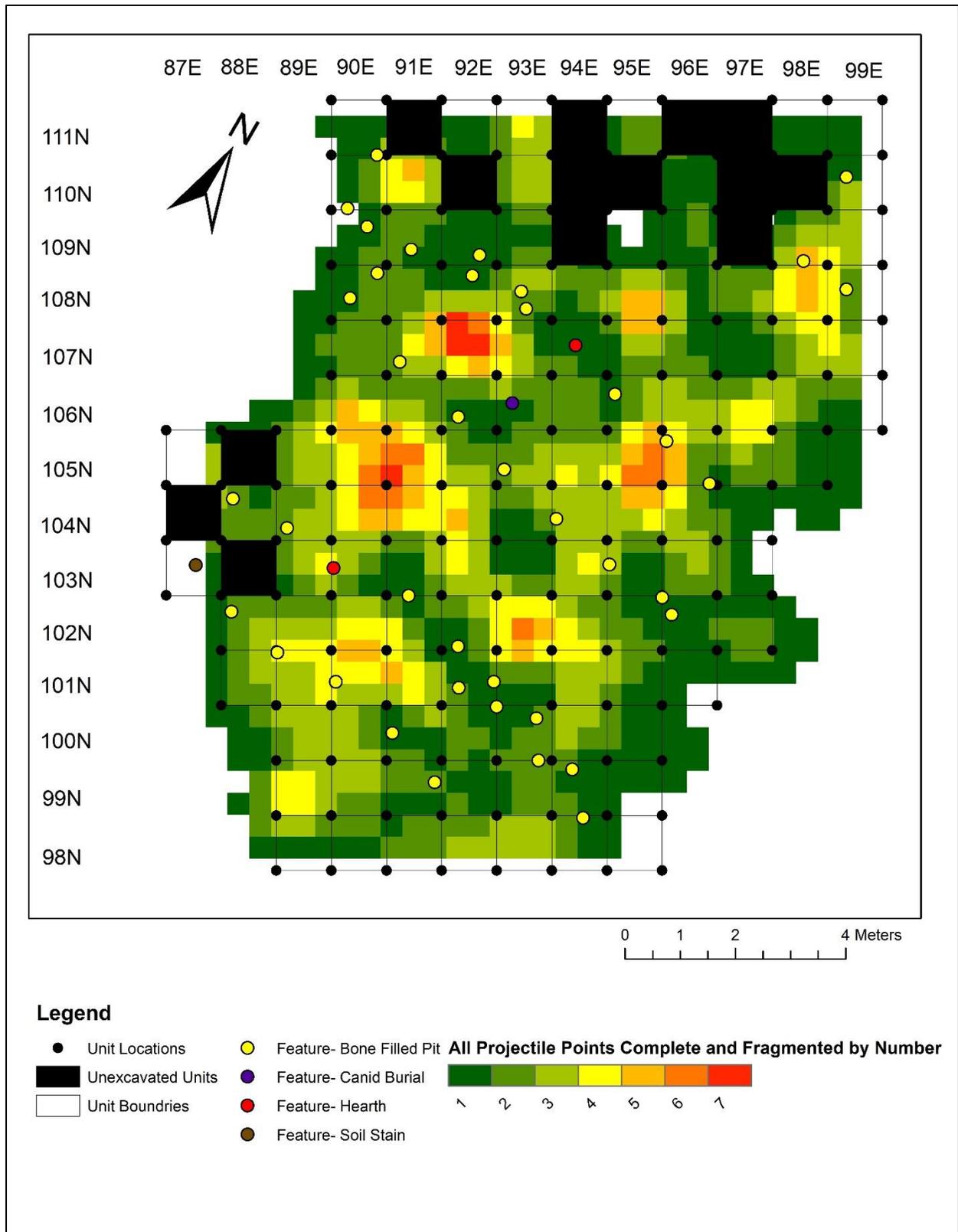


Figure 7.9 Complete and incomplete projectile points by number

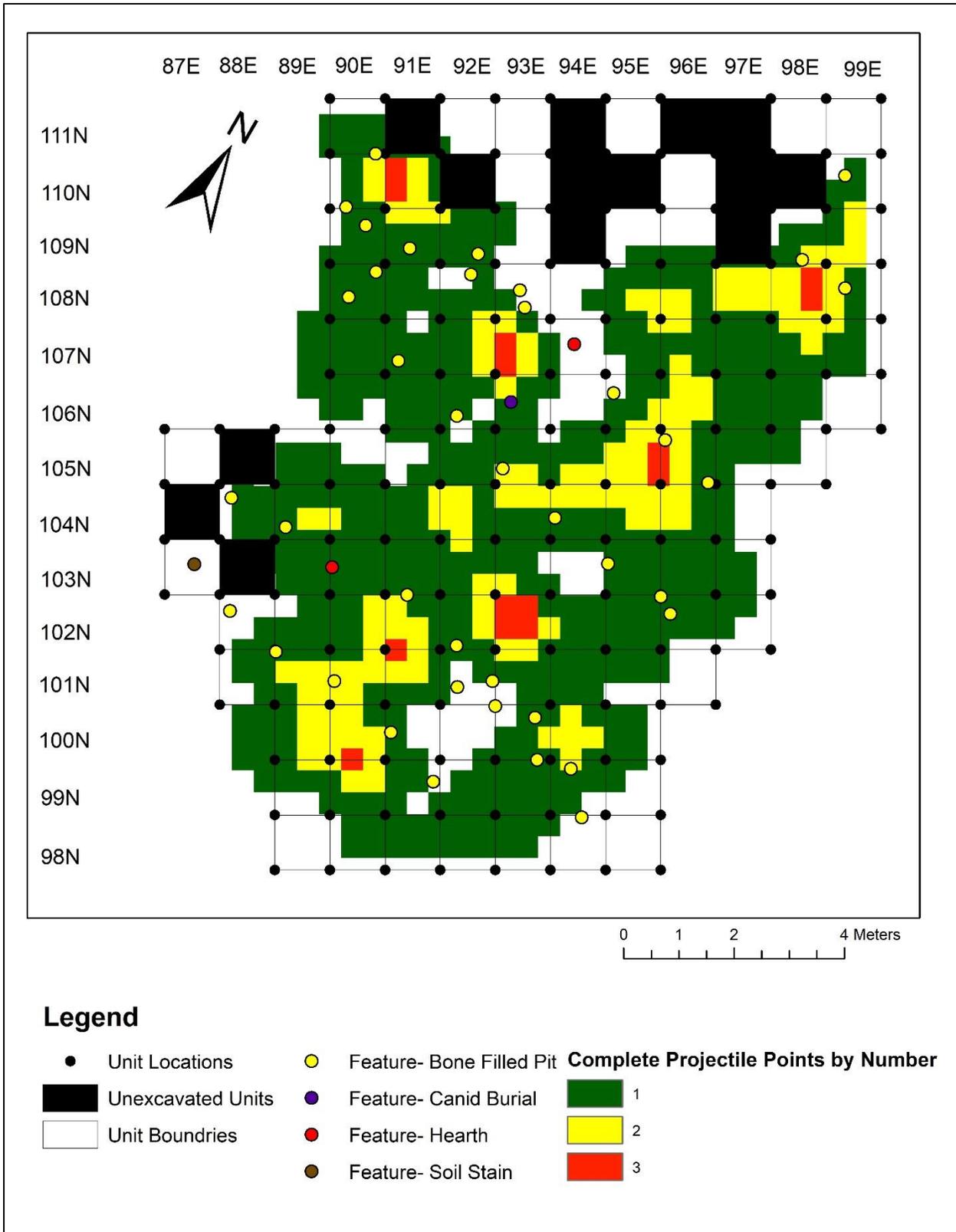


Figure 7.10 Complete projectile points by number

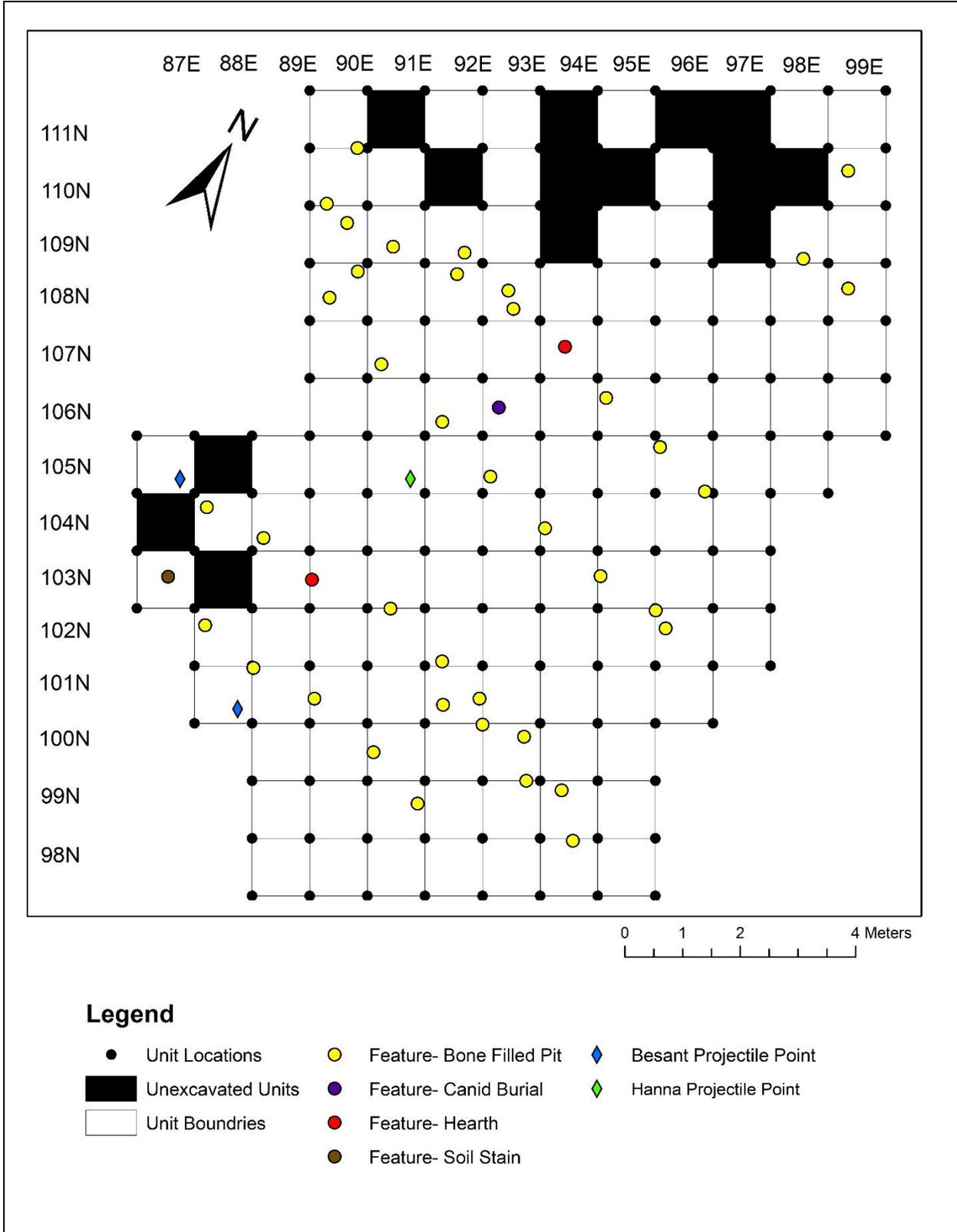


Figure 7.11 Non-Avonlea projectile points

7.2.2 Lithic Processing Tools

Given that Whiting Slough is a processing site a multitude of tools used to aid in bison processing were expected. However, this is not necessarily the case as only 36 lithic and 2 faunal tools were found. The lithic tools consist of bifaces (5), chopper (1), end/side scrapers (5), knives (5), preforms (2), hammer stone (1) and multiple retouched flakes (17). The highest density of these tools is only three within one square meter (figure 7.12). This is not very many tools if extensive use of these tools was taking place at the site. It is also possible, however, that many tools used at Whiting Slough were re-collected by the people inhabiting this site. Therefore, they did not enter the archaeological record.

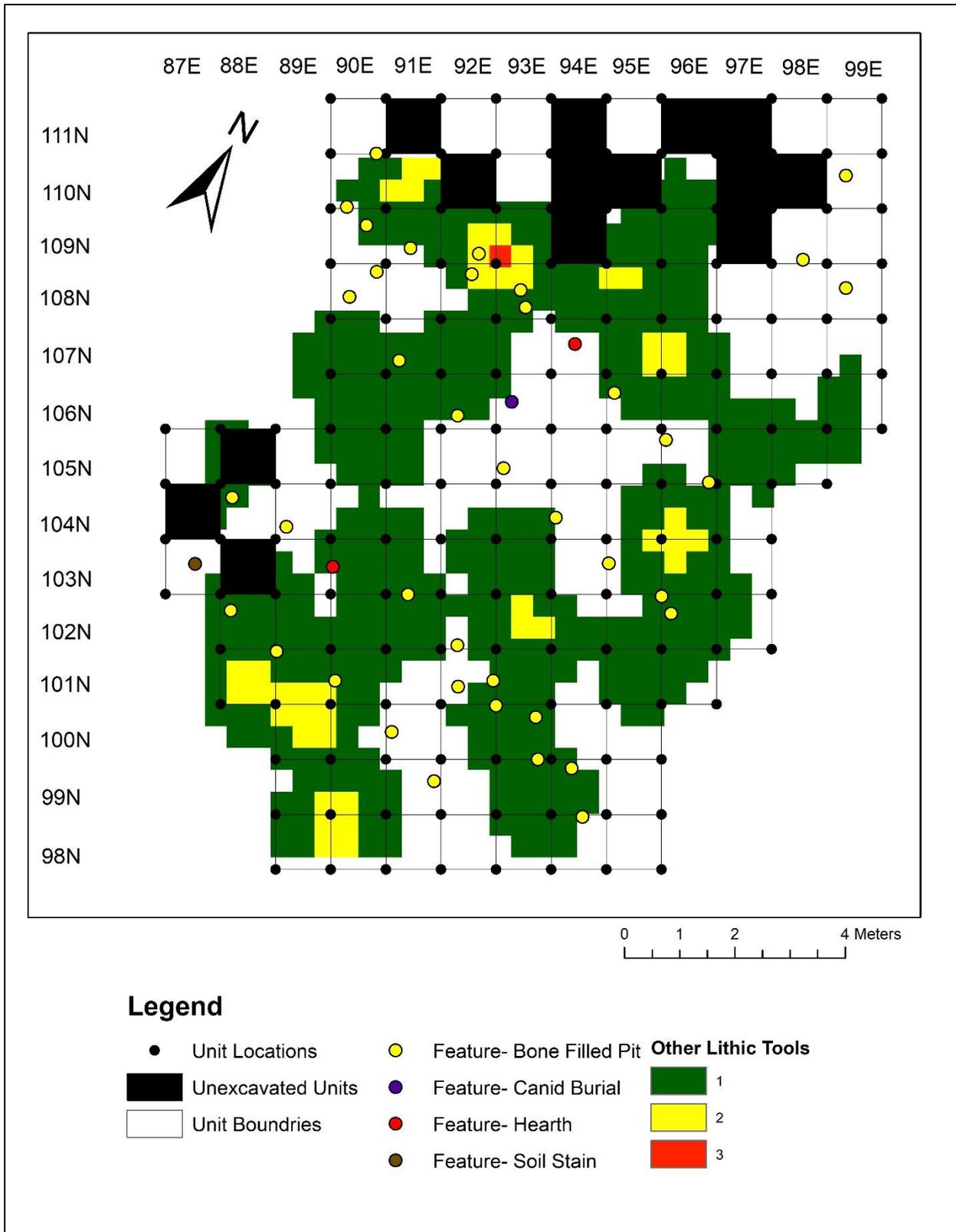


Figure 7.12 Other lithic tools by number

7.2.3 Lithic Manufacturing and Debitage

Lithic manufacturing is evidenced by the presence of flakes, cores and shatter. There were 427 of these lithic artifacts uncovered at Whiting Slough. As can be seen in figures 7.13 and 7.14, the remnants of lithic manufacturing are seen throughout the site. Figure 7.13 depicts distribution by weight in grams, revealing several areas in the south and east of the site where there are more lithics by weight. Figure 7.14 depicts the number of lithics within a square meter revealing that higher numbers in the south and east are still present, with the highest numbers in the eastern part of the site. There are also reasonably high numbers of artifacts in the west that are not reflected by elevated weights. Overall, comparison of distributions by counts and weight indicates that there are larger flakes in the south and east of the site with more, albeit smaller, flakes in the east and west of the site. Nevertheless, given the low total lithic count for the site, it does not appear that any substantial amount of lithic manufacturing was taking place. With only one core and a minimal amount of larger flakes, it can be assumed that the majority of tool manufacturing was confined to an area outside of this site. It is far more likely that the majority of lithic items that are represented within the site are a result of expedient tool manufacturing and the resharpening of existing tools being used for bison processing. This resharpening process would create very small flakes that would have easily fallen through the 6mm mesh screens being used during the excavation of the site.

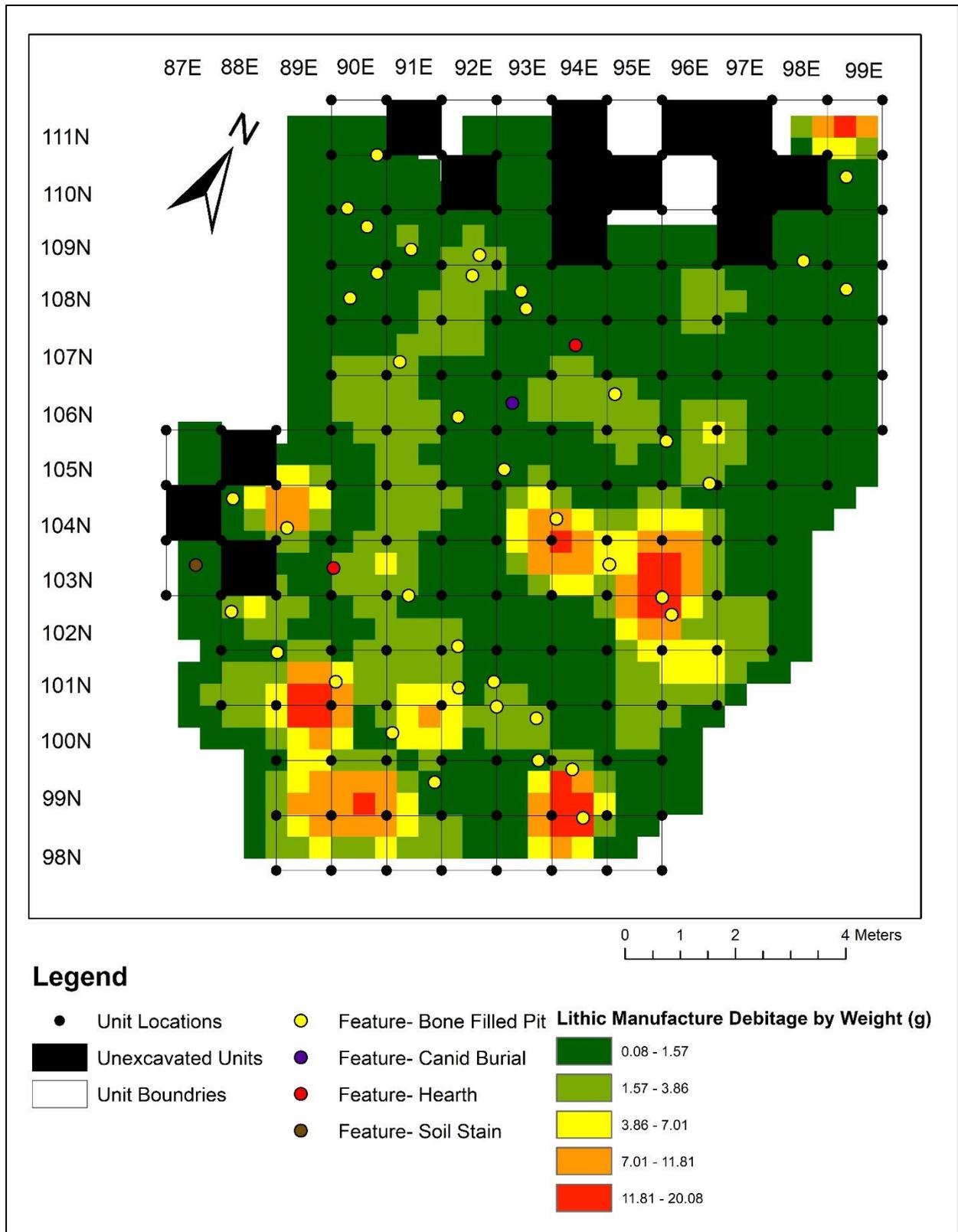


Figure 7.13 Lithic manufacture debitage by weight (g)

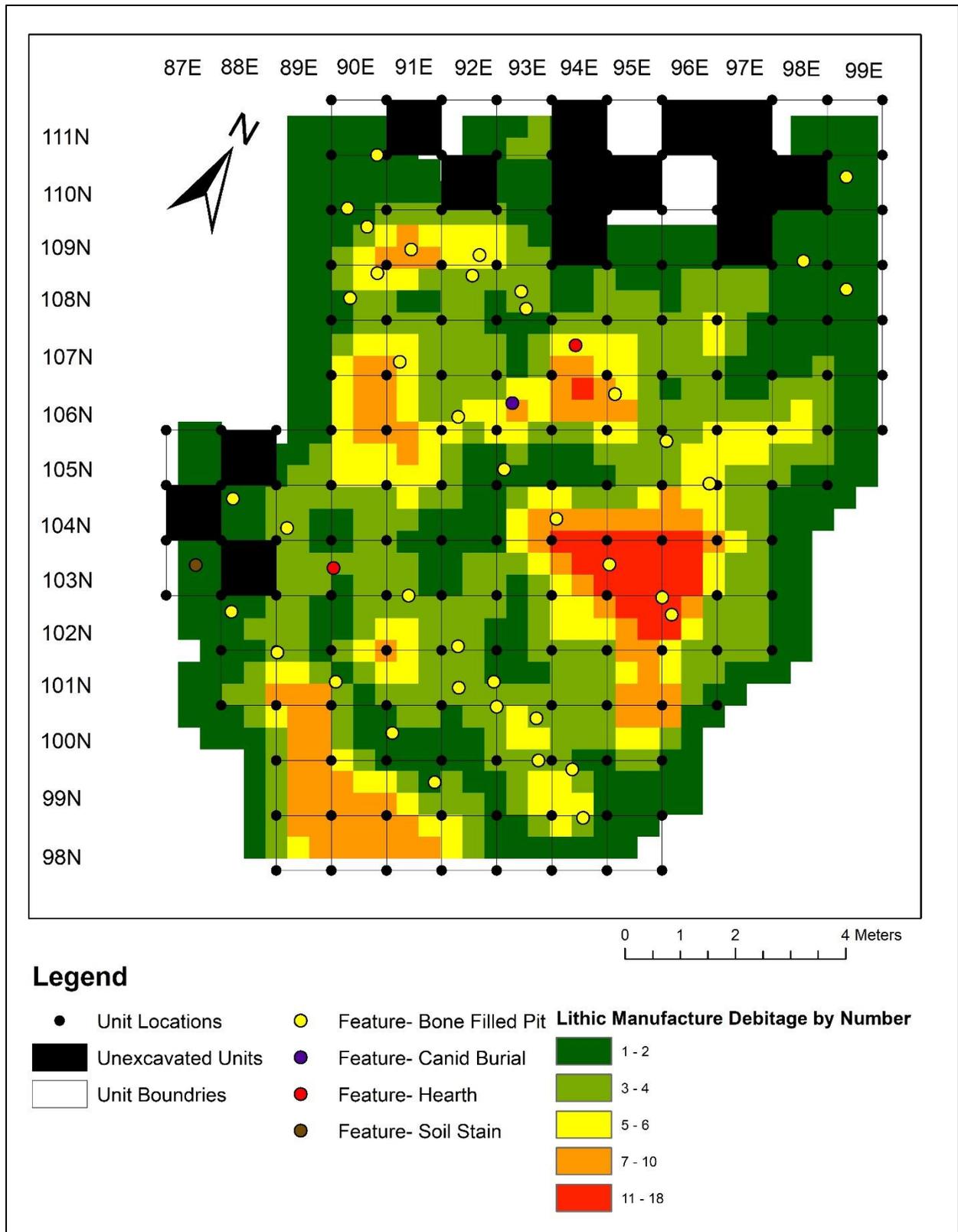


Figure 7.14 Lithic manufacture debitage by number

7.2.4 Fire-Cracked Rock (FCR)

Fire-cracked Rock counts for a large portion of the lithic material found at Whiting Slough accounting for 65% (5171.3g) of lithic material by weight and almost a quarter of the assemblage by number (205). As a by-product of the grease extraction process, FCR can be found quite regularly at sites on the Northern Plains, Whiting Slough is no exception. In many cases the presence of FCR is directly associated with the presence of hearths and/or boiling pits. This is not directly the case with Whiting Slough as no boiling pits were located. It is possible that they were missed during the excavation process, but it is more likely that they are located just outside of the excavated area of the site. As can be seen in figure 7.15 there are clusters of FCR present within the site. These clusters are located through the central and western areas of the site and are within close proximity of the two hearths that are located within Drying Racks 1 & 2. However, there does not appear to be any boiling pits within the site or areas with a large enough number of FCR to suggest that a boiling pit may have been present within the site. While we see clusters within figure 7.15, they reflect a relatively low number of artifacts and were likely discarded here after being used in an adjacent area of the site.

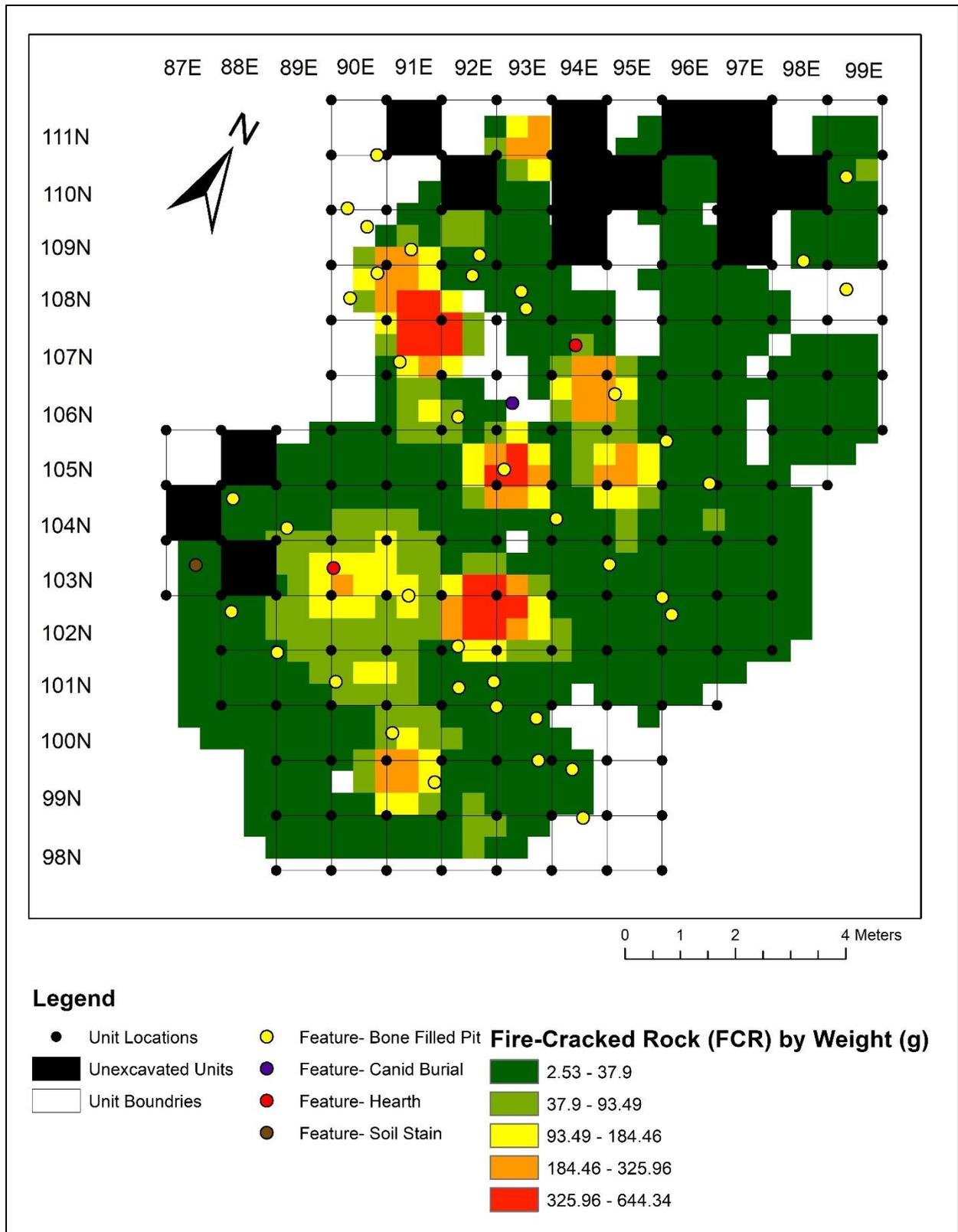


Figure 7.15 Fire-cracked rock by weight (g)

7.3 Charcoal Densities and Hearths

Given the amount of burned bone found at the site, it was expected to see large amounts of charcoal spread throughout the site. While charcoal is present the amounts are very small with the exception of several charcoal 'hot spots' (figure 7.16). There are three areas of interest when examining the distribution of charcoal at the Whiting Slough Site. The first is the area of high density around Feature J, on the northern edge of Drying Rack 1. It was as a result of this density and associated feature pictures that this was later re-identified as a hearth during post-excavation analysis. This feature and the area surrounding it contains a large portion of the charcoal found at the site. The second hearth was also discovered this way. This is Feature D1 on the northern edge of Drying Rack 2. The last area of interest regarding charcoal counts is the northern edge of Drying Rack 2. There appears to be a higher concentration of charcoal along the bone features on the northern edge of this drying rack. In total, these charcoal densities lend insight into the probable locations of hearths at the site. While there are only two hearths that have been identified, it is highly probable that others exist outside of the excavated area of this site. This can be assumed because of the large amounts of heavily fragmented bone suggesting extensive bone processing and grease extraction that were taking place.

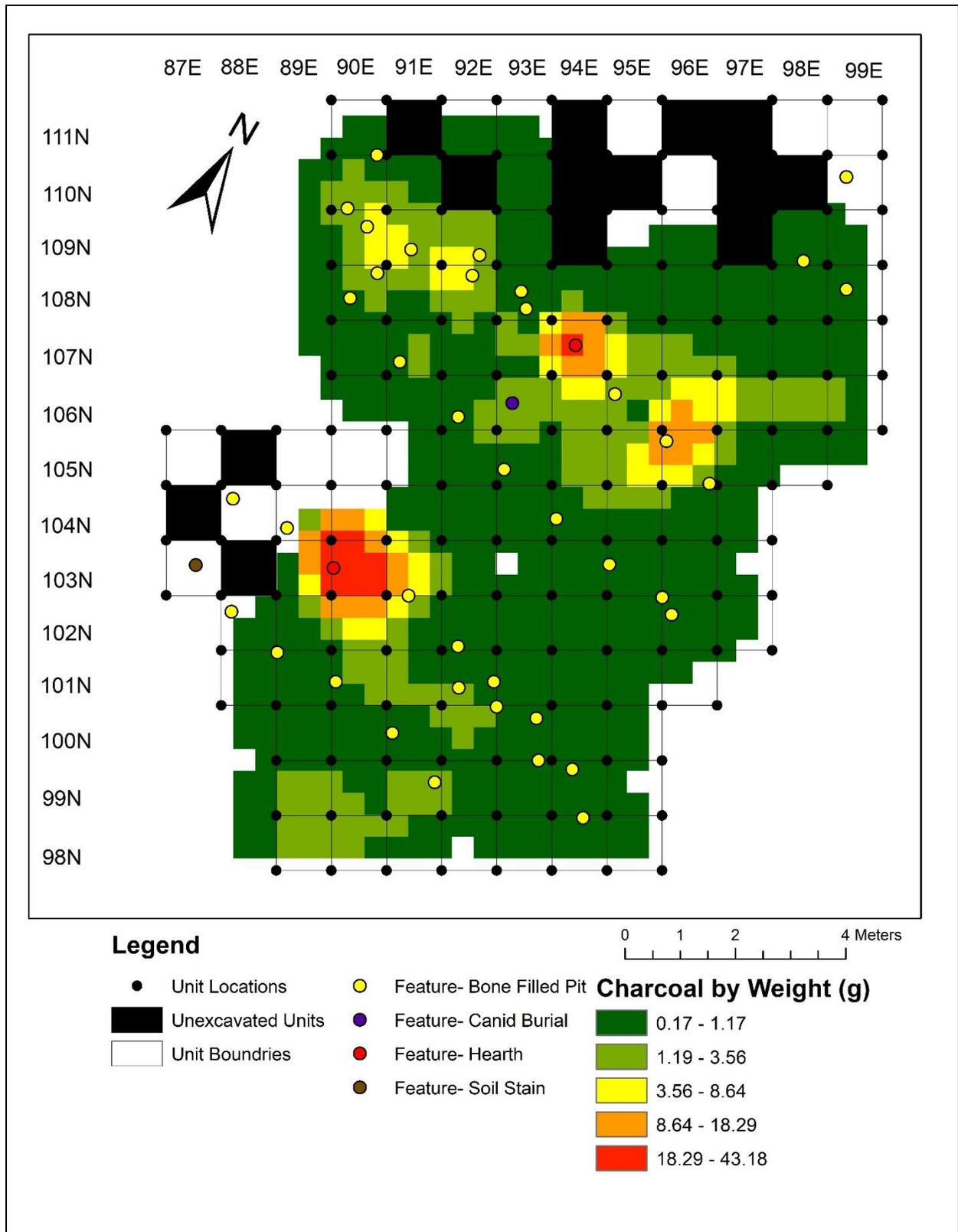


Figure 7.16 Charcoal by weight (g)

7.4 Pottery

There were only four pieces of pottery found during the excavations at Whiting Slough. Unfortunately, given the extremely small number of artifacts found as well as the dispersed nature which their locations portray (figure 7.17), it is difficult to draw any conclusions about activity areas where pottery may have been used. Three of these artifacts are very small weighing no more than 0.5g. The fourth was larger at 2.4g and was located within Feature CB mixed with the bison and canid remains. Unfortunately, the only piece of information that can be gathered from these small pottery artifacts is that the group that was inhabiting Whiting Slough was using pottery at this site.

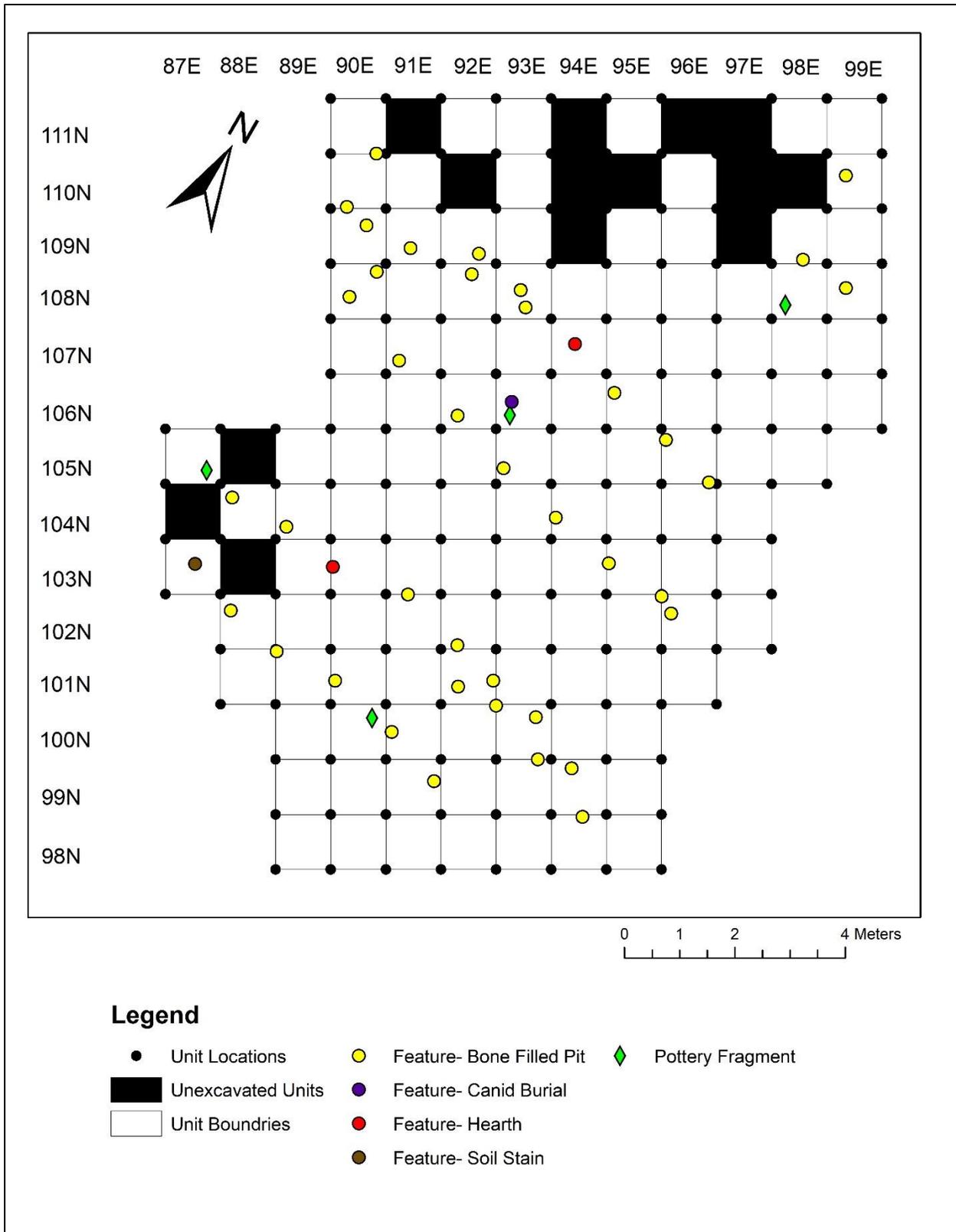


Figure 7.17 Pottery

7.5 Spatial Analysis and Activity Areas Conclusion

In conclusion, there are some areas where specific activities would have taken place within Whiting Slough. Locations such as the primary and secondary bone processing areas show clear boundaries between separate work areas. This is based on both the clear difference in the densities of small and large bone fragments as well as the differences in the high-density locations of burned versus unburned bone.

However, the lithics are far less separated into activity areas. Processing tools appear to be located throughout the site and appear in smaller numbers than what is to be expected given the size of the site and the amount of accumulated and heavily processed bone that can be found here. The appearance of minimal lithic manufacturing debitage, FCR and no boiling pits is also very intriguing. This would suggest that there is still likely more to the site than what was found during the excavation process. These activity areas were likely destroyed during the land stripping process that took place as part of highway construction, either modern or as part of the original highway construction project.

Chapter 8: Discussion

8.1 Site Designation

There were concerns with calling Whiting Slough a processing site because of the overwhelming number of projectile points that were found. The density of points found here could suggest that this area was in fact the kill site. However, this is the only aspect consistent with this interpretation. Two of the major pieces of evidence for this not being the kill site were the fact that there was very little low utility bone and the massive amount of processing that had clearly taken place. The appearance of the large number of projectile points within the site can be explained in other ways. The movement of meat into this processing area, combined with the small size of the Avonlea projectile points, means that points would have easily been carried into the site still embedded into the meat of the bison. It is at this stage where they would have been removed and discarded. It is because of this evidence, or the lack thereof, as well as the interpretation of the features found, that the site has been determined to be an Avonlea processing site.

8.2 Activity Around the Whiting Slough Site

Whiting Slough would not be the only site that was used by this group during the hunting and processing events that were undertaken in the area. There would be at least two other sites in the area that would be related to Whiting Slough, the kill site and campsite. Given the topography around the site and the proximity to the processing area at Whiting Slough, it is likely that the kill site is located to the south, across or under the modern highway, in an area that contains more hills and would be a good location to place a bison pound. As previously stated in chapter 4 there were two main hunting techniques employed during the Avonlea Phase, these were bison pounds and bison jumps (Reeves 1983). Given the topography that is present around the Whiting Slough Site, it is likely that a bison pound was constructed and employed as the hunting technique used at the kill site to the south of Whiting Slough. It is difficult to say definitively where the campsite that would have been used could or would be located.

8.3 Chronology of Events at Whiting Slough

There are several events that happened in and around the area of the Whiting Slough Site. The first event was the kill event. The kill site was likely partially or fully destroyed during the original construction of Highway 7 and construction of the rail line that passes to the south of Whiting Slough. This event would have started with the construction of the bison pound and collection of the bison within it. After the successful kill had taken place, the bison meat and some bones would have been transported to an adjacent area so that processing of the meat and bone grease extraction could be undertaken. As mentioned in Chapter 4, this processing task was labour intensive and consisted of smashing the bones and boiling them to extract the grease as part of the pemmican manufacturing process. This processing area and the plethora of fragmented bones associated with it is what was excavated at the Whiting Slough Site.

It was at this later stage that the main construction phase of this site was undertaken. This was the construction of the drying racks and drying of the meat. As previously stated, construction of the drying racks began with digging holes and filling them with a mixture of bones that were lying around the area. This process was done to fortify the soft sandy sediment that is present throughout the area. This was likely to prevent the collapse of the drying racks by giving a sturdier base and larger surface area to the wooden legs. It is also probable that it was during this construction process that the canid and bison skull were buried in the center of Feature CB. Construction of the drying racks would be completed, and the meat drying would have taken place.

8.4 Whiting Slough Site Occupation

Radiocarbon dates for the Whiting Slough Site are relatively tight chronologically (see Appendix A). These dates would suggest that the site was not used over a long period of time. However, there are two lines of evidence that would suggest that this site was used for more than a single hunting/processing event. The first is the substantial amount of bone that is present at the site. This considerable amount of bone would suggest that there are several hunting/processing events represented within this sample. The second line of evidence was the relatively extensive construction that was present at the site. Given the effort put into the

construction of the bone pits, it could be assumed that the group at least had intentions of reusing the site for multiple hunting and processing events. With this extensive construction that took place at the site, it is easy to see that if the herd of bison were passing near the site it would have been much easier to reuse this location rather than recreate the site elsewhere.

Given the consistent season of late fall to early winter use (Thomson 2020), it can be assumed that if groups did inhabit this processing site more than once, they were surely using it at a similar time of the year as the bison moved past the site as part of their seasonal movement patterns. The site was then abandoned having served its purpose for a relatively short amount of time. While it is impossible to say exactly why it was abandoned there are two candidates that appear to be most likely. The first is that the processing or kill site fell into disrepair and it was easier for the group to start new somewhere else. The second is that the seasonal movements of the bison shifted and therefore made it impossible or impractical to reuse the Whiting Slough Site given its location and perhaps now distant proximity to the herds.

8.5 The Features of The Whiting Slough Site

8.5.1 Drying Rack Features

As previously mentioned, there are 43 features that were excavated at Whiting Slough. They form two (possibly 4) large distinct features or structures interpreted as meat drying racks. While this is the likely purpose of these structures, this idea is not without contradictions. The first of these is that there are so many of the bone-filled pits. These features are interpreted as post reinforcements, but this would require for there to be upwards of 17 or more posts for these individual drying racks. This seems like an incredible amount of overkill to support this structure. It also appears that the construction of the individual pit features did not have a desired shape that needed to be replicated over and over. This seemingly random building pattern can potentially be explained. These differences in feature morphology could represent attempts by different individuals within the group at solving the issue of the structure sliding in the loose sand. This idea would also explain the seemingly large number of features that are present. If an attempt were made by an individual and it did not work or have the desired outcome, another feature would have to be created next to it in order to support the weight of

the structure in that area. This may have been done immediately when it was known that the pit would not support the structure or could have been done later after the structure collapsed because of the faulty bone-filled pit construction. Additions could also have been added to the structure at a later time to support more weight in an effort to be able to dry higher volumes of meat at a time.

While looking into these drying rack features, the starting and terminating depths of the pit features were examined. In tables 8.1 - 8.3 these depths have been placed into graphs. While there are many features that start and end at similar depths there does not appear to be much of a pattern. This can be attributed to the undulating terrain for the tops of the features and that there was no intended termination depth for the bottoms of the features. The one major problem with attempting this type of analysis is the level of accuracy within the recorded depth of the features. While some of the features have a very accurate start and end depth, several factors caused some of the feature depths to be less accurate. These scenarios include the difficulty of seeing the beginning of features because of the black sediment, seeing the end of the features because of the high water table and inaccuracy in recording exact start and end depths. As a result of this, much of the information about starting and ending depths were gathered using the arbitrary 10 cm levels to decide when features start and end.

8.5.2 Feature CB

Feature CB is one of the most intriguing features found during the excavations at Whiting Slough. It is unique within the assemblage of features at the site and is also the deepest feature found (see table 8.3). Above this feature there was an assortment of crushed burned bone similar to what was seen all around the site. Partway through the black soil layer the density of this bone increased drastically. It was at this point that the feature itself begins. This was a difficult line to see because of the lack of any discernible soil changes that would suggest the beginning of a feature within the sediment. Feature CB begins with a cluster of crushed bison bone that starts within the black sediment layer. This continues down until the area where the water starts appearing within the unit at 100 cm. It is after this that the bison skull fragments begin to appear during the excavation. It is also during this lower portion that the appearance of the canid bone first begins. It is unknown what the total depth of this feature

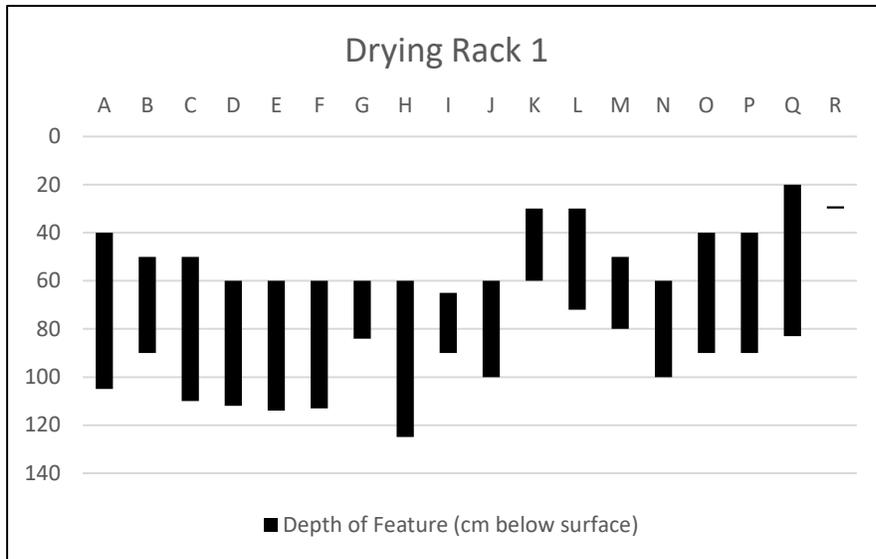


Table 8.1 Drying rack 1 feature depths.

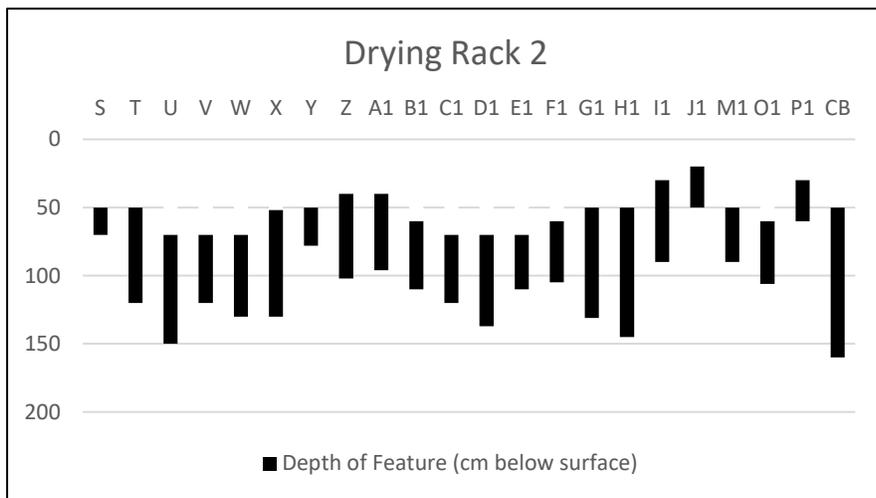


Table 8.2 Drying rack 2 feature depths.

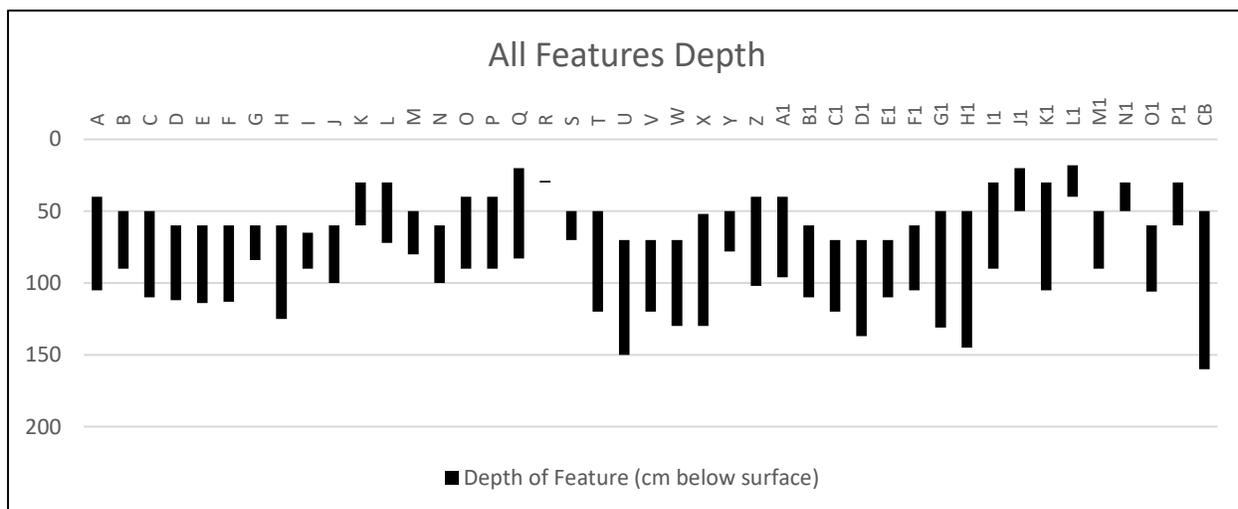


Table 8.3 All features total depths.

was because of the water table that was present during the excavation of the feature. This feature is of particular interest because of the inclusion of bison cranium and canid bone. Also, its location within the central area of drying rack 2 is particularly interesting because of its seemingly purposeful placement within the feature.

It is believed that the crushed bone above the burial is part of the occupational layer and not an intended feature of the Canid Burial. It is likely a result of the back filling process after the burial was completed. This lends insight into when this event was carried out. As a result of this, it appears that the creation of feature CB happened after much of the processing and bone-filled pit construction had taken place but before the drying rack was built.

While it is impossible to say for certain, it is assumed that this feature holds some type of spiritual or ceremonial significance for the people that were using this processing site. There are several lines of evidence that were considered before making this claim. The first is the location of this feature, centrally within the drying rack and extending to a greater depth than other features at the site. The second interesting aspect is the clear association of bison skull and canid bones. This association of animals as well as the selected bones does not have any utilitarian use within this drying rack. The burial of bison skulls at kill sites are known to have ceremonial significance within hunter gatherer groups on the Northern Plains and has been seen on other sites such as the Hardisty Bison Pound Site (FdOt-31) (Moors 2017). Lastly, the canid that was included within Feature CB was heavily arthritic. This animal exhibited osteoarthritis throughout its body and likely would have had difficulties with its daily necessities such as hunting for food. As a result of this degraded state, it is possible that the animal was being cared for by the people inhabiting the site prior to the animal's death. Given the condition of the remains of this animal, it is impossible to say if this animal was domesticated, but regardless, it is possible that the people at Whiting Slough were feeding this animal. While it is impossible to say with certainty that this feature is ceremonial in nature, given the evidence that is presented within the archaeological assemblage of Whiting Slough it is the explanation that appears to be the most logical.

8.5.3 Feature Analysis

There are two last construction features of the drying racks that need to be further discussed. The first is its seemingly perfect east-west orientation. These features appear to run parallel to one another in an east-west orientation. This is definitely an intended construction element that was chosen by the group inhabiting the site. The complete explanation for why these features were laid in this manner is impossible to say for certain, but the most likely explanation relates to effective utilization of these features for their intended purpose of drying meat. The east west orientation as well as the north-south spacing between features has a utilitarian function. On the Northern Plains the prevailing wind is from the west. By setting up the drying rack features in this east-west orientation it would ensure proper air flow over the meat. This would help with drying the meat quicker. There is another result that comes from this orientation as well. This is that the force put on the feature from the wind would be much less then if the drying racks were placed in a north-south alignment. The last of the utilitarian functions that the east-west orientation fulfills involves exposing the meat to the southern sun of the late fall early winter. Having the meat exposed to the sun would also accelerate the drying process of the meat. Thus, effective drying is the likely explanation for the orientation of these features.

The second of the construction elements are that many of the individual features within the drying racks appear in some cases to fall within regular spacing. This is definitely an interesting aspect of the construction process of the site. However, this appearance may be misleading. As will be discussed later within this chapter there are many issues with Western Heritage's grid alignment. So, while these features seem to have sections of regular spacing this is likely not as perfect as it's made out to be. As a result of these errors little can be said definitively whether this is an actual attribute of these feature groups.

8.5.4 Feature Analysis Discussion

The features found throughout Whiting Slough were an interesting and difficult aspect of the site to identify and analyze. Many attempts were made to divide these features (especially the bone-filled pits) into a series of different sub-categories based on the different attributes that were seen within this feature class. There were several attempts to do this. The first was to

divide the bone-filled pits based on visual attributes. This resulted in two subcategories, large and small. While there was a clear difference in size between some of the larger and smaller features, there was no clear divide, with there being many features that were in-between the large and the small features. Attempting to add a third medium size category just further emphasized these issues. In the end this categorization system was abandoned because it was too arbitrary and subjective.

The next attempt involved the contents of the features. This included examining attributes such as included animals, types of bones and level of bone processing. These methods produced different results, but again did not result in any clear breaks within the data that would justify creation of these different sub-categories. This again resulted in ambiguous and subjective categories that would change slightly every time the features would be reclassified.

Other smaller attempts were made to divide these features. One concerned starting and ending depth of features. This again did not return any positive results, as reflected in tables 8.1 to 8.3. The last of the attempts involved looking for irregularities within the features. This consisted of examining different soil staining that was recorded within some of the features. As there were no photos or samples taken of these changes it was impossible to say what they were or how they were formed. So as a result, this attempt was also quickly rejected.

While it would have been beneficial to divide the bone-filled pits into several sub-categories it proved to be a difficult task. While different sub-categories could be placed on these features, it would have resulted in a subjective classification system that would be difficult to replicate with any amount of scientific reasoning. It was at this point that the randomness of these features was simply a product of their construction and apparent lack of a mental template in their design. This idea of randomness can account for many of the variabilities that are seen within the range of bone-filled pit features that are located throughout the site. While the contents of the bone-filled pits may be random, their placement on the landscape is far from arbitrary. In combination, they form very purposeful shapes on the landscape that are clearly desired by the constructors.

There were other interpretations that were also considered for the feature groups found at the site. The main one that was discussed at Whiting Slough was the possibility of these features being a type of habitation structure. There are several reasons why this interpretation was eventually abandoned. The first is the size of these features. With a diameter of 8.6m by 2m and 8.2m by 2.8m for the two complete feature structures, they are quite small for accommodations being able to house a very small number of individuals. The second point is that the living floor of these features was completely covered in discarded bone fragments that would have been a nuisance if they were within a habitation structure. Another deterrent for people to be living here would have been the smell and flies that would have been present throughout the site given the massive processing event(s) that occurred here. The processing event(s) and the construction of these features would have taken place one right after the other as the radiocarbon dates for the site are quite tight and the bone needed for the construction surely came from the nearby kill site.

Another interpretation that was discussed was the potential of this site being a kill site and these structures being some type of pound. This idea was quickly discarded as the structures were too small to be an effective aid to a mass hunting technique and the site didn't appear to have the faunal composition that would be expected if Whiting Slough was a kill site.

The last alternate interpretation that was discussed was the idea that these feature groups were smoking racks. This would be largely a similar structure to the drying racks but would be used to smoke the meat as opposed to drying it. This interpretation was abandoned because of the lack of substantial hearths. While there are hearths present at the site these are not enough of them to suggest this is the proper interpretation. If this was the correct interpretation there would be more or larger hearths spread throughout the center of the feature groups.

8.6 Non-Avonlea Artifacts

As was previously stated there were three projectile points, two Besant points and one Hanna point, that are not part of the Avonlea lithic assemblage. The average depth of the Whiting Slough projectile points was 40-50 cm below the surface. The two Besant points were

found at depths of 20-30 cmbs and 30-40 cmbs while the Hanna point base was found at a depth of 60-70 cmbs. While finding points at this depth is not rare at this site, only 35 of the 232 (15%) projectile points found were located at a depth of 60+ cmbs.

Even though there is the presence of these other point types at the site it does not make this a multi-component site. Since the number of non-Avonlea points is so low (much less than 1%) it is highly unlikely that either of these groups inhabited the Whiting Slough Site. There are more likely explanations for the presence of these points at the site. The Besant points could have been traded to the group or could have been found on the ground and used in the processing of the bison at the Whiting Slough Site. Like the Besant points the Hanna point could have been found by the group and used within the Whiting Slough hunting and processing event until it was ultimately broken and discarded. They also could have been dropped by another group that was passing by the area presumably prior to the Avonlea occupation of the site.

8.7 Examinations Within the Artifact Distribution and Inclusion

The break down of distribution and abandonment of artifacts at the Whiting Slough site is quite interesting. While we see an abundance of evidence for the heavy processing of bison when examining the faunal remains, this is not the case when analyzing the other aspects of the site. There are many examples within the faunal remains at the site that would suggest that bone is being heavily processed in anticipation for its use in boiling pits as part of the grease extraction process. However, there were no boiling pits found within the site. This does not necessarily mean that grease extraction was not taking place here. Though, it does mean that if they are present the boiling pits are located nearby but outside the scope of the work that was done at the site. The relatively low numbers of FCR that were found within the site would indicate that the boiling pits were not within the excavated area of Whiting Slough.

The lithics at Whiting Slough can also be difficult to fully understand. The small number of processing tools and large number of projectile points is one of the reasons the site was first thought to be a kill site. Knowing that the site is in fact a processing site, the number of processing tools versus the number of points is interesting. It appears that the group using Whiting Slough diligently collected their processing tools for further use while leaving behind

large numbers of projectile points. This care for one tool type and disregard for another is puzzling. With quality lithic material hard to find in the area it is difficult to understand why this group would have left behind so many reusable projectile points. It can be assumed that the points that were left behind were not located by the group after the hunting process had ended. The small size of these points likely made them difficult to locate after they had been lodged into an animal. Another potential reason for them being lost or left behind could be as a result of natural factors at the site. With the known seasonality of the site and its location there are several natural factors that could have made it difficult for the people to relocate these points. This could include dense grass cover over the area, snow or shallow water. These conditions would have potentially made it difficult or undesirable for the group to recover the complete points that were located around the area.

8.8 Problems within the Data

There were several problems and inconsistencies that were encountered during the duration of this project. These ranged from human errors to issues provided by mother nature and technology. Many of these problems were solved, but there are some that certainly affect the accuracy of the data and could potentially slightly alter interpretations. Having said this, I am still very confident in the interpretation on the whole site, but minor details and exact alignment of features may be altered slightly.

The first of the problems that the project was faced with occurred during the fieldwork portion. During the Western Heritage excavations, the water table was encountered while excavating one of the deeper features. This occurred for feature G1 (Western Heritage 2015c) where the feature had to be abandoned at 131 cmbs. During the 2017 field school excavation the water table was higher and caused problems on two of the three features that were found that season. The waterline in this season was just above the 100 cmbs mark. This was highly problematic for one of the two affected features, feature CB. Most of this feature, including the canid bones and bison skull were all found below the waterline. This prevented the cross-sectioning of the feature, obtaining photos and the careful excavation that this feature would otherwise have required.

The next set of problems encountered have to do with the excavation blocks and how they were set up both at the beginning of excavations as well as between the different excavation stages by Western Heritage. The first of these difficulties was that there were no GPS coordinates taken of the site datum. This matter of not having a site datum was one of the



Figure 8.1 Google Earth image of stage 1 excavations (Google Earth 2020)

biggest concerns for a project using Geographic Information Systems (GIS) to study spatial relationships within the site. This issue was mitigated with the help of Google Earth. Luckily enough, the Stage 1 excavations were captured by Google Earth (see figure 8.1). From this image I was able to figure out the site datum's latitude and longitude by measuring off of the Google Maps

image. Any errors that this issue would cause within the spatial dataset are minimal because while the location of the site in the greater landscape could be off by a small amount, this would not affect the interrelationships of artifacts within the site itself. The grid of the site was also set up based on being parallel with the highway as opposed to a true north or magnetic north grid. While this has no effect on the data itself, it makes interpretation a little more difficult as the grid is approximately 30° off true north.

The next difficulty that was encountered was an issue with the grid alignments between excavation stages (See figure 8.2). This could be explained partially because of the above-mentioned datum issues or errors in setting up units. In addition, it seems as though there were also problems with the grid northing as it appears that units are not square to one another. This resulted in overlap of units between field seasons as well as sections of ground being left unexcavated within the site. These gaps in the excavated areas can be seen during the construction monitoring process, where an artifact cluster was found in the middle of an already excavated section of the site (see figure 8.3). Unfortunately, this issue could not be

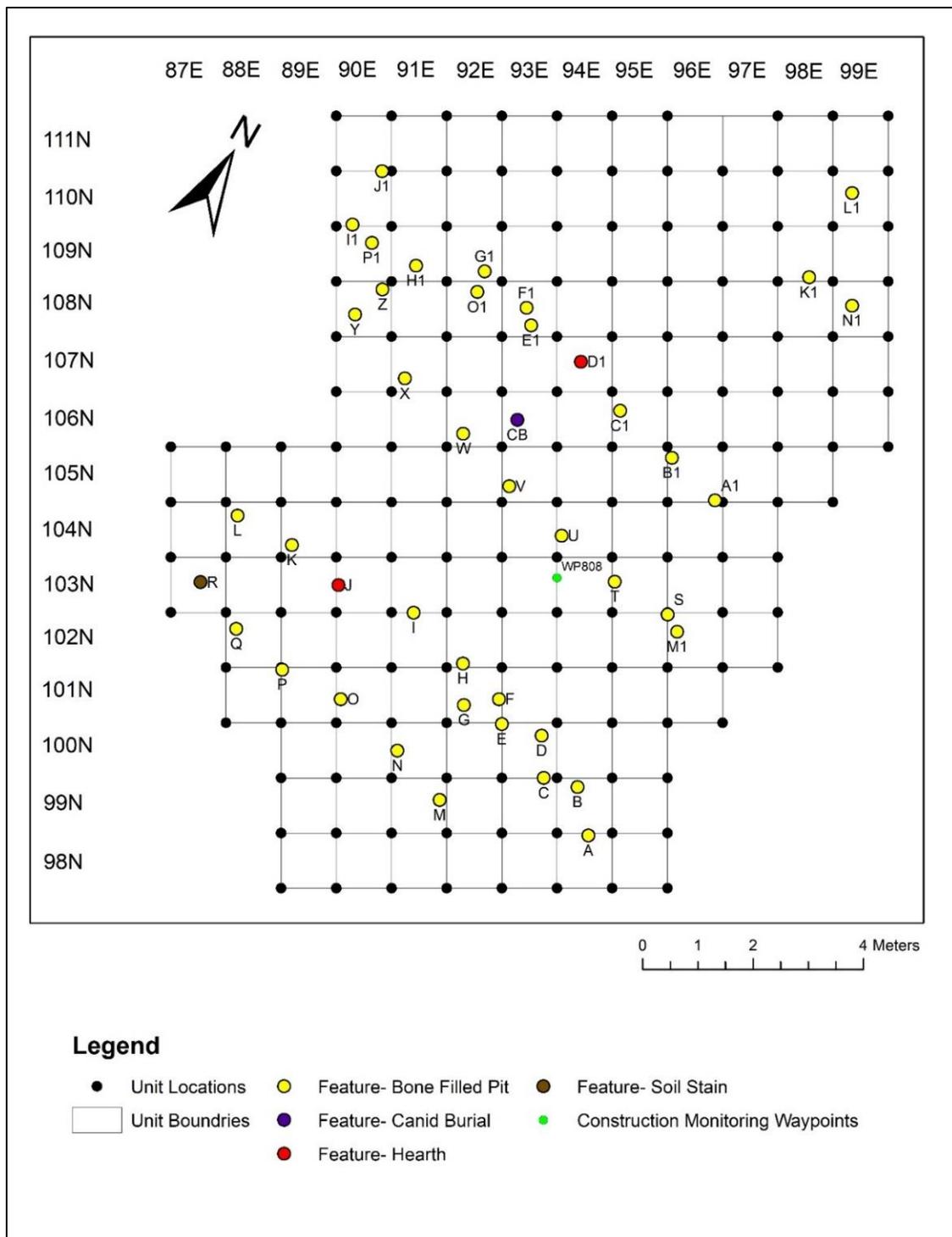


Figure 8.3 Site Map with construction WP808 in the middle of the site (green dot).

The fourth set of questions involve excavator errors and consistency within the paperwork. There are several instances where the paperwork recorded in the field does not align with field pictures. There is no better example of this than in Feature I. There are several irregularities within this one feature. The first is an apparent major grid alignment issue (See figures 8.4 - 8.6). In figure 8.4 and 8.5 feature I is in the center of the north wall of the unit. Compare this with picture 8.6 where the feature is in the corner of the unit and the entire unit is only partially overlapping the unit to the south of it.

Even with the above-mentioned problems and inaccuracies, the data overall are accurate enough to draw conclusions about the activities that are taking place at Whiting Slough. While there are some aspects of the dataset that caused difficulties, these were dealt with and in most cases have only minor effects on the final dataset that was used for the interpretation of this site.



Figure 8.4 Feature I in 102N 91E.
(Western Heritage n.d.)

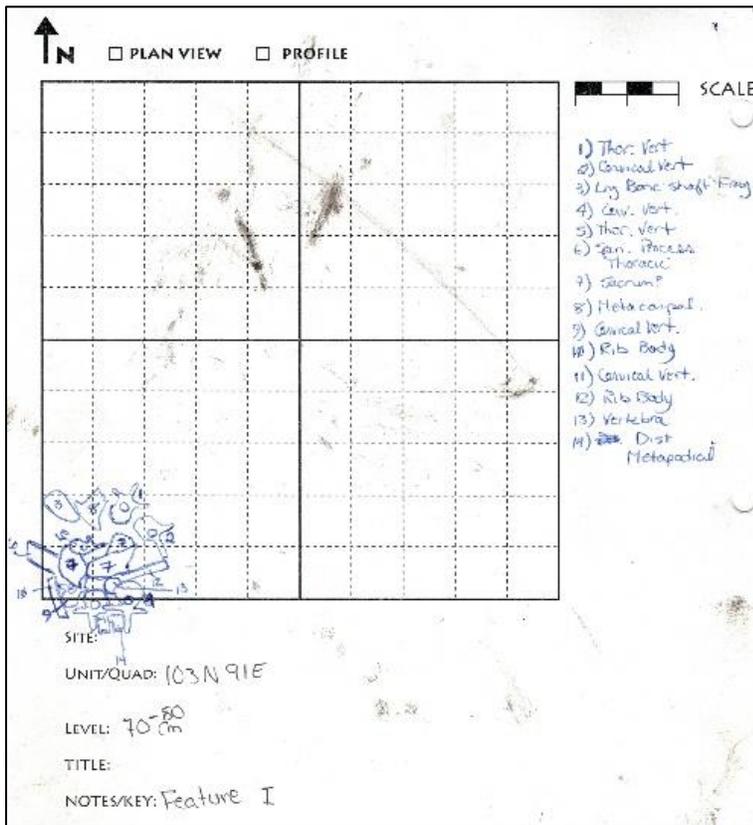


Figure 8.5 in Unit 103N 91E- Feature I in southwest corner. (Western Heritage 2015c)



Figure 8.6 Feature I in 103N 91E. (Western Heritage n.d.)

Chapter 9: Summary and Conclusions

The Whiting Slough Site is a single component Avonlea site located 26km southwest of the City of Saskatoon, Saskatchewan. It was occupied in the late fall or early winter (Thomson 2020) on multiple occasions over a period of several years or, less likely, several times over one season. There were three radiocarbon dates that were taken from the occupational layer, resulting in dates of 1325 ± 15 (ULA-6040), 1330 ± 20 (ULA-6042) and 1320 ± 20 (ULA-6043) (The Laboratoire de Radiochronologie and Keck Carbon Cycle AMS Facility 2016). This created a tightly clustered group of dates that coincide with the known dates of the Avonlea Phase on the Northern Plains.

The artifact assemblage of this site is primarily composed of bones with 98% of the 398,329 artifacts being faunal. The overwhelming majority of bone found belongs to bison with candid remains coming in as a distant second. There are also indeterminate rodent, deer, northern pocket gopher, snowshoe hare and indeterminate members of the squirrel family represented at the site.

Only 2% of the archaeological assemblage at Whiting Slough is lithic, totaling 900 artifacts. This assemblage includes projectile points, bifaces, cores, flakes, choppers, scrapers, hammer stones, fire cracked rock, knives, retouched flakes and shatter. Of these artifacts 232 are projectile points with 226 of them being identifiable as Avonlea style. In addition to the Avonlea points there are two other point styles present within the Whiting Slough lithic assemblage, one Hanna point base as well as two Besant points, one of which is nearly complete.

The main interest of this site and of this project are the 43 individual features that were found. These collections of features created two distinct ovoid features with the possibility of two more of these same features continuing outside of the excavated area of the site. These are mostly made up of a series of bone-filled pits with the inclusion of a hearth in the two main ovoid features. The bone-filled pit features are created by placing varying amounts of bones into conical shaped pits throughout the site. There does not appear to be any preference in the bones selected within the features as well as there is no uniform construction size throughout

the site. These features are interpreted as the support structures for drying racks. It is hypothesized that as a result of the lightly packed sandy sediment that is at the site, a series of subterranean supporting structures were needed to support the weight of the drying racks. These subterranean bone-filled pit structures were created to disperse the weight of the structure as well as the weight of the meat that was being dried. This idea also accounts for the fact that there seems to be a large number of supports included within this drying rack. It can be assumed that the group inhabiting this site kept adding supports and bone-filled pits to support the weight until they were satisfied that the structure would hold the weight.

Whitin the site there are also several activity areas that can be seen through the spatial analysis of artifact densities (counts and weights of items per square meter) throughout the site. This analysis resulted in discovery of one primary and one secondary bone processing area. The primary bone processing took place in the south of the site. This is the area closest to where the kill site is hypothesized to be located (to the south of the highway). Secondary processing took place further north closer to the center of the site. It is within this area that bone was more heavily processed into small fragments, presumably as part of a grease extraction process. While no boiling pits were located within the excavated area of the site it does seem likely that such pits were located quite near this secondary processing area.

The final and arguably most interesting aspect of the Whiting Slough Site is Feature CB. This feature is located within the central area of drying rack 2. This feature begins as a high-density area of bone fragments that changes into a unique pit feature. This feature goes substantially deeper than other features at the site and, unfortunately, is primarily located below the water table. This feature contains a fragmented bison skull intermixed with the remains of a highly arthritic Canid. Unlike many of the other features found at this site, this feature does not appear to serve any utilitarian function. It is also located quite centrally within the boundary of drying rack two. All of this makes this feature unique within Avonlea sites. It can only be hypothesized that this feature served some type of spiritual or ceremonial significance. What that may be can only be speculated.

In conclusion, the Whiting Slough Site is an Avonlea processing site which exhibits a new drying rack construction process that has not previously been seen archaeologically. It also includes new features both utilitarian and ceremonial. The drying rack and pit feature construction shows the ingenuity of this group to solve a problem not encountered at other Northern Plains Avonlea sites. Evidence for previously undocumented processes as well as the scale of the event that took place at this site makes the Whiting Slough Site unique within Northern Plains Avonlea sites.

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Appendix A: Radiocarbon Dates for EINs-10



**Western
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March 30, 2016

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Québec, Canada
G1V 0A6

To Guillaume Labrecque:

RE: AMS Samples from archaeological site EINs-10

Enclosed are 6 bone samples for AMS dating. All samples were excavated and collected from archaeological site EINs-10, located west of Saskatoon along Highway #7. The site is situated a horse pasture that is native prairie, but will soon be constructed into the new twinned highway.

This is a stabilized sand dune area and the soil below the plough zone is fine silty sand. The excavation focussed on a bison kill that appears to be one event that resulted in a thick layer of bones. The sandy matrix surrounding the bones is black and organic rich, but in some areas the black could also be caused by localized burning. In some areas of the site the bones are unburned and more complete, while other areas are heavily burned with large amounts of crushed bones. The site is also unique in that there are features comprised of bones that stand vertical and extend below the bone layer.

I am submitting a bone sample from above, within, and below the bone layer. As well, there are samples from three separate bone features (A, V, and J1). The artifacts were excavated using shovels and trowels, then stored in plastic bags while being transported to the lab. The faunal material was dry brushed, catalogued, and stored in a new plastic bag.

If you have any questions, please don't hesitate to contact me: kvanderzwan@westernheritage.ca
306-715-1582 (m) or 306-975-3860 ext303 (w)

Sincere regards,

Karmen VanderZwan, M.A.
Archaeologist
Western Heritage

INNOVATIVE SOLUTIONS TO AGE-OLD QUESTIONS



KECK CARBON CYCLE AMS FACILITY
 Earth System Science Dept.
 UNIVERSITY OF CALIFORNIA, IRVINE, CA, USA

¹⁴C Results

Karmen VanderZwan (Western Heritage)

June 13, 2016

University of California #	Université Laval #	Customer ID (sample type)	Pre-Treatments	F ¹⁴ C	±	D ¹⁴ C (‰)	±	¹⁴ C age (BP)	±	δ ¹³ C (‰)	% N	% C	C/N (wt%/wt%)	% of bone transformed into collagen
UCIAM5-173582	ULA-6040	cat #10,036 (collagen from bone)	HCl-NaOH-HCl	0.8481	0.0016	-151.9	1.6	1325	15	-19.4	15.8	44.1	2.79	10.0
UCIAM5-173583	ULA-6042	cat #10,550 (collagen from bone)	HCl-NaOH-HCl	0.8475	0.0016	-152.5	1.6	1330	20	-19.1	15.7	43.5	2.77	7.4
UCIAM5-173584	ULA-6043	cat #3809 (collagen from bone)	HCl-NaOH-HCl	0.8483	0.0020	-151.7	2.0	1320	20	-19.7	15.3	42.1	2.74	5.3
UCIAM5-173585	ULA-6052	cat #10,804 (collagen from bone)	HCl-NaOH-HCl	0.6309	0.0014	-369.1	1.4	3700	20	-18.0	14.2	41.8	2.95	4.1
UCIAM5-173586	ULA-6053	cat #9925 (collagen from bone)	HCl-NaOH-HCl	0.6352	0.0013	-364.8	1.3	3645	20	-18.2	16.3	44.4	2.73	16.1

Radiocarbon concentrations are given as fractions of the modern standard, D¹⁴C, and conventional radiocarbon age, following the conventions of Stuiver and Polach (Radiocarbon, v. 19, p.355, 1977).

Sample preparation backgrounds have been subtracted, based on measurements of ¹⁴C-free mammoth bone.

All results have been corrected for isotopic fractionation according to the conventions of Stuiver and Polach (1977), with δ¹³C values measured on prepared graphite using the AMS spectrometer. These can differ from δ¹³C of the original material, if fractionation occurred during sample graphitization or the AMS measurement, and are not shown.

Comment:

δ¹³C values shown above were measured to a precision of $\pm 0.1\text{‰}$ on aliquots of filtered collagen, using a Costech ECS 4010 CHNSO Elemental Analyzer coupled to a Thermo Delta V Advantage isotope ratio mass spectrometer.

Appendix B: Faunal Assemblage of Individual Features at Whiting Slough

Feature A

Feature A Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Thoracic Vertebrae	819.50	9	27.79
Lumbar Vertebrae	580.20	5	19.67
Femur	306.80	1	10.4
Rib	302.10	13	10.24
Humerus	276.60	1	9.38
Bone Fragments	245.40	351	8.32
Axis	176.80	1	5.99
Cervical Vertebrae	90.20	2	3.06
Phalanx	88.80	2	3.01
Indeterminate Vertebrae	36.80	5	1.25
Caudal Vertebrae	17.80	1	0.6
Lateral Malleolus	6.70	1	0.23
Cranial	0.70	1	0.02
Incisor	0.60	1	0.02
Indeterminate Tooth	0.40	2	0.01
Total	2949.40	396	

Feature B

Feature B Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Radius	753.20	1	24.58
Humerus	457.30	1	14.92
Pelvic Girdle	387.30	1	12.64
Bone Fragments	325.6	568	10.62
Ulna	301.70	1	9.84
Rib	297.70	8	9.71
Scapula	142.10	1	4.64
Tibia	130.50	1	4.26
Cranial	83.50	11	2.72
Thoracic	79.00	3	2.58
Phalanx	45.60	1	1.49
Long Bone	34.90	1	1.14
Indeterminate. Vertebrae	22.00	2	0.72
Indeterminate Tooth	4.10	4	0.13
Total	3064.5	604	

Feature C

Feature C Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Cervical Vertebrae	783.10	4	20.37
Bone Fragments	580.4	991	15.09
Axis	499.20	3	12.98
Lumbar Vertebrae	407.30	3	10.59
Atlas	341.00	1	8.87
Rib	350.30	9	9.11
Pelvic Girdle	178.40	2	4.64
Thoracic Vertebrae	176.90	2	4.6
Maxilla with Teeth	145.6	2	3.79
Cranial	109.60	19	2.88
Indeterminate Vertebrae	102.6	3	2.67
Long Bone	43.00	1	1.12
Molar	40.4	1	1.05
Phalanx	30.80	1	0.8
Scapula	29.20	1	0.76
Premolar	19.30	2	0.5
Indeterminate Tooth	5.00	13	0.13
FCR	1.90	2	0.05
Avonlea Point	0.8	1	0.02
Charcoal	0.10	1	0
Flake	0.10	1	0
Shatter	0.10	1	0
Total	3845.1	1064	

Feature D

Feature D Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Pelvic Girdle	701.10	2	16.62
Bone Fragments	675.70	1119	16.02
Molar	414.20	8	9.82
Rib	353.30	9	8.38
Cervical	338.10	3	8.02
Thoracic	335.40	4	7.95
Cranial	287.60	34	6.82
Lumbar Vertebrae	241.60	2	5.73
Atlas	217.3	1	5.15
Femur	208.90	2	4.95
Scapula	182.50	3	4.33
Maxilla with Tooth	97.2	1	2.3
Phalanx	61.10	1	1.45
Indeterminate Tooth	25.70	11	0.61
Long Bone	25.1	1	0.6
Carpal	24.8	1	0.59
Premolar	16.00	1	0.38
Indeterminate Vertebrae	7.60	1	0.18
Mandible	2.1	1	0.05
Wood	2.3	1	0.05
Charcoal	0.1	1	0
Total	4217.7	1207	

Feature E

Feature E Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Cervical Vertebrae	923.10	5	29.41
Lumbar Vertebrae	556.60	6	17.73
Thoracic Vertebrae	504.20	8	16.06
Pelvic Girdle	368.10	3	12.23
Atlas	269.00	2	8.57
Bone Fragments	140.30	122	4.47
Molar	137.5	3	4.38
Rib	59.20	2	1.89
Maxilla with Teeth	53	1	1.69
Mandible	45.80	2	1.46
Premolar	42.60	3	1.42
Cranial	31.30	2	1
Hyoid	8	1	0.25
Charcoal	0.1	2	0
Total	3138.80	162	

Feature F

Feature F Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Lumbar Vertebrae	518.50	5	16.07
Mandible	494.30	2	15.32
Bone Fragments	448.50	732	13.9
Rib	250.7	14	7.77
Ulna	232.9	2	7.22
Cervical Vertebrae	175.9	1	5.45
Thoracic Vertebrae	163.90	3	5.08
Molar	131.30	3	4.07
Metacarpal	126.1	1	3.91
Tarsal	120.02	1	3.72
Phalanx	109.20	3	3.38
Radius	100.2	1	3.11
Scapula	83.1	3	2.58
Premolar	69.50	5	2.24
Indeterminate Vertebrae	60.80	3	1.88
Cranial	40.50	3	1.26
Sesamoid	28.7	5	0.89
Long Bone	26.5	1	0.82
Maxilla with Teeth	14.4	1	0.45
Indeterminate Tooth	18.6	9	0.58
Tibia	8.4	1	0.26
FCR	2.3	3	0.07
Hyoid	2.3	1	0.07
Flake	0.1	1	0
Total	3226.9	804	

Feature G

Feature G Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Bone Fragments	286.70	426	42.14
Rib	110.10	8	16.18
Femur	109.9	2	16.15
Talus	79.9	1	11.74
Long Bone	41.1	1	6.04
Tibia	40.2	1	5.91
Cranial	7.1	1	1.04
Incisor	5.10	3	0.75
Flake	0.1	1	0.01
Indeterminate Tooth	0.1	1	0.01
Total	680.3	445	

Feature H

Feature H Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Thoracic Vertebrae	496.70	5	26.88
Bone Fragments	210.50	463	11.39
Tibia	199.6	1	10.8
Indeterminate Vertebrae	162.50	9	8.79
Calcaneus	137.1	1	7.42
Cervical Vertebrae	120.80	2	6.54
Lumbar Vertebrae	96.2	1	5.21
Cranial	95.70	9	5.18
Phalanx	93.80	3	5.08
Sacrum	67.30	2	3.64
Tarsal	57	1	3.08
Long Bone	48.9	1	2.65
Premolar	25.80	2	1.4
Premaxilla	19.2	1	1.04
Rib	14.2	1	0.77
Indeterminate Tooth	2.50	3	0.14
Charcoal	0.1	3	0.01
Mandible Rodent	0.1	1	0.01
Total	1848	509	

Feature I

Feature I Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Bone Fragments	1058.80	1705	36.89
Cervical Vertebrae	742.70	9	25.87
Thoracic Vertebrae	267.70	5	9.33
Sacrum	214.80	1	7.48
Metacarpal	146.90	1	5.12
Indeterminate Vertebrae	142.90	7	4.98
Rib	118.80	5	4.14
Long Bone	58.60	1	2.04
Metapodial	43.20	1	1.51
Premolar	29.80	2	1.04
Cranial	21.10	3	0.74
Mandible	8.40	1	0.29
Indeterminate Tooth	5.80	8	0.2
Hyoid	5.30	1	0.18
FCR	3.70	1	0.13
Charcoal	1.90	52	0.07
Total	2870.40	1803	

Feature J

Feature J Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Axis	339.7	1	21.47
Bone Fragment	298.60	744	18.88
Mandible	292.80	3	18.51
Rib	192.00	5	12.14
Long bone	134.3	4	8.49
Atlas	124.9	1	7.9
Pelvic Girdle	123.70	1	7.82
Charcoal	40.10	921	2.53
Cranial	19.3	1	1.22
Tooth	10.30	5	0.65
Indeterminate Vertebrae	6.2	1	0.39
Total	1581.9	1687	

Feature K

Feature K Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Bone Fragment	79.70	153	39.15
Molar	60.90	2	29.91
Maxilla with Teeth	46.9	1	23.04
Rib	15.40	2	7.56
Indeterminate Tooth	0.7	3	0.34
Total	203.60	161	

Feature L

Feature L Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Mandible	188.5	1	46.68
Thoracic Vertebrae	97.00	2	24.02
Molar	87.10	3	21.57
Cranial	24.6	1	6.09
Premolar	6.60	3	1.63
Total	403.8	10	

Feature M

Feature M Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Axis	535.20	2	27.83
Mandible	473.10	2	24.6
Atlas	315.4	1	16.4
Molar	282.90	6	14.71
Rib	117.60	3	6.12
Cervical Vertebrae	87.6	1	4.56
Bone Fragments	49.10	126	2.55
Long Bone	26.1	1	1.36
Indeterminate Vertebrae	18.80	3	0.98
Premolar	12.6	1	0.66
Incisor	3.60	2	0.19
Indeterminate Tooth	1	2	0.05
Flake	0.1	1	0.01
Total	1923.1	151	

Feature N

Feature N Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Bone Fragment	342.80	744	60.8
Cervical Vertebrae	103.00	3	18.27
Humerus	80.6	1	14.3
Atlas	34.2	1	6.07
Sesamoid	2.2	1	0.39
Tooth	1.00	5	0.18
Total	563.8	755	

Feature O

Feature O Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Bone Fragment	794.20	1391	33.9
Cervical Vertebrae	471.30	2	20.11
Thoracic Vertebrae	314.30	5	13.41
Axis	296.5	1	12.65
Molar	115.20	2	4.92
Phalanx	87.20	3	3.72
Rib	76.30	8	3.26
Indeterminate Vertebrae	56.50	5	2.41
Lone Bone	41.1	2	1.75
Mandible	31.6	1	1.35
Carpal	18.6	1	0.79
Premolar	10.4	1	0.44
Petrous Temporal	9.00	2	0.38
Indeterminate Tooth	8.30	22	0.35
Sesamoid	5.60	1	0.24
Incisor	3.7	2	0.16
Hyoid	2.4	1	0.1
Avonlea Projectile Point	0.9	1	0.04
Total	2343.1	1451	

Feature P

Feature P Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Bone Fragments	1211.20	2162	25.83
Cervical Vertebrae	825.00	7	17.59
Axis	465.60	2	9.93
Thoracic Vertebrae	457.70	4	9.76
Mandible	313.90	2	6.69
Atlas	295.9	1	6.31
Radius	254.00	2	5.42
Rib	250.30	4	5.34
Indeterminate Vertebrae	141.10	6	3.01
Pelvic Girdle	140.70	1	3
Long Bone	122.90	2	2.62
Phalanx	64.40	2	1.37
Lumbar Vertebrae	51.00	3	1.09
FCR	31.70	6	0.68
Molar	29.1	1	0.62
Metapodial	20.9	1	0.45
Indeterminate Tooth	11.00	21	0.23
Hyoid	1.4	1	0.03
Avonlea Point	0.60	2	0.01
Indeterminate Point	0.7	1	0.01
Charcoal	0.1	2	0
Flake	0.1	1	0
Total	4689.3	2234	

Feature Q

Feature Q Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Bone Fragments	265.40	385	29.52
Metacarpal	144	1	16.02
Long Bone	140.90	4	15.67
Radius	118.70	2	13.2
Phalanx	67.90	2	7.55
Molar	47.1	1	5.24
Indeterminate Vertebrae	35.20	3	3.92
Thoracic Vertebrae	21.3	1	2.37
Rib	20.30	2	2.26
Humerus	17.2	1	1.91
FCR	16	1	1.78
Sesamoid	4.40	2	0.49
Avonlea Point	0.7	1	0.08
Total	899.1	406	

Feature R

Feature R Artifact Composition	Number	Weight
Rib	1	64.60
Long Bone Shaft Fragments	2	Unknown
Total	3	64.60

Feature S

Feature S Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Atlas	486.9	1	23.15
Cervical Vertebrae	421.8	1	20.06
Molar	343.8	9	16.35
Rib	274.90	8	13.07
Axis	261	1	12.41
Mandible	162.60	3	7.73
Bone Fragments	118.70	176	5.64
Long Bone	23.2	1	1.1
Thoracic Vertebrae	6.5	1	0.31
Incisor	1.8	1	0.09
Indeterminate Tooth	1.6	1	0.08
Shatter	0.2	1	0.01
Total	2103	204	

Feature T

Feature T Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Atlas	667.60	2	27.21
Thoracic Vertebrae	393.70	6	16.05
Rib	298.90	11	12.18
Radius	186	1	7.58
Bone Fragment	157.70	429	6.43
Molar	130.00	4	5.3
Mandible	105.90	3	4.3
Talus	94.3	1	3.84
Indeterminate Vertebrae	58.9	1	2.4
Phalanx	47.2	2	1.92
Axis	46.2	1	1.88
Long Bone	45.30	5	1.85
Cervical Vertebrae	35.2	1	1.43
Caudal Vertebrae	32.20	2	1.31
Calcaneus	32.9	1	1.31
Cranial	27.30	10	1.11
Femur	26.70	2	1.09
Carpal	26.6	1	1.01
Pelvic Girdle	20.4	1	0.83
Indeterminate Tooth	15.50	31	0.63
Hyoid	2.7	1	0.11
Incisor	1.2	1	0.05
Flake	0.6	1	0.02
Charcoal	0.2	1	0.01
Shatter	0.2	1	0.01
Total	2453.40	520	

Feature U

Feature U Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Cervical Vertebrae	506.20	2	45.57
Mandible	282.3	1	25.42
Molar	126.40	2	11.38
Bone Fragments	75.10	169	6.76
Maxilla with Teeth	69.9	1	6.29
Indeterminate Vertebrae	33.2	1	2.99
Cranial	15.30	6	1.38
Indeterminate Tooth	1.8	4	0.16
Incisor	0.4	1	0.04
Flake	0.1	1	0.01
Total	1110.70	188	

Feature V

Feature V Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Bone Fragments	1214.80	1995	43.97
Sacrum	244.50	3	8.85
Cervical Vertebrae	197.6	1	7.15
Phalanx	155.20	7	5.62
Femur	148.4	1	5.37
Indeterminate Vertebrae	133.40	10	4.83
Metatarsal	123.9	1	4.48
Atlas	118.4	1	4.29
Humerus	117.7	1	4.26
Lumbar Vertebrae	100.30	1	3.63
Mandible	53.9	1	1.95
Long Bone	39.30	2	1.42
Rib	39.30	5	1.42
Scapula	32.5	1	1.18
Indeterminate Tooth	21.9	20	0.79
Sesamoid	12.50	6	0.45
Ulna	7.1	1	0.26
Cranial	1.5	2	0.05
Avonlea Projectile Point	0.3	1	0.01
Phalanx Canid	0.1	1	0
Total	2762.6	2061	

Feature W

Feature W Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Bone Fragment	1660.60	3841	67.05
Indeterminate Tooth	246.80	233	9.97
Mandible	154.70	2	6.25
Thoracic Vertebrae	131.10	3	5.29
Rib	97.90	10	3.95
Long Bone	60.70	2	2.45
Cranial	38.90	2	1.57
Indeterminate Vertebrae	31.90	1	1.29
Cervical Vertebrae	21.40	2	0.86
Phalanx	19.60	1	0.79
Sesamoid	7.00	2	0.28
Lumbar Vertebrae	5.80	1	0.23
Shatter	0.10	2	0
Total	2476.50	4102	

Feature X

Feature X Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Bone Fragments	910.60	1220	70.67
Rib	97.60	7	7.57
Tooth	69.40	49	5.39
Ulna	63.5	1	4.93
Cranial	53.30	4	4.14
Cervical Vertebrae	25.70	4	1.99
Indeterminate Vertebrae	20.90	11	1.62
Mandible	17.70	5	1.37
Molar	17.60	1	1.37
Premolar	8.30	1	0.64
Hyoid	1.8	1	0.14
Shatter	1.1	1	0.09
Avonlea Point	0.7	1	0.05
Long Bone Rodent	0.2	1	0.02
Charcoal	0.1	1	0.01
Total	1288.5	1308	

Feature Y

Feature Y Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Humerus	475.9	1	68.89
Cervical Vertebrae	207.5	1	30.04
Bone Fragments	7.40	9	1.07
Total	690.8	11	

Feature Z

Feature Z Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Humerus	491.5	1	25.52
Mandible	378.2	1	19.64
Atlas	309.1	1	16.05
Cervical Vertebrae	285.1	1	14.8
Ulna	217.6	1	11.3
Radius	196.9	1	10.22
Bone Fragments	19.80	28	1.03
Indeterminate Vertebrae	12.8	1	0.66
Premolar	11	1	0.57
Metacarpal	2.7	1	0.14
Avonlea Point	0.7	1	0.04
Charcoal	0.3	4	0.02
Flake	0.1	1	0.01
Total	1925.8	43	

Feature A1

Feature A1 Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Mandible	288.2	1	53.66
Rib	123.50	3	22.99
Long Bone	74.70	2	13.91
Phalanx	37.7	1	7.02
Bone Fragments	11.40	29	2.12
Indeterminate Tooth	1.6	1	0.3
Total	537.10	37	

Feature B1

Feature B1 Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Bone Fragments	219.60	456	56.28
Rib	107.70	6	27.6
Indeterminate Vertebrae	30.30	2	7.77
Long Bone	25.00	2	5.97
Cranial	6.1	1	1.56
Long Bone Large Bird	1.7	1	0.44
Indeterminate Tooth	1.1	3	0.28
Avonlea Point	0.4	1	0.1
Total	390.2	471	

Feature C1

Feature C1 Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Bone Fragments	165.00	427	27.36
Lumbar Vertebrae	114.2	1	18.94
Cervical Vertebrae	112.4	1	18.64
Rib	84.10	4	13.94
Thoracic Vertebrae	50.1	1	8.31
Phalanx	26.9	1	4.46
Long Bone	21.2	1	3.52
Mandible	12.8	1	2.12
Cranial	5.2	2	0.86
Indeterminate Tooth	4.80	5	0.8
Sesamoid	3.8	1	0.63
Hyoid	2.3	1	0.38
Charcoal	0.2	5	0.03
Flake	0.1	1	0.02
Total	603.1	452	

Feature D1

Feature D1 Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Bone Fragments	1480.90	3794	47.49
Indeterminate Vertebrae	433.50	6	13.9
Radius	244.50	2	7.84
Lumbar Vertebrae	190.50	2	6.11
Cervical Vertebrae	181.50	5	5.82
Humerus	178.90	1	5.74
Mandible	155.30	2	4.98
Cranial	81.30	7	2.61
Long Bone	66.30	4	2.13
Indeterminate Tooth	41.50	49	1.33
Molar	20.40	1	0.65
Charcoal	19.10	591	0.61
Premolar	7.70	1	0.25
Thoracic Vertebrae	7.50	1	0.24
Tooth Rodent	4.5	1	0.14
Incisor	3.30	4	0.11
Cranial Frag Rodent	0.9	16	0.03
Humerus Rodent	0.2	2	0.01
Mandible Rodent	0.2	2	0.01
Axis Rodent	0.1	1	0
Scapula Rodent	0.10	1	0
Shatter	0.1	1	0
Cervical Vertebrae Rodent	0.1	1	0
Total	3118.4	4495	

Feature E1

Feature E1 Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Thoracic Vertebrae	543.20	4	40.24
Radius	217.5	1	16.11
Rib	182.70	4	13.53
Cervical Vertebrae	182	1	13.48
Femur	91.5	1	6.78
Bone Fragments	70.50	76	5.22
Mandible	52.6	1	3.9
Cranial	9.40	2	0.7
Charcoal	0.50	8	0.04
Total	1349.9	98	

Feature F1

Feature F1 Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Mandible	510.10	2	67.14
Molar	122.50	4	16.12
Cranial	64.1	1	8.44
Rib	24.50	3	3.22
Bone Fragments	20.80	66	2.74
Premolar	16.90	3	2.22
Retouched Flake	0.7	1	0.09
Maxilla Rodent	0.1	1	0.01
Total	759.7	81	

Feature G1

Feature G1 Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Long Bone	42	1	69.42
Bone Fragment	15.10	68	24.96
Indeterminate Tooth	3.20	3	5.29
Humerus Rodent	0.2	1	0.33
Total	60.50	73	

Feature H1

Feature H1 Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Lumbar Vertebrae	176.10	2	49.72
Cranial	85.6	1	24.17
Bone Fragments	61.00	157	17.22
Premolar	17.50	3	4.94
Molar	12.2	1	3.44
Indeterminate Vertebrae	0.7	1	0.2
Avonlea Point	0.6	1	0.17
Charcoal	0.3	6	0.08
Flake	0.1	1	0.03
Humerus Rodent	0.1	1	0.03
Total	354.2	174	

Feature I1

Feature I1 Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Cervical Vertebrae	217	1	37.63
Cranial	144.70	35	25.09
Molar	94.10	3	16.32
Rib	43.8	1	7.59
Mandible	32.1	1	5.57
Bone Fragments	30.30	68	5.25
Premolar	9.7	1	1.68
Thoracic Vertebrae	4.1	1	0.71
Charcoal	0.5	13	0.09
Indeterminate Tooth	0.2	1	0.03
Shatter	0.2	1	0.03
Total	576.7	126	

Feature J1

Feature J1 Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Radius	145.40	2	61.09
Metapodial	32.2	1	13.53
Carpal	23.9	1	10.04
Rib	21.2	1	8.91
Cranial	9.3	3	3.91
Bone Fragments	6.00	15	2.52
Total	238	28	

Feature K1

Feature K1 Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Bone Fragments	291.40	517	48.83
Thoracic Vertebrae	146.40	3	24.53
Indeterminate Tooth	54.30	16	9.1
Rib	32.00	4	5.36
Long Bone	22.5	1	3.77
Phalanx	20.8	1	3.49
Lumbar Vertebrae	11.5	1	1.93
Cranial	11.3	1	1.89
Premolar	3.9	1	0.65
Charcoal	0.80	7	0.13
Avonlea Point	0.7	1	0.12
Incisor	0.6	1	0.1
Shatter	0.6	1	0.1
Total	596.8	555	

Feature L1

No artifacts assigned to this feature.

Feature M1

No artifacts assigned to this feature.

Feature N1

No artifacts assigned to this feature.

Feature O1

Feature O1 Artifact Composition	Weight (g)	Number	Percent of Feature by Weight (g)
Humerus	1289.60	3	84.5
Mandible	96.3	1	6.31
Long Bone	41.4	1	2.71
Bone Fragment	32.90	55	2.16
Thoracic	27.1	1	1.78
Indeterminate Vertebrae	18.4	1	1.21
Tibia	9.3	1	0.61
Indeterminate Tooth	7	1	0.46
Charcoal	4.1	47	0.27
Totals	1526.1	111	

Feature P1

Feature P1 Artifact Composition	Weight (g)	Number	Percent of Feature by Weight (g)
Cervical	201.4	1	49.11
Mandible with Teeth	195.7	1	47.72
Molar	11.5	1	2.8
Indeterminate Tooth	1.5	1	0.37
Total	410.1	4	

Feature CB

Feature CB Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Avonlea Point	0.90	2	0.01
Axis	50.70	3	0.7
Axis Canid	8.3	1	0.12
Bone Fragments	4518.80	8716	62.73
Carpal	146.40	13	2.03
Caudal Vertebrae	17.70	9	0.25
Cervical Canid	2.9	1	0.04
Cervical Vertebrae	161.00	4	2.23
Charcoal	2.40	65	0.03
Cranial	644.10	44	8.94
Cranial Canid	93.20	20	1.29
Flake	0.18	2	0
Frag Canid	109.10	35	1.51
Humerus	93.60	1	1.3
Humerus Canid	13.30	2	0.18
Hyoid	2.7	1	0.04
Incisor	0.8	1	0.01
Indeterminate Tooth	72.6	209	1.01
Indeterminate Tooth Canid	1.40	3	0.02
Indeterminate Vertebrae	106.20	19	1.47
Indeterminate Vertebrae Canid	39.00	6	0.54

Feature CB Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Lumbar Vertebrae	75.20	4	1.04
Lumbar Vertebrae Rodent	0.09	1	0
Mandible	19.00	2	0.26
Mandible Canid	49.30	2	0.68
Maxilla Canid	37.90	6	0.53
Metacarpal	81.00	5	1.12
Metacarpal Canid	24.20	8	0.34
Metapodial	80.1	6	1.11
Metapodial Canid	12.40	6	0.17
Molar Canid	0.50	1	0.01
Patella	15.10	2	0.21
Pelvic Girdle Canid	3.60	1	0.05
Phalanx	143.40	22	1.99
Phalanx Canid	11.40	9	0.16
Planter process Canid	0.30	1	0
Thoracic Vertebrae Canid	8.60	2	0.12
Pottery	2.40	1	0.03
Pre-Maxilla Canid	9.90	2	0.14
Premolar	13.00	1	0.18
Radius	30.40	1	0.42
Radius Canid	44.00	4	0.61
Rib	99.9	44	1.39
Rib Canid	15	15	0.21

Feature CB Artifact Composition	Weight (g)	Number	Percentage of Total Assemblage by Weight (g)
Scapula	121.50	3	1.69
Scapula Canid	15.30	2	0.21
Sesamoid	6.40	3	0.09
Sternal Rib Canid	1.60	2	0.02
Sternum Canid	2.70	2	0.04
Talus	69.00	2	0.96
Tarsal	24.60	2	0.34
Tarsal Canid	8.20	2	0.11
Thoracic Vertebrae	4.40	1	0.06
Tibia	66.10	2	0.92
Tibia Canid	2.50	1	0.03
Ulna Canid	19.50	2	0.27
Total	7203.69	9323	