

AN INTRA-SITE SPATIAL ANALYSIS OF SELECTED FAUNAL REMAINS
FROM THE AZTALAN SITE (47JE01)

by

Megan Leigl

A Thesis Submitted in
Partial Fulfillment of the
Requirements for the Degree of

Master of Science
in Anthropology

at

The University of Wisconsin-Milwaukee

December 2014

ABSTRACT

AN INTRA-SITE SPATIAL ANALYSIS OF SELECTED FAUNAL REMAINS FROM THE AZTALAN SITE (47JE01)

by

Megan Leigl

The University of Wisconsin-Milwaukee, 2014
Under the Supervision of Professor Jean Hudson, Ph.D.

Aztalan is one of the northern-most Mississippian villages east of the Mississippi River. It can be considered a multi-cultural settlement, having been occupied at the same time by both Mississippian and Late Woodland cultural groups. Because of this mixing of cultures, it offers unique insights on Woodland to Mississippian transitions in the Midwest. Many excavations over the years have led to a site-wide artifact assemblage scattered among different institutions. Much of the information available is of a site-wide provenience.

Faunal remains are one line of evidence about life in the past. Intra-site analysis of faunal remains can shed light on variation in animal use within a community. Samuel Barrett was the first to conduct professional, systematic excavations at Aztalan (1933). His collection is housed at the Milwaukee Public Museum and includes extensive faunal remains. These are traceable to features located in the site's main habitation area. Using

this feature-level provenience information, the faunal remains are compared between 30 features representing two separate areas of the site to address questions regarding spatial differences and possible human behaviors causing these differences.

© Copyright by Megan Leigl, 2014
All Rights Reserved

TABLE OF CONTENTS

Chapter 1: Introduction	1
Research Goals	2
Significance	3
Chapter 2: Spatial Variation in Faunal Remains	7
Social Dietary Differences	7
Different Activity Areas	11
Disposal Practices	14
Animals and Ritual in Mississippian Contexts	15
Intra-Site White-tailed Deer Variation	19
Summary	20
Chapter 3: Cultural Background	21
Late Woodland Cultures in Southeast Wisconsin	21
Mississippian	23
Current Definitions	24
Middle Mississippian at Aztalan	26
Summary	28
Chapter 4: Archaeological Background	29
History of Discovery, Mapping and Major Excavations	29
Previous Faunal Analyses	33
A.N. Somers	34
Paul Parmalee	35

Marian Binkley	39
Richard Yerkes	39
James Theler	40
Bonnie Styles	41
Jean Hudson	42
Matt Warwick	43
Rachel McTavish	44
Site Layout	45
Summary	50
Chapter 5: Methods	51
Origins of Faunal Sample	51
Generating the Dataset	53
Tracing Faunal Remains to Features	53
Tracing Features to Locations on Barrett's Plan	
Map	56
Identification of Faunal Remains.	57
Quantification of Faunal Remains	60
Determining Feature Types	62
Analyzing the Dataset	65
Summary	66
Chapter 6: Results	67
Animal Remains in Barrett's North and South Sections	67

Differences Between Features	76
Historic Features and North and South Sections	82
White-tailed Deer Remains and Utility	84
Faunal Remains By Weight	87
Conclusions	94
Chapter 7: Discussion and Conclusions	95
Differences in Faunal Remains by Section	96
Feature Descriptions	100
Enclosure	101
Refuse Pits	101
Hearths	105
Special and Potential Ritual Features	106
Unknown Features	110
Differences Between Prehistoric Feature Types	114
Differences Between Historic and Prehistoric Features	116
Conclusions	117
References Cited	120
Appendix A: Faunal Database	129
Appendix B: Feature Type Maps by Section	130

LIST OF FIGURES

1.1	Aztalan's layout, major features and location	5
2.1	A butchering activity area and refuse example for Nunamuit hunters	12
2.2	An example of a hearth refuse area for a Nunamuit group	13
2.3	A depiction of a birdman from a shell cup fragment	16
2.4	A winged serpent figure from a at Moundville	17
4.1	Lapham's map of Aztalan	31
4.2	Barrett's Plat Section II with Feature 37 outlined in red	38
4.3	Aztalan's layout, major features and location within the larger locality. Also shown in Chapter 1 as Figure 1.2	47
5.1	A page of the MPM's catalog book showing in the center of the page catalog number 26956, a lot of 3 animal bones	54
5.2	A catalog page showing in the remarks section II,9	55
5.3	Catalog number 26875 with the label: "Bones from Kitchen Midden"	56
5.4	Map showing the two clusters of catalogued faunal remains traceable to features	59
5.5	Locations of different features by type	64
6.1	Percentage of Faunal Remains in North and South Sections	70
6.2	NISP of Faunal Remains by Feature Type	80

6.3	Percentage of Low, Medium and High Utility Elements in the South and North Sections of the Site	85
6.4	Percentage of White-tailed Deer Utility By Feature	88
6.5	Percentage of Faunal Remains by Weight (g) in South and North Sections	92
7.1	The location of Feature 50 in Section IV on Barrett's plat map	112
B.1	Section II features by type and location	130
B.2	Section IV features by type and location	131
B.3	Section V and V-A features by type and location	132

LIST OF TABLES

6.1	Animal Remains by NISP	69
6.2	Percentage of Animal Remains by NISP	69
6.3	Haberman Residuals as Calculated in R for North and South Sections	71
6.4	Total NISP without Dog Burial and Midden Remains	73
6.5	Percentage Animal Remains without Dog Burial and Midden	73
6.6	Revised Haberman Residuals as Calculated in R without Midden and Dog Burial	74
6.7	Comparison of Known Midden Deposits (Warwick 2002) with Barrett's Kitchen Midden	75
6.8	Percentage of Animal Classes in Midden Deposit Comparisons	75
6.9	Haberman Residuals of Midden Deposit Comparisons	76
6.10	NISP by Feature	78
6.11	Percent NISP by Feature	79
6.12	Haberman Residuals For Faunal Remains by Feature Type as Calculated in R	81
6.13	NISP Comparison of North and South Sections with Historic Features	82
6.14	Percentage of NISP of North and South Sections with Historic Features	82

6.15	Haberman Residuals of Historic Comparison with North and South Section	84
6.16	Haberman Residuals of Historic Comparison with South Section	84
6.17	MNE and MGUI* of White-tailed Deer	86
6.18	Percentage of Low, Medium and High Utility White-tailed Deer Elements in the South and North Sections of the Site	87
6.19	Haberman Residuals of White-tailed Deer Utility	87
6.20	White-tailed Deer Utility by Section and Feature	90
6.21	Percentage White-tailed Deer Utility by Section and Feature	91
6.22	Faunal Remains by Weight (g) in South and North	92
6.23	Percent Faunal Remains by Weight (g) in South and North Sections	92
6.24	Haberman Residuals of Faunal Remains by Weight (g) in South and North Sections	94

ACKNOWLEDGEMENTS

I owe a large debt of gratitude to my advisor, Dr. Jean Hudson. Her time, comments and faunal identification help are much appreciated. Her suggestions and comments helped me to explore different angles on a difficult topic that I had my heart set on. The hours that she has spent with me going over drafts and ideas in her office have played a large part in the completion of this thesis. My other committee members, Dr. Pat Richards and Dr. John Richards, have been wonderful from the inception of this project to the realization of it. Their comments and help have been most valuable.

I must also thank Dawn Scher-Tomae in allowing me to work with the Barrett collection at the Milwaukee Public Museum. Her sharing of faunal lists, permitting me to look through the catalogs, providing space for analysis, transportation of bones to the anthropology lab, and finally, allowing me access to the bones – this was all vital to the generation of my dataset that was the basis of my entire thesis. The interns who pulled bones for me for further analysis also have my gratitude.

Finally, I thank all my friends and family who encouraged me throughout the writing of this thesis. It's finally done!

CHAPTER 1: INTRODUCTION

Multiple excavations at the archaeological site of Aztalan spanning more than a century have left researchers with a number of different artifact collections dispersed across the upper Midwest and Canada. Some of the collections of faunal remains in particular have been under-analyzed. In this thesis, I seek to add to our understanding of animal use at Aztalan by looking at intra-site spatial patterning in faunal remains.

While it is common terminology to refer to faunal and floral remains as ecofacts, I will use artifact interchangeably in this thesis. I believe the assemblages produced by these items are just as much a product of culture as they are the environment. Referring to them as ecofacts suggests lack of agency, while artifact suggests a conscious choice in the type of animals hunted and used.

The idea that animal remains at a site are primarily a product of environment has led to most faunal analyses from Aztalan being of site-wide provenience and focusing only on ecological causes. This leaves us with an incomplete view of faunal remains and how site inhabitants might have used or selected them. Intra-site spatial analysis allows us to focus more on faunal remains as a result of behaviors of the residents of the Aztalan community.

Research Goals

In this study, I conduct an analysis of faunal remains that can be assigned a feature-level provenience from Samuel Barrett's early excavations. In this sample, there are two spatially discrete clusters of domestic features: one on the south end of the riverbank and one on the north end. This will allow comparisons to be made:

- 1). Are there any differences in the types of fauna recovered in the two areas? Differences could indicate dietary variances among the inhabitants of the site. Alternately, it could suggest different activity areas at the site. No differences might suggest relatively uniform diet and activity patterns among site inhabitants.
- 2). Is there any evidence of high status or ritual activity associated with animal remains? This could point the way to identifying ritually important areas of the site away from the platform mounds.
- 3). How do individual features compare to each other, based on location as well as inferred function (refuse pits versus hearths versus kitchen middens)? Does either variable – function or location – predict the contents of features?
- 4). How do the features compare to faunal remains from other studies, most notably Warwick's (2002) diachronic sample as well as Hudson's (2001) historic features? This allows for consideration of temporal as well as spatial factors.

5). Finally, given that whitetail deer are both large-bodied and abundant at the site, how do their element frequencies compare between the two sample areas, as well as to feature types? This could help address questions of differential status within the Aztalan community, specialized events such as feasts or transport logistics.

Significance

Aztalan (47JE01) is a multicomponent site located on the west bank of the Crawfish River in southeastern Wisconsin. The town was founded by a Late Woodland culture around A.D. 820. Approximately 300 years later, Middle Mississippians presumably from the American Bottom migrated to the area (Richards 1992). From A.D. 1100-1250, the two cultures co-existed at the site together. During that time, the inhabitants built three platform mounds and a palisade surrounding the town. They lived in an area along the riverbank on the eastern half of the site (Figure 1.1). Mounds likely predate the Mississippian occupation stretch along a ridge just northwest of the site (Birmingham and Goldstein 2005).

Platform mounds, the occurrence of Ramey Incised and Powell Plain pottery, as well as a heavy reliance on maize agriculture characterize Middle Mississippian towns (Green 1997). Whitetail deer constituted the majority of animal resources utilized; fish, waterfowl, turtles and other small game supplemented the diet. Usually, Mississippian settlement systems are

characterized by a major civic-ceremonial center, smaller regional centers and farmsteads scattered throughout the river valley. Aztalan is unique in that it is the only major Mississippian settlement in the area. In addition, because there was a mixed Woodland/Mississippian population, it is unknown whether social hierarchy was as highly stratified as it is thought to have been at other Mississippian centers.

Zych's (2013) recent thesis suggests that residents at Aztalan during the Middle Mississippian occupation used a cooperative approach towards monument building and living together. This agrees with the most current research that sees the spread of Mississippian culture primarily as the spread of an ideology, not an economic or political hegemony (Alt 2012; Pauketat and Emerson 2000).

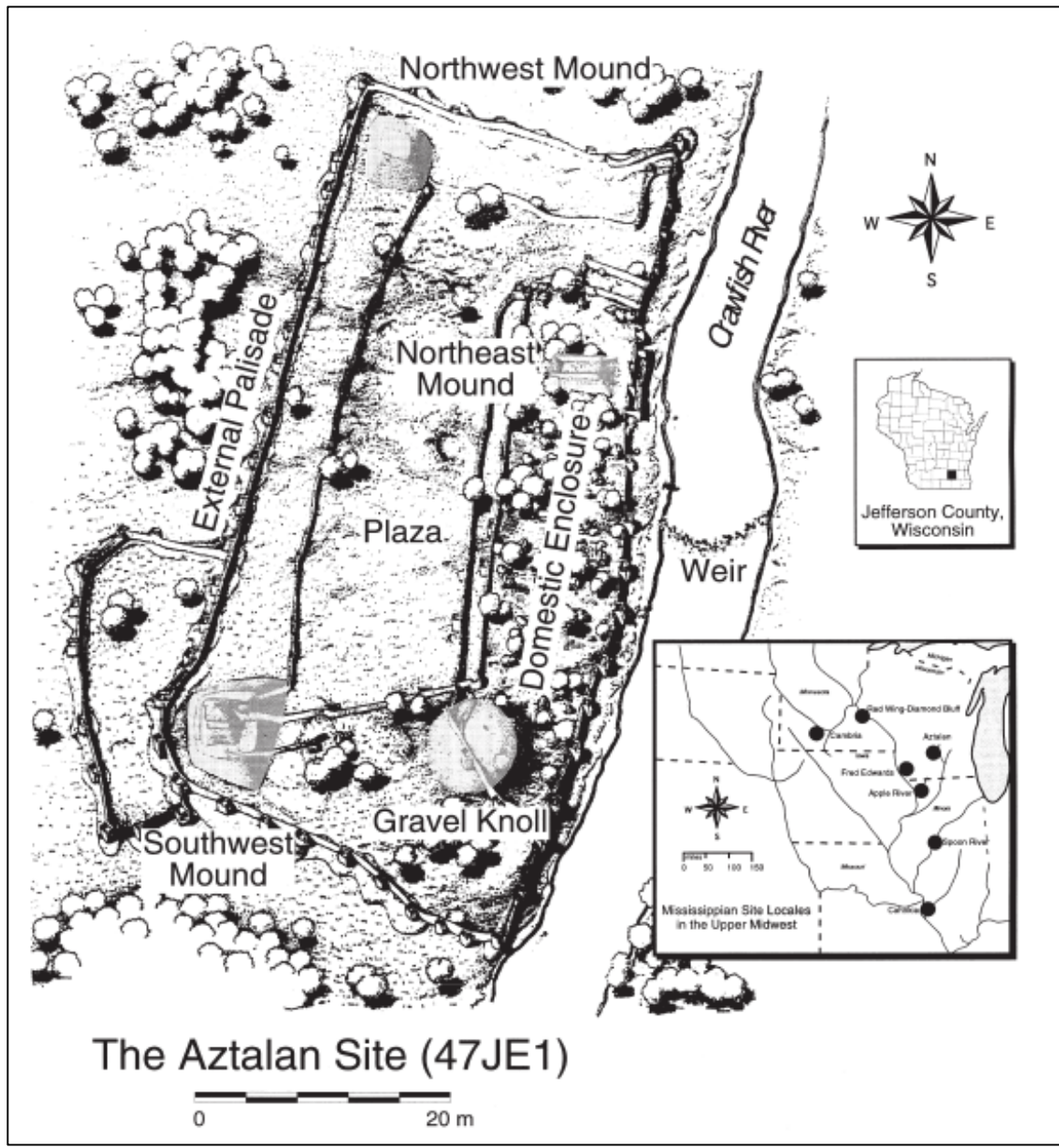


Figure 1.1: Aztalan's layout, major features and location within the larger locality (Richards 2003:Figure 1, based on illustration by E. Paulson)

The present analysis employs an intra-site comparison of faunal remains to understand existing spatial patterns and whether site inhabitants' behaviors can explain these patterns. This can help to refine the view of how Aztalan functioned during its Mississippian occupancy phase.

CHAPTER 2: SPATIAL VARIATION IN FAUNAL REMAINS

Spatial variation of faunal remains can come from a number of sources. These include: dietary differences between social groups due to status differences or other aspects of social identity, such as ethnic traditions; separate activity areas, such as one space for processing and another space for consumption; taphonomic factors such as animal gnawing, differences in soil composition affecting rates of decay. Most taphonomic biases can be ruled out for this particular study since the faunal assemblage comes from a relatively small area within a single site, and factors affecting decay would be relatively uniform throughout.

Spatial Variation Caused by Social Dietary Differences

Social dietary differences associated with status are a real factor to consider at Mississippian sites. There has been documented food hierarchy at both Cahokia and Moundville, two large Mississippian mound centers. Aztalan is not considered a mound center (Birmingham and Goldstein 2005), however, we might expect patterns there to be scaled down compared to the two larger sites, given Aztalan's smaller size and more isolated location. Alternately, lack of dietary differences could suggest a less rigid social hierarchy and a more egalitarian community.

Moundville is a large site located in the Black Warrior River valley of Alabama. It has been interpreted as a complex chiefdom (Welch and Scarry 1995). At its peak in the thirteenth century, the highest-ranking chiefly families would have lived there. Scattered throughout the river valley were smaller, lower ranking agricultural settlements. Welch and Scarry (1995) argue that status was neither solely ascribed nor achieved, but a mixture between the two. For example, one might achieve distinction in battle, or one might simply be born to a chiefly lineage (or both).

At Moundville a study of features north of the main mounds found that one of the most important species was white-tail deer, in addition to catfish and squirrel. Deer elements were mainly represented by prime cuts of meat: the lower back, the hind legs and ribs (Welch and Scarry 1995). Because of their proximity to the mound, the features there were hypothesized to be from households that were high-ranking. Comparison of the domestic features near the mound with domestic features near the riverbank – which were hypothesized to be from lower ranking households – showed that mound features had better/higher utility white-tail deer elements, as well as more turkey and beaver. The riverbank domestic features also had less species variability (Welch and Scarry 1995).

Cahokia, perhaps the only pre-Columbian city-state in North America (Redmond and Spencer 2011; Pauketat 2005; and Alt 2012), also shows evidence of social stratification in faunal remains analyzed from the site.

Although scale and social influence at Cahokia - the magnitude of which is cause of some debate (Milner 1998; Pauketat and Emerson 2000) - is admittedly greater than any other Mississippian site, it can still be considered a good case study. In fact, it should be the site to weigh other interpretations against: if any site would have evidence of differential elite consumption of animals, it would be one where social stratification is arguably the most complex.

Like Moundville, Cahokia is hypothesized to have three different types of site hierarchy. The main center at Cahokia would have been home to the highest-ranking people, while outlying sites would have been either smaller administrative centers or small farming communities. Kelly (2000) found evidence that faunal remains at Cahokia were different from outlying sites where non-elites would have been living. Whitetail deer elements were much more abundant at Cahokia than the outlying sites. Normal ratios of high to low utility body parts outside of Cahokia were almost fifty percent, while at Cahokia the low utility parts constituted only about a five percent ratio (Kelly 2000). Even though farming communities outside of Cahokia were near whitetail deer habitat, few deer remains were found. Instead, subsistence tended to focus on waterfowl, fish and other animals from the aquatic habitats. Meanwhile at Cahokia, there was a marked increase in deer consumption. The greatest increase was during the Lohmann and Stirling phase occupation, when Cahokia had become the premier center in

the area (ca. AD 1050 - 1250). (Kelly 2000). The evidence points to higher ranking people living in Cahokia having greater access to deer than those in the small farming communities surrounding the city.

Social dietary differences can also reflect aspects of identity aside from hierarchical status. Meals are a daily practice in every human community. As such, they have the power to reinforce social norms and are reflective of participants' places in the society as a whole (Hastorf and Weismantel 2007). People might consume different types of food based on their gender, ideology, class, occupation or ethnicity (Gumerman 1997). Differences related to ethnicity are another possibility at Aztalan; the material culture suggests that the local Late-Woodland tradition co-existed at the site with a Mississippian tradition originating further to the south.

The style of preparation and ingredients used in meals can be considered a type of food culture, which is passed on from parent to child. This can be kept alive long after other parts of a culture have been lost, as was the case at Paa-ko/San Pedro, a Puebloan/Spanish settlement. Excluding introduced domestic animals, the assemblage of wild animals at the site closely mirrored the assemblage at Arroyo Hondo, a pre-contact site occupied two hundred years earlier (Gifford-Gonzalez and Sunseri 2007). This is evidence that even though dramatic changes may result from culture contact, the original culture can still maintain its foodways.

In a study of Iron Age hill forts in Wessex, Hill (1995) discusses how changes in deposition of ritual deposits (of which communal meals and feasting were a large component) parallel major cultural changes through time. As food production and settlements became more integrated, the deposits show a difference in the way people view the animals they are using. Animals were not simply “other”, but something familiar and domestic (Hill 1995). Meals are not just the result of the local ecological site catchment area. They are evidence of social patterns and replicate cultural beliefs.

Spatial Variation Caused by Different Activity Areas

Different activities will result in a different set of artifacts produced (Binford 1983). In his ethnographic work among the Nunamiut, Binford (1983) proposed numerous theoretical feature layouts and compositions based on his observations about how people acted in their home environment. According to his ethnography, living space will have less debris and refuse than a midden, which would accumulate a large variety of artifact classes from all over the site. Butchering produces a unique set of bone debris, while hearths have a completely different pattern of bone debris (Figure 2.1, Figure 2.2). This is based on the idea of drop-and-toss zones as well as logistical transport – a kill site, where the animal is butchered is likely to contain less useful parts of the animal if the hunter has to transport it a distance or has a lot to carry relative to the amount of people available to help carry it. A

hearth feature by contrast, where the animal is consumed, is likely to contain fragmented bone due to marrow consumption, or those bones that have high food utility (Binford 1983).

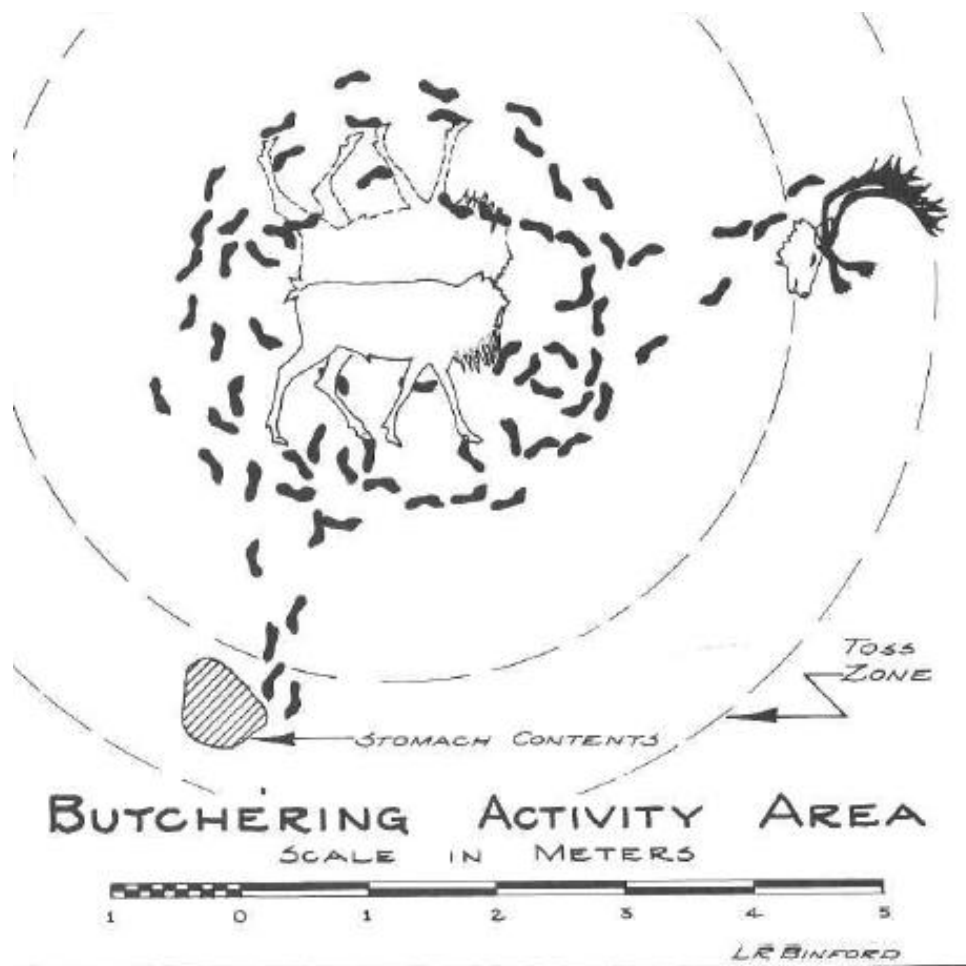


Figure 2.1 A butchering activity area and refuse example for Nunamuit hunters (Binford 1983:170)

At the Widow Harris site, a historic homestead in the Ozarks occupied in the 19th century, Price (1985) was able to discern different activity areas based on historic/ethnographic research and patterns of animal remains. The

butchering site had a higher concentration of hog skull and pelvis bones, while features caused by a sweeping out of kitchen waste had higher concentration of hog foot bones and smaller animal bones (Price 1985).

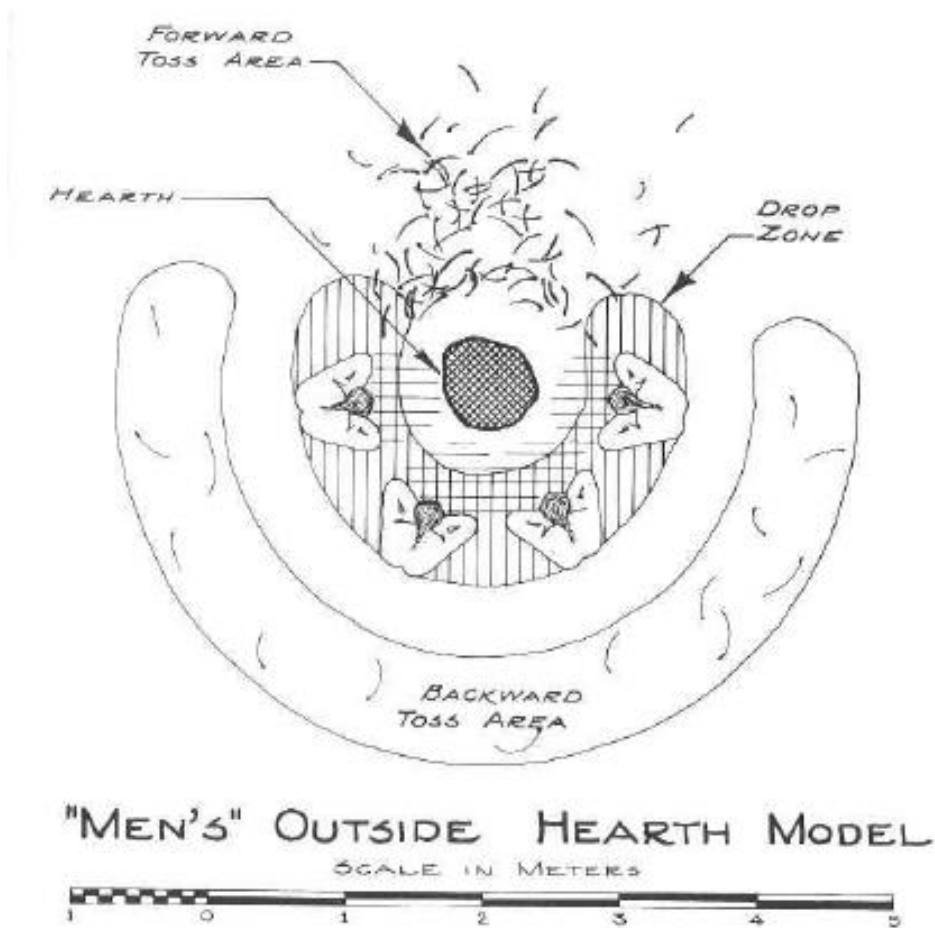


Figure 2.2. An example of a hearth refuse area for a Nunamuit group (Binford 1983:153).

At Aztalan, we would expect to see similar patterns based on butchering, consumption and discard. The least useful elements in the modified general utility index (MGUI) also happen to be the densest – e.g. crania (Lyman 1985). In the case of hunting camps, it is logical that these would be left at a butchering site instead of being carried back to a habitation

area. Those elements with the most amount of meat – the pelvis, femur, humerus and scapula would be brought back to the living area for consumption. Conversely, if deer are being brought back whole and butchered near where people are consuming them, we would expect to see a variety of bone from the whole skeleton (Lyman 1985).

Variation Based on Disposal Practices

Archaeological sites do not always reflect direct depositions from primary activities at a site, such as butchering and consumption. It is important to note that excavation reveals the final resting place of an artifact or ecofact after a significant period of time has elapsed since it was first used (Schiffer 1976). Faunal remains are not always deposited directly after consumption or butchering. Many times, it is common to sweep out hearth features and deposit them in a refuse pit near the house (Binford 1983). Other times, such as in a midden, animals will be able to gnaw bones left out in the open. In addition, hearths and small refuse pits most likely reflect the activity of a single household, while middens are more reflective of the activities of many households in a wider site area (Schiffer 1976). Therefore, we should expect to see some differences between different types of features.

The amount of time the feature was open to the elements, scavenging animals, as well as the soil composition (acidic vs. basic) can also have an effect on which bones will preserve in the archaeological record (Schiffer

1976). However, since this analysis deals with only one site, the effect taphonomy has on comparisons between features is expected to be minor.

Animals and Ritual in Mississippian Contexts

People do not have simple exploitative relationships with the animals they hunt and interact with. Animals are not just food, but are also companions, symbols and social mechanisms (deFrance 2009). Animals were used considerably in ritual contexts in Mississippian societies.

There are several prominent animals in the Southeastern Ceremonial Complex (SECC), a broad-ranging ideology represented by similar symbols throughout the Mississippian world (Knight et al. 2001). Raptors, especially falcons, are symbolic of a falcon warrior or perhaps Red Horn, a cultural hero in a cycle of Ho-Chunk stories and legends (Pauketat 2005). “Bird-men” or warriors with bird attributes are a common theme on many effigies, gorgets and copper plates found throughout the Mississippian world (Figure 2.3). Snake and winged-serpent imagery is also common (Figure 2.4) (Knight et al. 2001). Many times, images are a composite of animal and human such as the bird-men or snake-men (Knight et al. 2001). It would make sense that the archaeological presence of snakes and falcons, animals not often utilized for food, would be more indicative of a ritual process.

It is presumed that the SECC is only one aspect of Mississippian ritual and spirituality (Knight et al. 2001). In the layers of a sub-mound borrow pit

at Cahokia, excavators found the remains of a presumed public event that involved feasting. In addition to many whole, high utility whitetail deer elements, the quantity of swan bones was notable. Although swan composed about half the avian sample size, there were no wing bones present. This has led researchers to postulate that swan wing fans were important ritual objects (Kelly 2001).



Figure 2.3. A depiction of a birdman from a shell cup fragment (Reilly 2007:45).



Figure 2.4 A winged serpent figure from Moundville (Reilly 2007:51)

The Mississippian ideological world was marked by variations on a central theme. It would stand to reason that at Aztalan, we would see elements replicated from a broader Mississippian ideology, but also elements that are more specific to the local area. Excavations from the site have yielded four dog burials, leading researchers to speculate that dogs were also significant in ritual practices there (Parmalee 1960). Chandler Rowe excavated two of those burials in the 1950s; unfortunately his excavation notes are presumed lost (personal communication P. Peregrin, 7/30/14). Barrett excavated one dog burial consisting of an almost complete skeleton (Feature 37 in Section II, see Figure 4.2), and it is possible that he excavated

a second, less complete burial (Appendix A). The nearly complete skeleton was a male dog, as evidenced by the baculum.

Dogs are hard to interpret ritually since they have had such varying connotations to native peoples living in the Upper Midwest. Dogs have been known to be sacrificed at burials, corn ceremony feasts, and war rituals, as well as Midewiwin ceremonies (Cook 2012). The Midewiwin was a practice among Great Lakes Algonquian tribes and could be associated with safe return of war parties, death, life and renewal (Cook 2012). While it is known that it was in practice among historic tribes, there are hypotheses that it has widespread, deep prehistoric roots (Cook 2012, Hall 1997, Oberholtzer 2002).

Rituals relating to warfare are another possibility. The Ho Chunk used dog sacrifice in their war bundle feasts. According to Radin, at the beginning of the feast:

“The dog is strangled and a pouch of tobacco is tied to each limb, and another pouch and red feathers are tied around his neck. The body is then laid in front of the war bundle, facing south, this being the direction in which Disease-giver, the spirit to whom the dog is specially sacrificed, lives” (Radin 1970:380).

Some researchers think it is possible that the concept of Disease-Giver originated from Mississippian contact, since Mississippian groups also appeared in Wisconsin from the south (Boszhardt 2004).

Based on animal iconography in the SECC, as well as culturally widespread dog ritual practices, evidence of ritual at Aztalan should include large birds such as swans or raptors, snakes or dog burials. Whitetail deer

feasting would also be indicative of an out-of-the-ordinary occurrence or ritual.

Intra-Site Whitetail Deer Variations

Whitetail deer are one of the main animal food resources at Mississippian and Woodland sites. In addition to different consumption or butchering activities or ritual, hunting strategies might also play a part in variation at the site, or lack thereof. Age- and gender-related selection is most often seen in domesticated animals. This fits in with herding and breeding strategies. When humans are controlling animal reproduction, patterns show mostly adult females and a small number of adult males. Mortality profiles should include a large number of sub-adult or young adult males and older females.

In wild animals, a mortality profile representative of selective hunting should include mostly animals of prime age, with fewer very young or very old animals (Hudson 1991). In a study of non-selective hunting strategies, Hudson (1991) found that social behavior of the prey animals most likely dictated the age profile. If there are not a majority of prime age animals in the profile at Aztalan, we would expect to see either a profile that is indicative of whitetail deer behavior, or one without a majority age represented. Unfortunately, due to current hunting practices, age profiles for deer are much younger than they would have been historically (Torgerson

and Porath 1984). It is therefore unknown what the live profile would have been during Aztalan's occupation. However, deer behavior can be assumed to be relatively constant. In woodland areas, does usually only group with their fawns and are relatively solitary (Marchinton and Hirth 1984). Bucks usually congregate with up to five other males. The rut is the exception; females and males will interact together during this time, and males will typically avoid other males except for challenging each other. Therefore, a profile reflecting white-tailed deer behavior should either include mostly males or females and young deer.

Summary

There are many factors to consider when interpreting differences or lack thereof in a site's faunal assemblage. Human and animal behaviors can determine types of bones found. Human behaviors can be utilitarian or ritualistic, and animal behaviors can reflect that of the prey pre-mortem, or those of post-mortem scavengers. In addition, natural processes such as decay and erosion can further complicate assemblage results. This makes interpretation challenging but also a unique opportunity to make a case for the best possible explanation of the facts represented by the remains.

CHAPTER 3: CULTURAL BACKGROUND

Late Woodland Cultures in Southeastern Wisconsin

Aztalan was first occupied by a Late Woodland culture by about A.D. 800 (Richards 1992). Due to the palimpsest-like nature of the archaeological deposits at the site, not much is known about the founders. Many of the mounds around the settlement are not Mississippian in origin, however, it is still unknown whether Aztalan's early Late Woodland population built them or if they were constructed by even earlier occupants of the region (Birmingham and Goldstein 2005).

Late Woodland groups are thought to have been the builders of the numerous effigy mounds across Wisconsin and northern Illinois (Salkin 2000). The sites usually date to around A.D. 700 - 1200. The effigy mounds are unique to this area of the world and are usually representations of spirits or animals. There are some intaglio mounds - these are effigies shaped in an earthen depression - as well, although they are not as numerous as the above ground earthen mounds (Birmingham 2010). The effigies have often been found to contain burials, although there are some that have only hearth features (Salkin 2000).

The Late Woodland tradition in Southeastern Wisconsin is still being defined. Until the cultural resource management (CRM) boom of the 1970s, many Late Woodland sites were passed over by archaeologists in favor of more flamboyant cultural types such as Hopewell or Mississippian

(McElrath, Emerson and Fortier 2000). With an influx of excavation locations being determined by publically funded construction projects and not archaeologists' personal interests, new information began to emerge.

Originally there were two separations of Late Woodland sites in Southeastern Wisconsin: one of sedentary non-mound builders, and one consisting of hunter-gatherers responsible for the effigy mounds (Salkin 2000). These were termed the Horicon and Kekoskee phases. Horicon phase groups were thought to have lived at campsites rather than settlements; to have made grit-tempered Madison ware, some of which was fabric impressed; to have been hunters and gatherers; and finally, to have been responsible for building the effigy mounds (Salkin 2000). Kekoskee phase groups by contrast were thought to have lived in semi-permanent to permanent settlements; to have made collared grit-tempered Madison ware; to have been horticulturalists; and to have originated outside of the state (Salkin 2000). A Kekoskee phase group was thought to have inhabited Aztalan.

However, new research is showing that the Late Woodland phase is much more complex than originally thought (Rosebrough 2010, Clauter 2012;). Subsistence is suggested to be variable across bands, not as a result of a uniform cultural tradition. Effigy mounds can be associated with horticultural sedentism or hunting and gathering. The same is true of ceramics: multiple types of collared and non-collared Madison wares have

been found at sites with and without effigy mounds (Rosebrough 2010).

Lithic toolkits are also variable.

Rosebrough (2010) envisions a highly flexible set of population groups responsible for building effigy mounds. These might be mobile or semi-sedentary and have close economic or kinship ties with neighboring groups. Group membership is also assumed to be inconstant as a way of risk pooling or perhaps conflict management. This would help to explain the regional ceramic styles as well as variation within those regional groups.

Mississippian

The Mississippian-Late Woodland occupation of Aztalan occurred circa AD 1050 - 1250. This was the last major occupation, and the one in which the most enduring structural changes occurred.

The term Mississippian is hard to define concisely because the definition has changed so drastically from its original meaning. Although today it refers to types of material cultural traits and similar ideologies, when it was first put forth by W. H. Holmes in the late 1880s it was simply a geographical grouping of ceramic types (Griffin 1985). Holmes was working on a definitive monograph for prehistoric pottery, and found that the shell and grog tempered wares along the Mississippi were stylistically related and associated with mound sites.

It was not until the 1930s, with the advent of McKern's Midwestern Taxonomic Method, that Mississippian became more than just a pottery style (Griffin 1985). Material culture was now equated with actual cultures, and ceramics were just one of the traits used to define the people that had inhabited the Mississippi River basin and its tributaries. Thorne Deuel presented the main characteristics of Mississippian sites in 1937 (Griffin 1985). Now the definition included, among other things: platform mounds; wattle and daub house walls; rectangular floor plans; certain pipe styles, including effigy pipes; personal adornments made of marine shell; and of course two or more types of pottery with most designs including hatched triangles, scrolls and/or spirals.

Cahokia and similar sites were grouped into a Middle Mississippian categorization (Griffin 1985). Other sites were Upper or Lower Mississippian based on their latitude along the Mississippi river. Those further to the east might be categorized in a different manner altogether, such as the Fort Ancient aspect in Ohio.

Current Definitions

The latest explanation to emerge about Mississippians leans even further towards the single origin side of the theoretical spectrum. In it, it is proposed that Cahokia holds the key to defining what it means to be Mississippian (Pauketat and Emerson 2000; Pauketat 2004; Alt 2012;). Here,

the "Cahokia-Mississippian" tradition was the original ideological structure that radiated outward to be adopted and re-created by other Late Woodland cultures (Pauketat and Emerson 2000). This is important because the definition acknowledges that there are large variations within the Mississippian world, and also that there are degrees of contact between Cahokia and other Mississippian-based cultures. Alt (2012) envisions a sort of metropolis at Cahokia, where an influx of immigration would have brought about a creolization of the locals' cultural traditions with the newcomers'. The need to interact among others who did not share a common culture would have necessitated the advent of new traditions, rites and ceremonies that could have created a shared identity.

Central to this interpretation is the agency of the people. Alt (2012) refers to it as "making" Mississippian; the immigrants to Cahokia and its original inhabitants actively constructed this shared ideology. The result, which is sometimes called the Southeastern Ceremonial Complex, spread through various ways depending on the location in which artifacts representing it are found. The areas to the north of Cahokia, such as Wisconsin and Minnesota, had direct outposts or settlements, which have been referred to as missions (Benden 2004; Pauketat 2000). Other cultures, such as those to the east, were probably formed through indirect means like trading relationships or networks. .

The definition used in this paper will be a combination of both the economic and ideological. Mississippians were people who lived in river valleys; they fished, hunted and gathered wild plant resources; they also practiced varying degrees of corn and squash agriculture. There were varying degrees of settlement hierarchy in the river valleys, as well as varying degrees of social hierarchy in the main centers. They created ceramics with similar stylistic and technological attributes, particularly those with ceremonial uses. They had far-flung trade-networks centered on exotic prestige goods. Trade might also have included perishable goods such as hide or dried meat, however, there is for obvious reasons no concrete evidence of this. In addition, the Red Horn myth likely played a large role in Mississippian ideology, since we see representations of it in mortuary and petroglyph/rock art contexts. Monument building of plazas and platform mounds created a public space for rituals and community activities. Ultimately, those at Cahokia spread their views to the north, as well as indirectly through trade-networks. .

Middle Mississippian At Aztalan

Whether or not Cahokia is central to the understanding of Mississippian culture as a whole, it is most certainly central to understanding Mississippian culture at Aztalan. Based on ceramic and strontium isotopic evidence, it is most likely the major catalyst for change at

the site came from people moving into the area from the south. Originally the village was a Late-Woodland settlement; with the arrival of the newcomers it transformed into a Mississippian town. The Cahokia area is the most likely place of origin for these settlers. (Richards 2007; Richards 2003; Price et al. 2009).

Richards (2007; 2003) found both grit and shell tempered ceramic sherds present at the site representing the local Woodland occupation and the Lohmann and Stirling phases from the Cahokia area (AD 1050 - 1250), respectively. Aztalan and Cahokia share up to a third of the design motifs found on sherds of Ramey Incised pottery- a style with ceremonial connotations (Richards 2003). Finally, petrographic analysis has shown that clay from the American Bottom, where Cahokia is located, was used in the construction of some of the vessels.

Skeletal evidence adds strength to the Cahokia origins theory. Price et al. (2009) conducted a study of strontium isotopes present in human remains found at Aztalan. During childhood, strontium present in drinking water is deposited in tooth enamel. Because geological deposits are different throughout the world, there are distinct strontium isotope signatures per geographical region. When tested, it was found that the majority of the sample had values that matched what would be expected from Aztalan. However, four individuals had values that would have been expected if they had come from the American Bottom area. Interestingly, one of the

individuals was a bundle burial interred in a structure referred to as the crematorium on top of the northwest mound at the site. It is likely that the immigrants were held in high regard when they arrived, since this burial was placed in such a prominent place.

The type of relationship the Mississippian inhabitants had with their Woodland neighbors was likely synergistic. Site ceramics are mixed and there is evidence of cooperative mound building (Zych 2013).

Summary

The Late Woodland and Mississippian occupations have each left their mark at Aztalan. The archaeological deposits, because they are so mixed, present a challenge to archaeologists trying to untangle the various inhabitants' material signatures. Perhaps it is easiest to understand the site when allowing room for an intermingling of cultures of the Mississippian and Woodland.

CHAPTER 4: ARCHAEOLOGICAL BACKGROUND

Aztalan (47Je01) is a multicomponent site that was occupied simultaneously by a Late Woodland and Middle Mississippian culture. Located on the banks of the Crawfish River, it is one of the most well-known Mississippian sites in southeastern Wisconsin. Its mounds and palisades made it conspicuous on the landscape; as such, it was one of the first sites identified in Wisconsin and has a long history of excavations. This has resulted in collections housed in multiple institutions spread across the Upper Midwest. These present unique interpretive challenges and opportunities for researchers curious about Aztalan's past (Birmingham and Goldstein 2005; Richards 1992).

History of Discovery, Mapping, and Major Excavations at the Site

Nathaniel Heyer was the first person to publish information about Aztalan. In 1836-37 he made several trips from Milwaukee to survey the ruins. What resulted was a woodcut map published with a short description in Chicago and Milwaukee area newspapers (Richards 2007). In 1850, Increase Lapham created one of the most well known maps of the site (Figure 4.1). Although it was not the first, it is perhaps the most detailed map available of the surface features at the site. This map is invaluable because it records the site as it looked before heavy plowing. Lapham noted: "At the time of our survey, a crop of wheat was growing on the south part of the great

inclosure [sic]; and, in a few years, but slight traces of this part of the works will be left. The north part is still in its original condition, except where excavations have been made by persons curious in such matters..." (Lapham 1973:50). Many of the features visible on Lapham's map no longer existed above ground 60 years later (Barrett 1933).

S.A. Barrett was the first to conduct professional and systematic excavations at Aztalan. Working for the Milwaukee Public Museum, he started work in the field season of 1919, and continued again in the summer of 1920; the majority of his published research focuses on this second field season (Barrett 1933). After an extended hiatus he again conducted excavations in 1932; this time the focus was on delineating the stockade surrounding the site, and trying to match in the archaeological record what Lapham had recorded in his 1850 map. The collections from Barrett's excavations are housed at the Milwaukee Public Museum (MPM

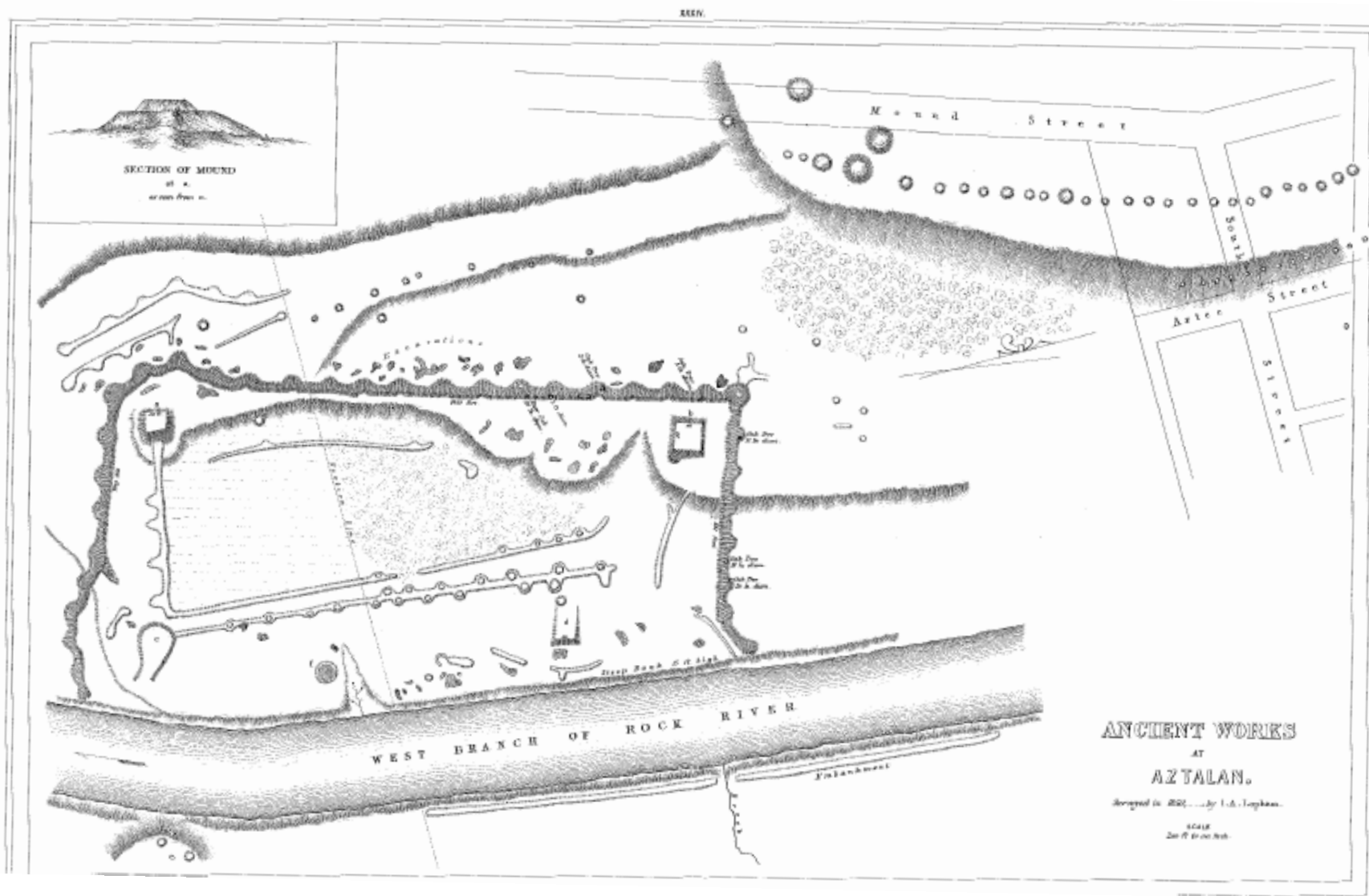


Figure 4.1. Lapham's map of Aztalan (Lapham 1973)

After Barrett, there were several excavations using more modern techniques that unfortunately did not result in the publication of detailed site reports. David Baeris, with the Wisconsin Archaeological Survey conducted excavations at the site from 1949-1952. The hope was that researchers could gather enough information to reconstruct certain features at the site, such as the pyramid mounds, palisade and houses (Baeris 1958; Wittry and Baeris 1958). Chandler Rowe from Lawrence University and Robert Maher excavated in the early 1950s in collaboration with Baeris (Rowe 1958; Maher 1958). The results from Baeris, Rowe, et al. were published in the *Wisconsin Archeologist* vol. 39. About 110 pages were dedicated to the lithic, ceramic and structural information gathered from the three years of excavations. There were no site-wide excavation maps published. Faunal were analyzed by Paul Parmalee (1960).

Next, William Hurley from the University of Toronto excavated in 1962 (Richards 1992). Plan views of his excavations are published in the *Wisconsin Archeologist* without any comment on the work, along with an accompanying article describing ceramic sequences and radiocarbon dating at the site (Hurley 1977). The maps are something of a non sequitur to the article.

Joan Freeman conducted several excavations in the 1960s with the State Historical Society of Wisconsin. While there have been no comprehensive site reports published, artifacts from the excavations centered around the northeast mound have been analyzed (Zych 2013). In

addition, Freeman published a summary of general information about Aztalan- first in 1986 and an update co-authored with Lynn Goldstein in 1997 (Freeman 1986; Freeman and Goldstein 1997).

Finally, the University of Wisconsin-Milwaukee (UWM) conducted excavations under Lynn Goldstein and John Richards from 1983-1985, as well under Goldstein in 1996 and Richards in 2011 and 2013. Funded by a grant from the Department of the Interior, the excavations in the 1980s were part of a larger project surveying southeastern Wisconsin. A report of this work was published under the title, *The Southeastern Wisconsin Archaeology Project* (Goldstein 1985). Many graduate students' theses and dissertations have resulted from the information gathered by the UW-Milwaukee excavations. Research has focused on a broad range of topics including: ceramic sequencing and typology (Richards 1992; Mollerud 2005; Kotwasinski 2014); faunal remains (Warwick 2002); and floral remains (Picard 2013).

Finally, a report of UW-Milwaukee excavations conducted by Richards in 2011 and 2013 is in the process of being published.

Previous Faunal Analyses

Much of the previous faunal work at Aztalan has focused on environmental questions. Site catchment, subsistence patterns and species lists have dominated much of the literature (e.g. Somers 1920; Parmalee 1960; Binkley 1962; Styles 1985). This may be due in part to the lack of fine-level provenience associated with much of the faunal

remains excavated. More in-depth explorations of collections would have been difficult using only site-level origins information. In addition, many of the studies show evidence of being influenced by the prevailing archaeological paradigms during the time period in which they occurred. This gives a valuable look at different perspectives on a faunal assemblage that – at a site-wide level – is similar in each of the studies.

A.N. Somers

The first published information on faunal remains comes from Rev. A.N. Somers in a 1920 article for *The Wisconsin Archeologist* (Somers 1920). In 1888, he took “a club of young people belonging to my church...for a day’s outing” at Aztalan (Somers 1920:20). The group dug through the ravine midden at the site, collecting artifacts and over 2,000 bones (Somers 1920).

This account should be used with caution, especially since it appears that the Reverend confused elk bones for moose. Moose and elk are both native to the state; however, moose are known to have been populous only in the northern part of Wisconsin. Elk, on the other hand were encountered most frequently in the southern third of the state, below 44 degrees latitude (Jackson 1961). In addition, he focuses much of his attention on the human bones that he has found, with the idea that cannibalism was a common subsistence practice at the site. The article contains dated theories and some misinformation, but provides a species list similar to other researchers’.

Paul Parmalee

As Director of Zoology for the Illinois State Museum, Paul Parmalee (1960) was the first professional analyst of the animal remains from Aztalan. These remains came from three sources: Barrett's excavations, which were stored at the Milwaukee Public Museum (MPM); Baerreis's excavations, which were stored in Madison; and finally a list of mussel species supplied by Chandler Rowe of Lawrence College. This list from Lawrence is all that is left of Rowe's mussel collection, since the shells were disposed of to make room in the collections storage at the college (Theler 1991). In addition to the mussel shells, Parmalee also tabulated mammal, bird, reptile and fish remains from the site.

Parmalee (1960) found that the most utilized animal by far was the whitetail deer. Out of the 1006 mammal specimens listed from the MPM, 914 of those were deer. In addition to these, of the unidentifiable mammal fragments he studied, Parmalee estimates that at least 90% were deer. In addition to deer, dog and elk were the next most numerous, respectively. Some of the dog remains were encountered as nearly complete burials, although it is not said whether they were articulated or not. The elk, while not numerous (n=21 from the MPM) would have supplied a large amount of meat (Parmalee 1960).

Birds made up about 17% of the assemblage (Warwick 2002 data manipulation of Parmalee 1960). Trumpeter swans were perhaps the most noteworthy find (n=4 from UW, n=3 from MPM). Aztalan is not located on any major migration routes, although the bird is not uncommon

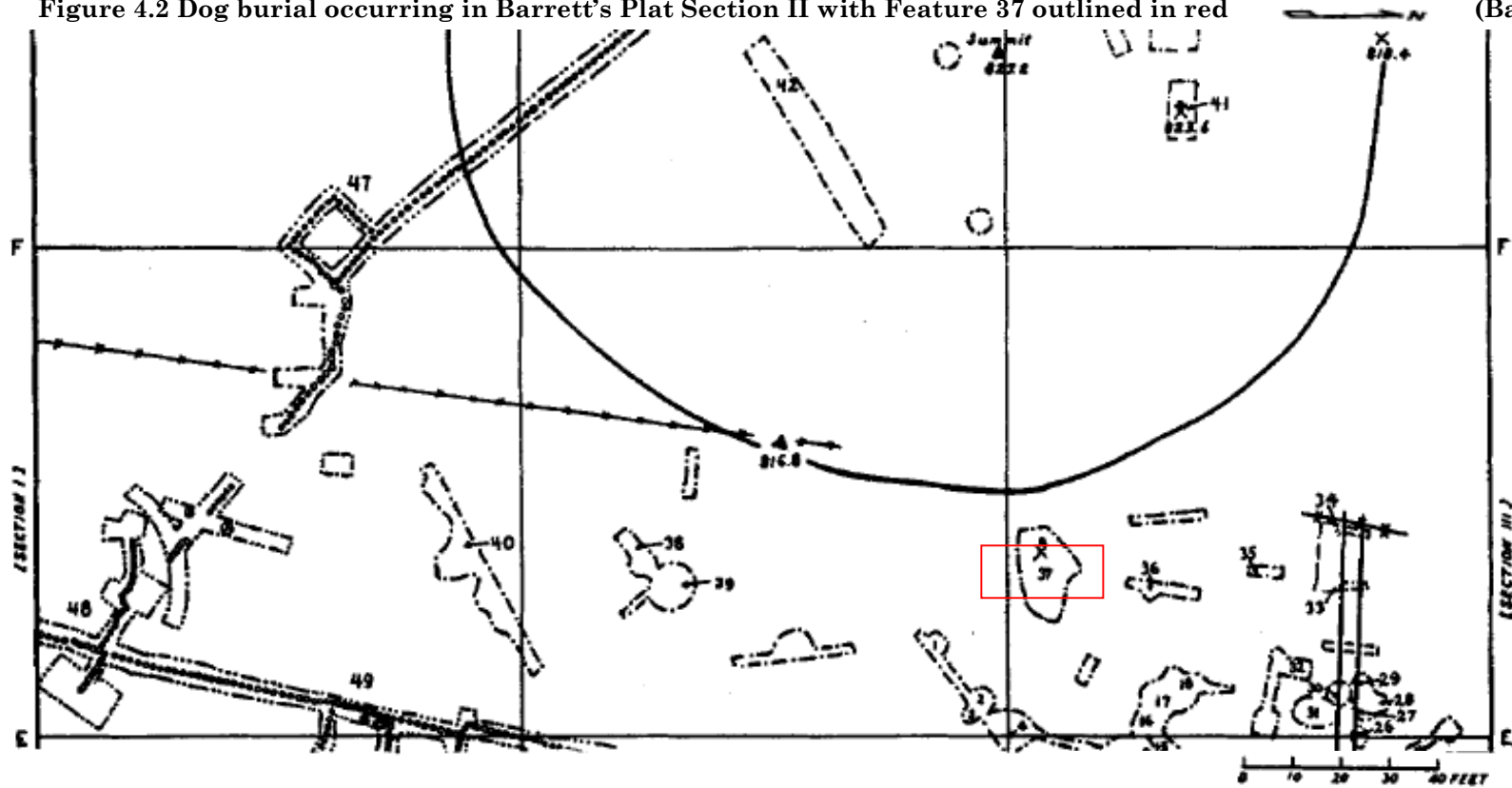
in Wisconsin. In addition to the swan, the majority of the birds taken were waterfowl. Duck-type birds were the most common, with diving ducks making up 75% of those. A large portion of bird remains included passenger pigeon at 26% (Parmalee 1960). A red-tailed hawk specimen was also notable since hawk/falcon iconography is hypothesized to be such an important part of the Mississippian ritual complex (Pauketat 2005). Parmalee notes a general absence of turkey. This was useful in determining possible matches for the large bird bones I had in my own sample.

While reptiles (mostly turtles), were the least utilized, fish were about equal in percentage of specimens to birds (Warwick 2002). Catfish, most likely *Ictalurus punctatus*, were the most represented. Buffalofish and suckers were the second most utilized fish at the site (Parmalee 1960).

Some of Parmalee's findings are interesting from a ritual standpoint. A male dog burial was found in Barrett's plat section II (Figure 4.2). Historically, Ho Chunk Indians associated dog feasting with both the deities Disease Giver and Thunderbird (Boszhardt 2004; Radin 1970). Disease Giver was an important member of the tribe's pantheon who had powers over life and death. War bundle ceremonies used to appease him included a dog feast. The dog, considered akin to a human, was sacrificed and bundles of tobacco were tied to its limbs. Boszhardt (2004) hypothesizes that the major population growth at large Mississippian centers would have been ideal conditions for the spread of disease, and gives evidence of anemia and also some tuberculosis.

Besides the dog, swans were also important ritually. There is direct evidence linking them to a Mississippian feasting episode at Cahokia. At the Sub-Mound 51 borrow pit, in addition to the deer remains, there are swan bones and red cedar (Kelly 2000). Ethnographic accounts attest to the sacredness of the bird: swan feathers were utilized during the Ho Chunk Thunderbird feast, while the Osage equated them with peace. They are also a general chiefly symbol in historic southeastern tribes, many of which are descended from people associated Mississippian cultures.

Figure 4.2 Dog burial occurring in Barrett's Plat Section II with Feature 37 outlined in red (Barrett



1933).

Marian Binkley

Marian Binkley catalogued and described faunal remains recovered from William Hurley's excavations at Aztalan in 1962 (Binkley 1962). The analysis was considered a student project and reported in a term paper written by William Hurley. The extent of Binkley's professional training was unknown, as well as her methodology. This should be taken as a caution when using her information. Binkley used number of identified specimens (NISP) to categorize her results by class and then species. She reports a species composition similar to that of Parmalee's. In addition, she notes the presence of a sub-adult dog burial. At the end is a list of the identified bones in her collection (N=2722) categorized by what appears to be Hurley's excavation units.

Richard Yerkes

Using data from Joan Freeman's 1967 excavations, Richard Yerkes conducted a study of fish scale focused on determining feature seasonality (Yerkes 1980). This report was also unpublished. Using scale morphology and growth rings, he was able to determine fish species as well as age and season of death. His sample consisted of flotation from 20 features (no N given). He was able to determine the seasonality of all of the features using the fish scales, as well as maize and nut remains.

Yerkes was able to demonstrate that fish were captured year round. He designates seasons based on monthly patterns in the annual growth ring

found on the scales. Members of the family Catostomidae (suckers, redhorse, buffalofish, etc.) were most abundant during the Fall-Winter (October-February) and Spring-Summer (May through July) seasons. In the Early Spring (February through May) season members of the Centrarchidae family (bass, crappies, bluegills, etc.) were dominant in the sample. Pike and perch were only found in Early Spring features. Late Summer (July-October) saw an equal dominance of Centrarchids and Catostomids.

Yerkes hypothesizes these patterns were due to both fish behavior and human technology. A fish weir on the Crawfish River would have enabled winter fishing of bottom-dwelling species like the suckers. In the early spring, spawning would have made pike, perch and the Centrarchid species more available than the Catostomids that spawned later .

Yerkes acknowledges that one of the drawbacks of his study is that it does not include scale-less fishes such as those in the family Ictaluridae (catfish) (Yerkes 1980). Based on other species lists (Parmalee 1960; Styles 1985; Hudson 2004), catfish were a major part of the piscine diet at Aztalan. However, since Yerkes was mainly concerned with determining seasonality and not diet (which had been done before), the lack of catfish is only a minor issue.

James Theler

Theler (1991) analyzed mussel shells found at Aztalan. This was a thorough analysis of not only the MPM collections, but also those from

published information from Lawrence College; specimens from the Wisconsin Archaeological Survey excavations dating from 1949 and 1950; the State Historical Society excavations dating to 1967; and also the 1984 University of Wisconsin-Milwaukee excavations. Most of the mussel shells were local, and easily procurable from the Crawfish. One species, the washboard (*Megalonaias nervosa*) was most likely from the Mississippi River.

Although shells were found throughout the site and thus likely had a high ubiquity, Features 42 and 42a were notable for their dense concentrations. These were from the Freeman excavations. It is hypothesized this was a cache for later use in pot making (Theler 1991). An alternative interpretation could be that the feature was the remains of a single processing event, such as a feast or communal effort at shellfish gathering.

Bonnie Styles

Bonnie Styles tabulated faunal remains from the 1985 Southeastern Wisconsin Archaeological Project (SEWAP) excavations at Aztalan (Styles 1985). Added as an Appendix A to the main report, her study details a list of species and collecting procedures. This was done to gauge the time needed to analyze the entire collection. The samples came from features and were floted. Compared with previous studies, flotation may have contributed many more small animals to the species list. Small rodents and fish were the most common. The entire sorting and identification took 10 hours and 40

minutes, and is considered by the author to be a preliminary effort at identifying the total amount of faunal remains (Styles 1985).

The species identified were similar to other samples taken, with exception of the rodents and small fish: white tail deer, beaver, waterfowl, small sunfish, turtle, pike, largemouth bass, bullheads, redhorse, freshwater mussels and snails (Styles 1985).

Jean Hudson

An introductory zooarchaeology class taught by Dr. Jean Hudson identified faunal remains in two features Barrett had excavated (Hudson 2004). Students identified specimens to class, and sometimes to species. The features are catalogued at the MPM as Sec. II, 29 and Sec. III, 17. Based on Barrett's site map, these are Feature 29 in Section II and Feature 17 in Section III (Barrett 1933). Both were grab samples from Barrett's excavations, and were more likely to contain only larger bones. Mammal and fish bones were the most abundant, and small to medium mammals were present (such as raccoon (*Procyon lotor*) and rabbit (*Lepus* or *Sylvilagus*)). This could mean the grab sample, while not ideal, was not completely biased towards large bones. Fish species found were tentatively identified as catfish (Ictaluridae) and pike (*Esox*). This is different from Parmalee's sample where the families Ictaluridae and Catostomidae (suckers) were most represented.

Feature 29 was historic and was used as a comparison in my own analysis with prehistoric features.

Matthew Warwick

Warwick's master's thesis (2002) analyzed faunal remains to class from the 1984 excavations conducted by Goldstein. These focused not on the habitation areas of the site, but on the riverbank midden just outside the palisade. Strata dated not only to the Middle Mississippian occupation, but also to the earlier Late Woodland occupation. Each occupation was analyzed to assess changes in dietary patterns over time. In addition, whitetail deer elements were analyzed to find trends associated with food utility, as well as evidence of possible feasting activities. (Warwick 2002).

It was found that the sample from the Late Woodland period stratum had a majority of mammal specimens (68.7%), while fish and birds made up roughly similar components of the diet at approximately 15% and 10%, respectively. The sample from the stratum dating to the Middle Mississippian/Late Woodland occupation had 59.4% mammal specimens, with 25.3% of the sample being fish, and 13.5% of the sample being bird remains (Warwick 2002). This is a significant decrease in mammal utilization at the site, with a significant increase in the use of fish. If we can assume that like Parmalee's and Hudson's samples, the majority of mammal remains are white-tail deer, it would mirror what we see at Cahokia in Kelly's (2000) dissertation where the Late Woodland period shows a greater consumption of deer than the Emergent Mississippian. While the Cahokian dynamic is a more dramatic drop-off than at Aztalan, this is not unexpected.

Whereas at Cahokia, the faunal assemblage studied came from sites spanning the range of Mississippian site hierarchies (from small farmsteads to the large multi-mound center) (Kelly 2000), at Aztalan, there is no inter-site hierarchy. Instead of representing either of the opposite ends of the scale, it is probably most analogous to an intermediary mound site.

In addition to changes through time, Warwick (2002) also identified whitetail deer elements to look for utility patterns. The Late Woodland sample was more reflective of taphonomic processes than anything else. It seems that the elements represented a sample that was relatively unbiased towards favorable cuts of meat, or else because it was significantly older and had decayed more (Warwick 2002). The Mississippian stratum, on the other hand, had a pattern that was biased towards mid-grade and higher food utility.

Rachel McTavish

At the time of this writing, Rachel McTavish is working on the faunal remains recovered during the 2011 and 2013 field season excavations conducted by John Richards. The final report is currently being processed for publication and is expected to be completed in 2014.

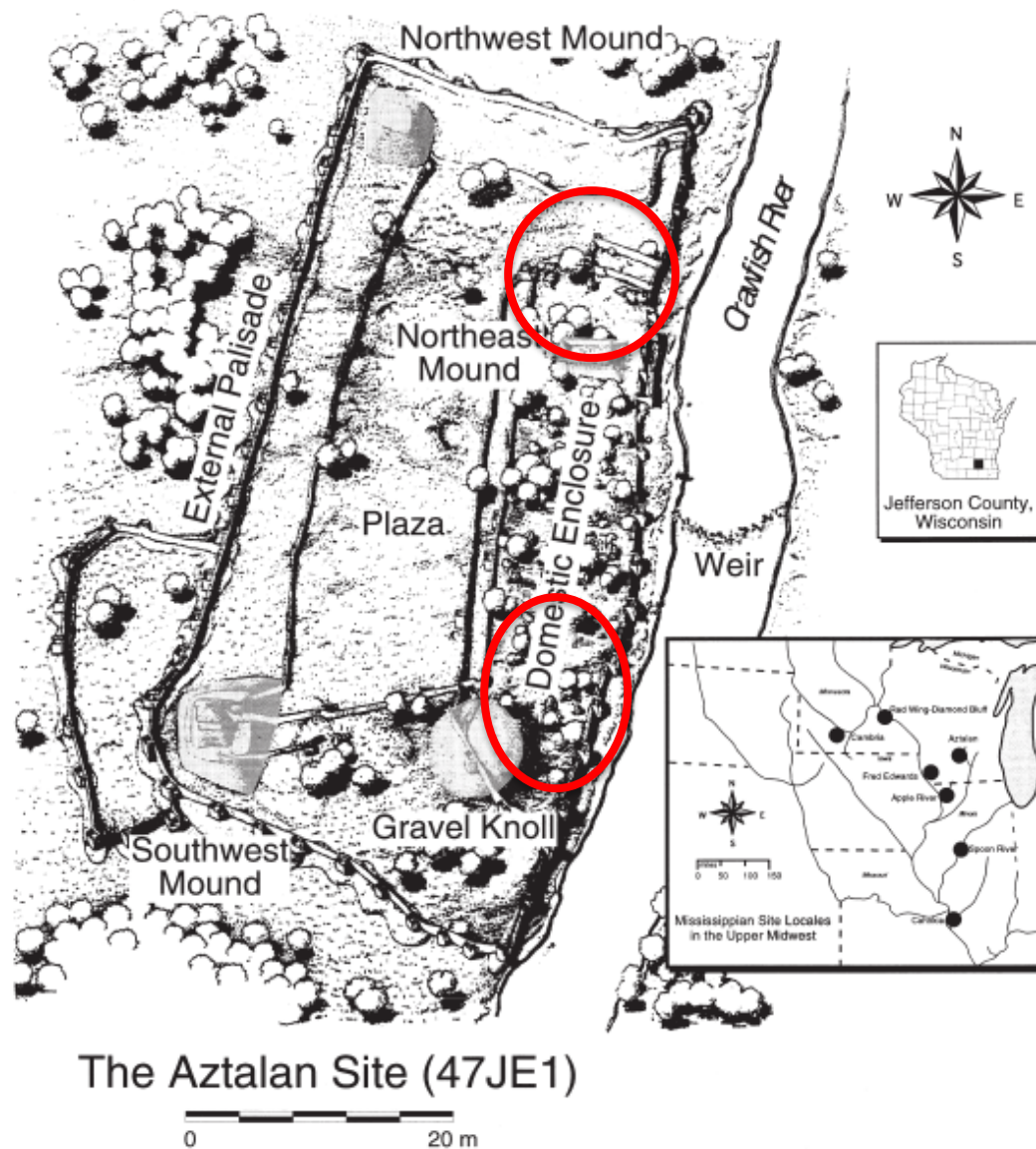
Site Layout

Aztalan as it appears in the archaeological record was laid out according to Middle Mississippian patterns (Figure 4.3). There is a palisade enclosing the site that has been documented since the earliest European recordings of it. Nathaniel Hyer, one of the first to map Aztalan, referred to it as "an ancient walled city" (Richards 2007). In addition, the walls and bastions are clearly visible on Hyer's map, as well as on the one made by Increase Lapham (Figure 4.1 and 4.2). Lapham was the first to scientifically document the site, and his map is an invaluable resource about what Aztalan looked like before heavy plowing obliterated many of the features there (Barrett 1933). The palisade surrounds the entire site. It is evenly interspersed with defensive bastions. In addition to enclosing the main area of the site, there is also a southwest enclosure, the purpose of which is unclear at this time (Birmingham and Goldstein 2005). Inside the outer walls, what could very likely be an earlier palisade surrounds the main habitation area of the village.

At the northwest corner of the site the location of one four mounds at the site. It was a man-made platform mound, built over three stages (Rowe 1958). Ten individuals were interred here as extended burials and one individual as a bundle burial. Grave goods were relatively scarce, however, there were hickory nuts and a shell tempered pot, as well as the remains of textiles (Rowe 1958; Price et al. 2009). Eventually the structure burned and

a third mound stage was built over it. Many of the burials interred in the mortuary had undergone multiple stages of processing before final burial (Goldstein and Freeman 1997).

Opposite the northwest mound, in the southwest corner of the site, is another large platform mound. This had two levels and was built in several stages. Originally the mound contained a large ceremonial post. Eventually, it was capped and the second terrace added. On top of this was a structure.



The Aztalan Site (47JE1)

Figure 4.3 Aztalan's layout, major features and location within the larger locality. In red are the two clusters of faunal remains being studied. (Adapted from Richards 2003:Figure 1, based on a drawing by E. Paulson)

Birmingham and Goldstein (2005) postulate that it could have been an elite residence; however Barrett, who was the first to excavate it, was non-committal saying that it was "either a building or a stockade made of posts" (Barrett 1933:79). Unfortunately plowing removed much of the last building

stage. These two mounds together make up what has been called an elite precinct, with the possible chieftain's house on the southwest mound, and the mortuary on the northwest mound (Birmingham and Goldstein 2005).

The northeast mound is also postulated to have been the site of an important structure. Located in the main habitation area, there were postholes found all the way around the top (Barrett 1933). Inside the structure, there were pits that had been burned and lined with white sand. In addition, there seems to have been a similar structure in place before the mound was built over it (Goldstein and Freeman 1997). Excavations by Freeman in the 1960s found evidence of several structures in place before mound construction began (Zych 2013). The mound top structure was a very large (375 square meters) wall-trench building used for non-domestic purposes. Several hearth and pit features were also noted in the sub mound area, as well as a similar sized non-domestic structure (300 square meters) (Zych 2013).

In the southeastern corner of the site is a glacial feature known as the Gravel Knoll. It appears to have been modified and may have functioned as a fourth platform mound (J. Richards, personal communication 11/21/14). The high ground here is where Barrett has hypothesized the location of a historic campsite (1933). This is based on the occurrence of historic artifacts in features just south of the knoll, as well as the hill's natural defensive advantages. Barrett did find burials and refuse pits on top of the knoll, but

no artifacts to indicate whether the features were historic. There are, however, four subsurface features with historic artifacts in them (Barrett 1933), as well as letters to Lapham (1973) communicating the presence of historic artifacts to confirm the presence of some sort of occupation. The knoll also had a stockade line with bastions running across it (Barrett 1933).

In the center of the site is what is currently interpreted as the main plaza. However, there is evidence that this was also a habitation area based on Freeman's excavations in the 1960s. While there are no artifacts or structures in this area, there were pit features that looked as if they had been truncated. Because the site was so heavily plowed, it could be that this area was simply stripped of archaeological remains. Otherwise it is possible these features predate the Mississippian building phase. The truncation could have occurred as the result of plaza-building (J. Richards personal communication 11/21/14; Goldstein and Freeman 1997).

The main habitation area was located in the eastern area of the site along the riverbank (Barrett 1933). Before the site had been plowed, Lapham and T. H. Lewis - a contemporary from Minnesota - were able to pick out the ruins of houses over the site. Lewis was of the opinion that they looked like ruined earth lodges (Goldstein and Freeman 1997). Both Barrett and Baerreis (1949) excavated houses in the area. They have characteristics of both Late Woodland and Middle Mississippian architecture. Both archaeologists found wall trench houses, typical of Cahokian styles, as well as

circular houses typical of Late Woodland types (Wittry and Baerris 1958). The sizes of the houses indicate that these were nuclear family dwellings.

Summary

Aztalan, like most well known sites, has suffered the effects of fame. Multiple excavations over the span of a century have scattered many of its collections. Fortunately, early maps made before the site was thoroughly plowed have given later excavators insights into what and where they were excavating. Barrett's (1933) excavations in the early part of the 21st century focused on finding the features described on Lapham's (1973) map. This in turn has created a relatively good documentation of features found across the entirety of the site (Barrett 1933). As excavations have taken place, faunal remains have been analyzed or simply put into storage.

What we do know about faunal remains at Aztalan is this: the inhabitants relied primarily on whitetail deer as a meat source; fish, turtles and waterfowl supplemented the diet. The majority of the research has focused on a site-wide provenience; several authors, Parmalee foremost among them, have provided species lists. Warwick (2002) looked at a stratified and dated midden, adding a temporal perspective. Hudson (2001) conducted feature-level analyses for two of Barrett's features. The current study aims to supplement the available research by adding an intra-site spatial perspective to a sample of Barrett's faunal remains.

CHAPTER 5: METHODS

Origins of the Faunal Sample

The faunal remains in this study came from the Samuel Barrett collection housed at the Milwaukee Public Museum (MPM). Barrett, with funding from the MPM, conducted several excavations at Aztalan in 1919, 1920 and 1932. During the three field seasons, Barrett conducted large-scale excavations across the entirety of the site. He discovered that the site had a stockade and riverbank midden in addition to hearths, storage pits, trash pits, burials, and structures (Barrett 1933).

Like many old collections housed in museums, provenience information is somewhat lacking. Although excavation techniques today focus heavily on the preservation of provenience, it does not mean that those collections without the benefit of the contemporary methodology must be relegated to simple demonstration collections or worse, de-accessioned. Winters (1981) explores comparative techniques for analyzing artifacts that have been poorly recorded. Even in instances where the artifact had only a county and state provenience, he found it useful to compare items on a regional scale. One example involved Late Woodland copper gouges, axes, adzes and celts: Winters was able to determine that these were sociotechnic items – indicators of social status rather than actual woodworking tools. In addition, by comparing collections across the United States, he was able to identify regional differences in manufacture and style.

The Barrett Collection, then, even though not all the provenience information is available is still a repository of valuable information. This was not because of a lack in diligence, but rather representative of the era.

Excavation techniques were primitive by today's standards. Judging from the plates in his monograph, Barrett's workers used pickaxes and shovels to uncover features. It is unknown if features were excavated in entirety or by arbitrary or cultural levels. Soil was not screened and artifacts were hand collected only. That being said, Barrett was surprisingly diligent. In addition to ceramics and lithic materials, he collected what he referred to as "kitchen refuse" (Barrett 1933:17): ashes, shells and cracked bones. Despite the coarseness of the excavation methods, the collection is surprisingly representative. It includes some small bones that are more often found through flotation, such as phalanges of small-sized mammals. Fish bones were also recovered, although the sample seems to skew towards larger individuals. In addition, when percentages of animal classes are compared to Parmalee's (1960) and Warwick's (2002) samples – the majority of which were screened - they are quite similar. Features (without outliers) from Barrett's sections contained 59% (southern sample) and 63% (northern sample) mammal remains, Parmalee's sample had approximately 63%, while Warwick's midden sample had approximately 59% in the upper Middle Mississippian stratum and 68% in the lower Late Woodland stratum. If the two strata are averaged together, the percentage becomes 63.5%.

Barrett's recording techniques were also rigorous relative to contemporaries. Many features have profile maps, and all of the features he excavated were mapped on a plan view of the site. There are also descriptions of varying length of each feature in his monograph. This means that the faunal remains from the Barrett collection have several advantages over other collections from Aztalan. The first is that the excavations give us a larger spatial scale than many modern excavations. This allows for an excellent comparison of intra-site patterns. The second is that because Barrett was the first to conduct large-scale excavations at the site, there is no worry about back dirt skewing the original provenience of objects. With the many natural causes that can obscure provenience, the back dirt is one less thing that must be taken into account.

Generating the Dataset

Tracing Faunal Remains to Features

Even though Barrett's excavations occurred almost a century ago, no one has yet published a comprehensive intra-site study of the faunal remains. Hudson's study compared two pit features, and Warwick compared a single riverine midden deposit with Parmalee's site-wide study. Most of the other faunal studies treat the site as a single provenience. This is because many of the bones themselves only have a site-wide provenience. The MPM, however, has an original accession record of each catalog number containing faunal

materials in Barrett's collection. This was invaluable as I was able to go back to the museum's original catalogs and look up each catalog number on the list. A catalogued item is listed with a description, catalog and acquisition number, among other miscellaneous details. Sometimes under remarks there is listed a Roman numeral with a corresponding Arabic numeral. For example, catalog number 26956 contains a lot of animal bones with a provenience of II, 7. Taking this as a reference to plat section II, Feature 7, it is possible to reference Barrett's site report for documentation of this feature (Figure 5.1 and Figure 5.2).

75

191

COLLECTIONS OF THE PUBLIC MUSEUM

DEPARTMENT OF ANTHROPOLOGY, DIVISION OF ARCHEOLOGY

Date of Entry	Current Number	Accession Number	Original Number	Number of Specimens	Name of Object	Description of Object
July 22	26951	6948		1	arm bone of human	l 13 in above
"	26952	"		1	"	l 10 in pass
"	26953	"		20	bones of humans; mostly leg. frag	
"	26954	"		1	arm bone of human	l 9 1/2 in
"	26955	"		1	rubbing stone; smooth on two sides	
"	26956	"		3	bones (a-c) animal fragments	
"	26957	"		1	hand of human; disjuncted, 17 small	
"	26958	"		1	animal bones (a-c) plain	
"	26959	"		1	refuse; box of misc pieces of bones, shells	
"	26960	"		1	bead shell diam 5/8 in	
"	26961	"		1	shell perforated	l 3 1/4 in

Figure 5.1. A page of the MPM's catalog book showing in the center of the page catalog number 26956, a lot of 3 animal bones.

75

OF THE CITY OF MILWAUKEE

Name of People Race, Tribe, Etc.	Where Collected	When Collected	By Whom Collected	From Whom Received	By Gift Exchange or Purchase	Cost	Remarks
<i>Amur Indian</i>	<i>Capitola Wis.</i>	<i>1919</i>	<i>Dr. L. M. Barrett</i>		<i>37565</i>	<i>80</i>	<i>II, 3</i>
	"	"	"	"	"	<i>1</i>	<i>550-3</i>
	"	"	"	"	"	<i>3</i>	"
	"	"	"	"	"	<i>1</i>	"
	"	"	"	"	"	<i>30</i>	<i>II, 7</i> <i>550-7</i>
	"	"	"	"	"	<i>12</i>	"
	"	"	"	"	"	<i>3</i>	<i>II, 9</i> <i>550-9</i>
	"	"	"	"	"	<i>10</i>	"
	"	"	"	"	"	<i>1</i>	<i>II, 15</i> <i>550-11</i>

Figure 5.2. The opposite catalog page showing in the remarks section II,7.

In addition to the catalog, sometimes the collection itself provided provenience information. One notable example came from catalog numbers 26875 and 26870. The provenience in the catalog is given as "V-A" with no feature numbers. When looking at the actual materials, however, the bones were still stored in what appeared to be their original boxes. Clearly printed on the side of the boxes were the words: "kitchen midden" (Figure 5.3). In total I was able to locate the provenience of 1,661 identifiable and unidentifiable bone fragments, not including fish scales. By comparison, Parmalee (1960) used 1,560 identifiable bone fragments from the entire Barrett collection.

Because the number of faunal remains with provenience is only a portion of the total remains excavated, the selection criteria for the sample is designed to incorporate as great a number as possible. All non-modified bone

coming from features are included. These are considered to represent the localized activity of site inhabitants unless otherwise noted. There are 30 features with trace-able provenience, yielding a combined total of 1,661 animal bones.

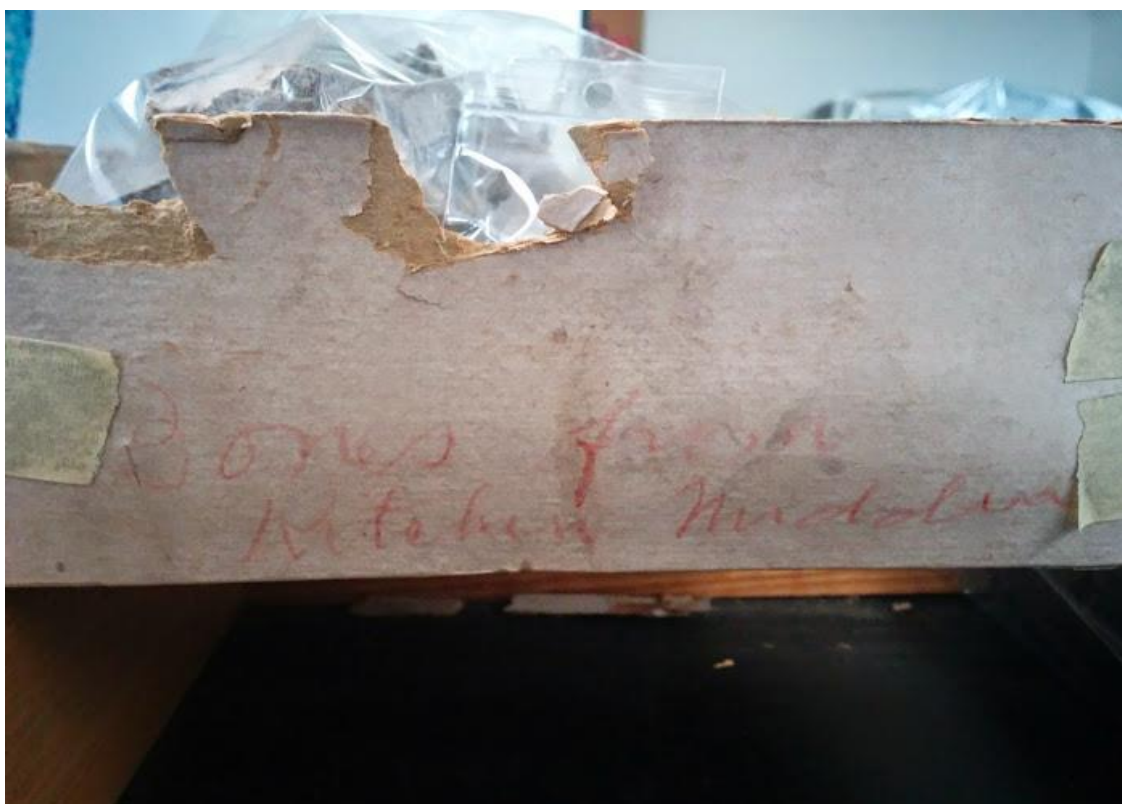


Figure 5.3. Catalog number 26875 with the label: "Bones from Kitchen Midden".

Tracing Features to Locations on Barrett's Plan Map

Barrett drew detailed plan maps of his Aztalan excavations for his 1933 monograph, *Ancient Aztalan*. These include a view of the site divided into 21 sections, as well as individual maps of each section. On the individual section maps are drawings of his excavation area, numbered features, hearths, burials, stockade lines and numerous other details.

Since I was provided with section and feature numbers, I was able to go to the corresponding section map, and highlight the features for which I had found catalogued faunal remains. When I finished, there was a pattern of two distinct clusters of features with faunal remains. Each cluster was in the domestic habitation area along the Crawfish River. However, one cluster was located at the south end in Section II while the other cluster was located at the north end in Sections IV, V and V-A (Figure 5.4).

Identification of Faunal Remains

I identified faunal remains using zooarchaeological reference books (Olsen 1964; Gilbert 1990) and the comparative specimen collection at the University of Wisconsin-Milwaukee. In addition, I consulted Dr. Jean Hudson for particularly difficult identifications and to verify specimens had been identified correctly. Bones that were less than $\frac{1}{4}$ inch in diameter were weighed and sorted through for small, classifiable elements but otherwise not counted or sorted by taxon, since such identifications would be tenuous at best. Since the collection was not screened, this was a rare occurrence (0.42g in one feature). Erring on the side of caution due to lack of a screen, only those bone fragments that were well under $\frac{1}{4}$ inch were weighed and left unidentified. Bones were sorted to the species level; if this was not possible they were sorted to a family level, or simply to class. When there was a strong resemblance to a species but not enough landmarks present to

confidently classify the bone, I used the qualifier “cf” from the Latin *confere* (Reitz and Wing 2008:36).

Class-level identifications constitute the majority of identifications in the sample. In some cases these are broken into size categories. For example, in addition to fish, bird, large bird (larger than Canada goose), reptile and amphibian, there were three divisions of the mammal class by size to reflect the large amount of diversity. The large mammal category is most likely to contain members of the family Cervidae and most especially in that family, whitetail deer. Medium mammals represent those species smaller than a whitetail deer but larger than a rabbit. Dogs, raccoons and beavers would all be in this category. Finally, small mammals are those that are rabbit size or smaller. There were no small mammals in Barrett’s collection. If a bone was too fragmented to size, it was simply labeled “mammal”. The category fish represents only the bony fishes (Osteichthyes).

Quantification of Faunal Remains

I recorded faunal remains by number of identified specimens (NISP) and weight. In the case of whitetail deer, I further refined the counts by minimum number of elements (MNE) and Lyman's (1994) modified food utility index values.

The NISP is broadly used as a quantification measure due to its straightforwardness. As a technique it uses untransformed raw data and is a simple count of specimens found at a site. This allows for ease of statistical analysis and comparison to other data sets, although it is critical that it be viewed as a measure of bone and not individual animals. As a comparative tool, the NISP works best when it is being used for similar classes of animals. Drawbacks occur when potential numbers of identifiable elements between species or classes vary widely. For example, fish and mammal bones each preserve differently and are subject to different types of cultural and natural breakage during deposition processes. Species with readily identifiable elements, such as teeth, are more likely to be represented in counts than those without. These factors can all affect how strongly one species will show at a site compared to another (Reitz and Wing 1999).

I recorded measurements for bone weight in grams. While it should not be taken as a direct stand-in, weight is a good general estimate of the dietary ranking of animals. Economic importance does not always

adequately translate to high numerical values for bones present at a site (Uerpmann 1973). For example, fish have many more bones compared to mammals. However, mammal bones weigh more. Bone weight is shown to correlate positively with meat weight and as such is important to consider when analyzing animal bone assemblages (Uerpmann 1973, Hudson 1990).

Bone weight is also preferable to MNI-based estimates of whole animal meat weight. This is because it takes into account cultural factors such as long-distance transport or exchange that might distribute parts of the animal outside or among inhabitants of the site (Reitz and Wing 1999). Criticisms of using bone mass to proxy for meat weight generally cite different taphonomical factors affecting bone weight at different parts of a site, or differences between classes of animals (e.g. bird and mammal bones) (Chaplin 1971). However, the general consensus is that while no method is without flaws, bone weight is an adequate measurement when used in conjunction with other methods for estimating economic/dietary importance of different species (Reitz and Wing 1999; Uerpmann 1973; Hudson 1990). In particular, bone weight is to be used in determining dietary ratios and not for general species ratios (Chaplin 1971).

The minimum number of whitetail deer elements (MNE) was calculated after Lyman's (1994:510) definition: "the minimum number of skeletal elements necessary to account for the specimens observed." Bones were sided, checked for refits and overlapping features. For example, if a

feature had two left innominate fragments, one with an acetabulum and one part of the ilium, there would be an MNE of one since the two specimens potentially could have come from the same element. In appropriate cases, age of individual also helped to determine MNE.

An adapted version of Binford's (Lyman 1994:Table 7.1) modified general utility index (MGUI) was used to determine economic value of whitetail deer elements. I modified the index to combine proximal and distal metatarsals and metacarpals into one category. I did this by taking the average of the four values. Elements with MGUI values less than 20.00 were considered low utility, those between 20.01 and 40.00 were medium utility while those greater than or equal to 40.01 were considered high utility elements (Table 6.17). Utility was defined on a scale based on the amount of meat, marrow and grease per unit of time it takes to access it. Femurs have the highest utility for cervids such as caribou and whitetail deer. The lowest utility would be those bones that have little food use and do not usually accompany high utility bones in butchering units.

Determining Feature Types

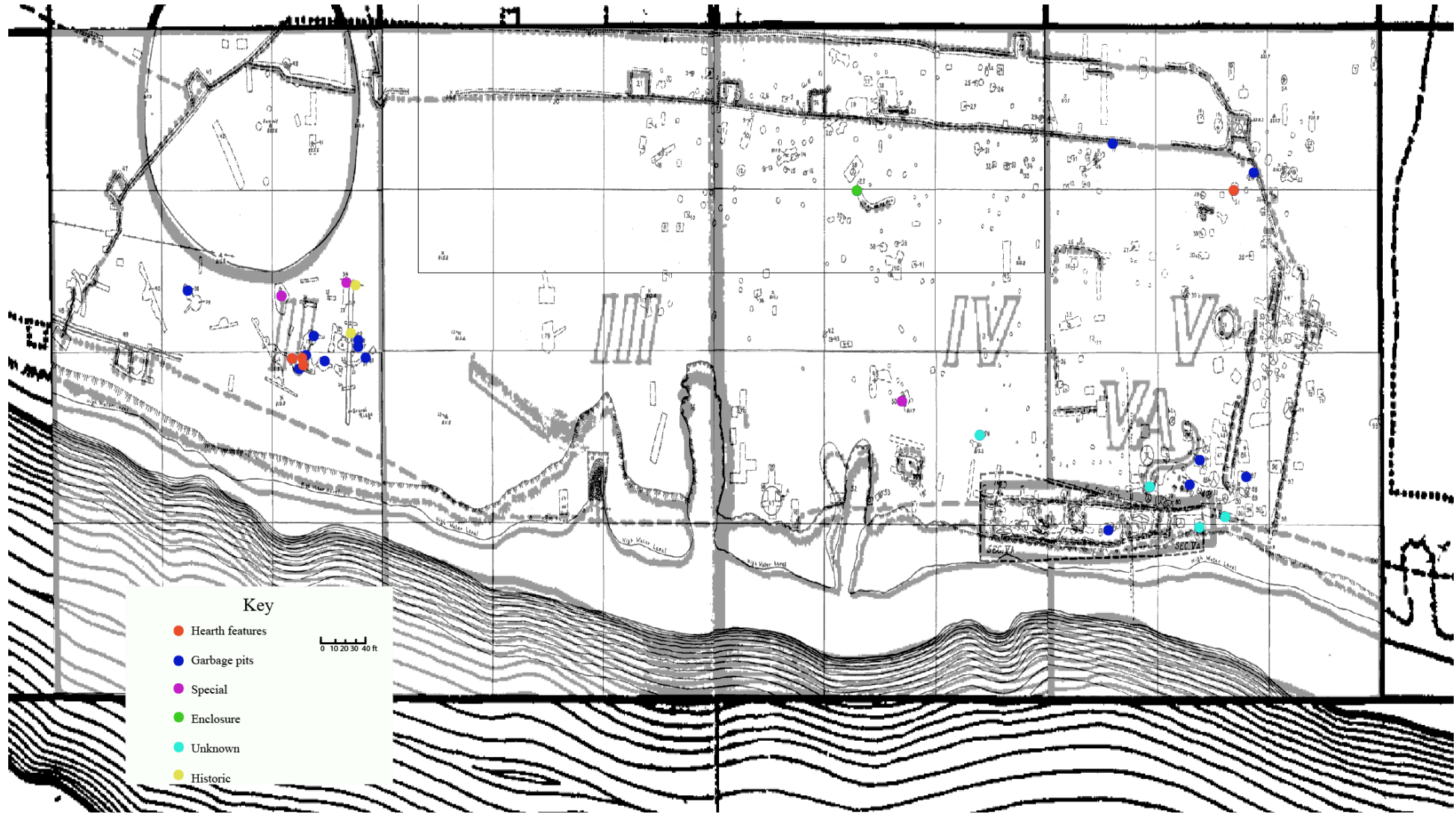
In order to determine if there were differences in faunal remains due to depositional processes, I had to compare different types of features. Using Barrett's descriptions of the features he excavated, I grouped them into six categories: enclosure, refuse pit, hearth, midden, special and

unknown (Figure 5.5).

The enclosure was in Section IV, Feature 23. Based on the fact that there have been no reports of a third inner stockade, and that it is in the middle of a habitation area, I designated it as an enclosure. Enclosure here is meant as a general term for enclosed structure. This could be a house or other building.

Refuse pits were what Barrett termed refuse pits. These were used for the disposal of general refuse, but were small and probably of a single-household scale. I designated hearths those features that Barrett termed a fireplace, or hearth. Midden features were those that were labeled “kitchen midden” (Figure 5.3). This was what Barrett termed the main riverbank midden that extends from the south to the north end of the site (J. Richards, personal communication 11/21/2014). However, because the catalog lists the provenience as “V-A” the location can be isolated to just that section. These and any other features that could not be traced to a specific point were not mapped. Special features were those that exhibited some sort of ritual activity, or were otherwise out of the ordinary. Burials, large amounts of prestigious artifacts or both burials and prestige goods determined whether a feature was out of the ordinary.

Figure 5.5. Locations of different features by type (please see supplemental file for greater detail) (Adapted from



Barrett 1933).

Analyzing the Dataset

Once the bones were quantified, I organized them in an Excel spreadsheet. This allowed me to categorize them based on feature, section, class, and species, among others. I then put this information into contingency tables based upon the comparisons I wanted to make. I used R statistics software to conduct chi square tests to determine if the counts were significantly different from each other. I further refined the results by looking at Haberman residuals to determine exactly which categories were higher or lower than what would be expected if there were no significant differences between them. Any residuals greater than the absolute value of ± 1.96 are significant at a 95% confidence level. Residuals greater than the absolute value of ± 2.58 are significant at a 98% confidence level (Durrheim and Tredoux 2013).

Comparisons using chi square and Haberman residuals were as follows:

1. The north and south faunal assemblages to determine differences between them.
2. The north and south faunal remains without potential distribution skewing outliers
3. A midden feature in the north section with Warwick's ravine midden. This was to determine how similar the two were.

4. The differences between feature types to determine whether types of deposition affected composition.
5. Differences between historic features and likely prehistoric features to determine whether the assemblage was similar to historic deposits.
6. And finally whitetail deer utility between the north and the south features to determine any differences of consumption between the two or possible butchering areas.

Summary

Taking an old collection and using new methods to find meaningful results is likely to be more and more common in the future of archaeological research. This is not only because excavation changes the inherent structure of a site, eventually erasing it after enough subsurface intrusion. It also means that as new data techniques become available, we can refine our interpretations of what we already know. The cataloging techniques and detailed recording in Barrett's monograph have allowed me to mine new information about Aztalan using a spatial type of analysis. I was able to use define features and locate them on Barrett's map. This allowed for a statistical comparison between the grouping of features at the north and south ends of the domestic enclosure.

CHAPTER 6: RESULTS

Animal Remains in Barrett's North and South Sections

The following are the results of the analysis of the remains in the northern sections of Barrett's excavation (IV, V, and V-a) compared to the southern section (II). Remains are first compared by NISP (Table 6.1), then by weight. All are class level comparisons. Counts from historic features are excluded. Percentages of the totals were used because the two areas had dissimilar sample sizes (Table 6.2). Results are visualized in Figure 6.1.

Percentages were calculated within the section. For example, because the total number of fish remains were 209 in the south section, they made up 22% of the total faunal remains in that section. Fish scales were excluded from the counts. There were 60 gar scales (ganoid) and four ctenoid scales in Feature 12, Section II. There were 0.74g of ctenoid scales (with 3 scales = 0.01g) in Feature 15, Section II. Including these would have inflated the counts for fish overall, while not including them would have negligible effect on the total counts since they likely represent only 3 individuals. Unless otherwise noted, they are excluded from all counts.

Large mammal remains are for the most part whitetail deer with the occasional elk or possible bison. This category made up the majority of animal remains for both sections. However, the northern section seems to have a larger proportion of large mammal remains at 45% of the total, than the southern section with 27%. Reptiles, more common in the southern area,

were all turtles. The southern section also had a much larger percentage of fish and medium mammal remains (22% and 19%, respectively) than the northern section (7% and 4%, respectively). Using the statistics program R, a chi-square test ($\chi^2 = 237.9787$, $df = 8$, $p\text{-value} < 2.2e-16$) and Haberman residuals (Table 6.3) indicate these results are significant.

**Table 6.1: Animal Remains by NISP
(Fish scales excluded)**

	South	North	Total
Fish	209	45	254
Reptile	37	8	45
Bird	14	25	39
Lg Bird	8	9	17
Mammal	154	210	364
Med mammal	180	27	207
Med-Lg Mammal	5	6	11
Lg Mammal	249	292	541
UNID	78	23	101
Total	934	645	1579

**Table 6.2: Percentage Animal Remains by NISP
(Fish scales excluded)**

	South % NISP	North % NISP
Fish	22%	7%
Reptile	4%	1%
Bird	1%	4%
Lg Bird	1%	1%
Mammal	16%	33%
Med Mammal	19%	4%
Med-Lg Mammal	1%	1%
Lg Mammal	27%	45%
UNID	8%	4%

Percentage of Faunal Remains in North and South Sections

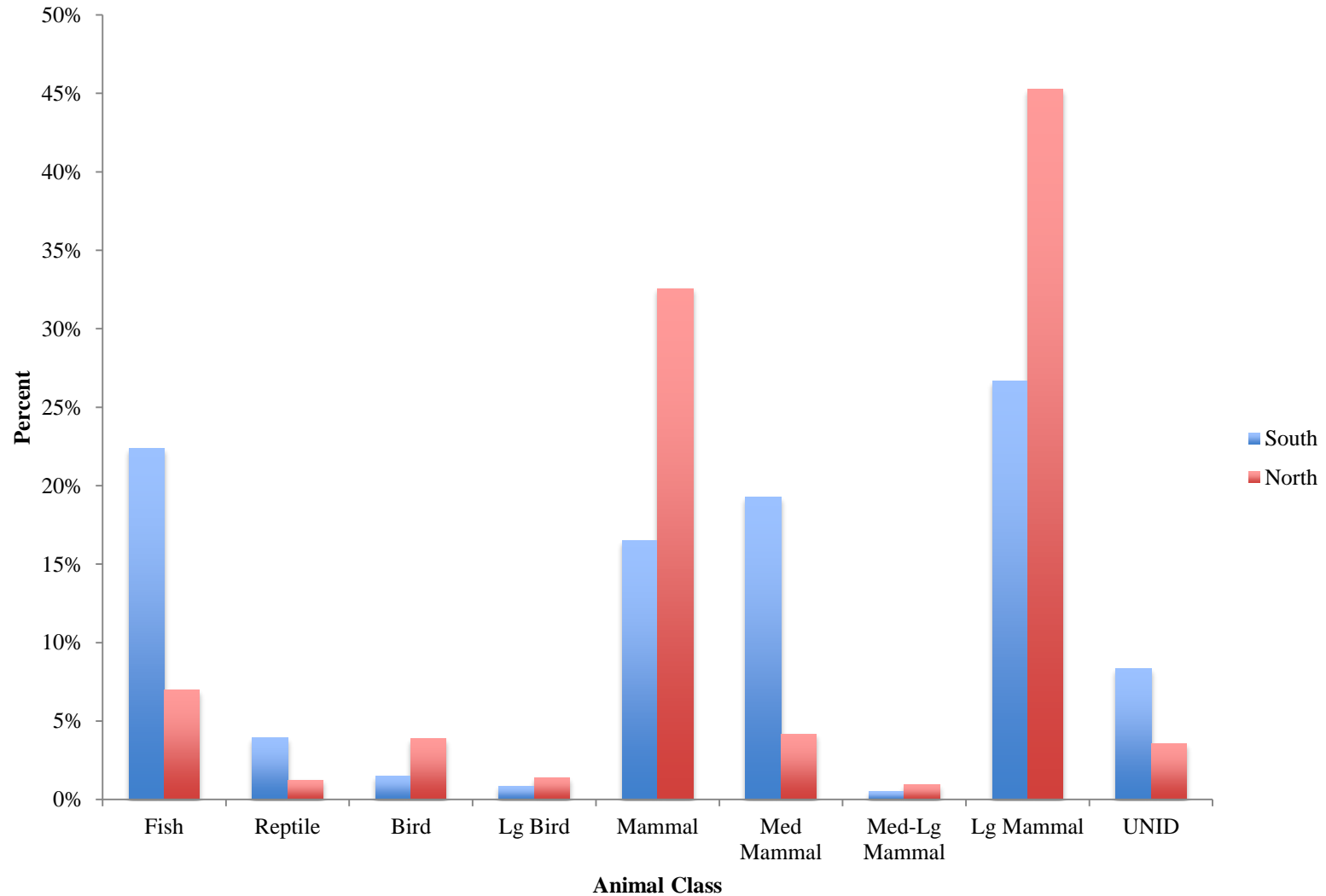


Figure 6.1: Percentage of Faunal Remains in the South and North Sections.

Table 6.3 Haberman Residuals as Calculated in R for North and South Sections

(Results over +/- 1.96 are significantly higher or lower than expected and are highlighted)

	South	North
Fish	8.19	-8.19
Reptile	3.19	-3.19
Bird	-2.99	2.99
Lg Bird	-1.02	1.02
Mammal	-7.45	7.45
Med Mammal	8.73	-8.73
Med-Lg Mammal	-0.93	0.93
Lg Mammal	-7.66	7.66
UNID	3.82	-3.82

On the northern part of the site, Barrett recorded Feature 32 in Section V-A as being part of the riverbank midden. In addition, the MPM had stored catalog numbers 26875 and 26870 in what looked like their original boxes. These boxes were labeled “kitchen midden”. It is possible then that the above results are not entirely representative of two discrete areas of the site, since midden deposits are an accumulation of refuse from a general area. On the southern section of the site, the medium mammal count contains one definite dog burial. This individual adds 14 bones to the NISP; if one assumes that the other medium mammal bones such as rib fragments or phalanges in the feature belong to the dog as well, then the total becomes 95. This is over half of the total NISP count for medium mammals (N=180) in the southern section. Results (Table 6.4, Table 6.5, and Table 6.6) without these potentially inflating feature counts show that there are still statistically

significant differences between the two areas. There are fewer differences than with the midden and burial components, however, notably there are more fish than expected in the southern section, and more bird and large bird remains than expected in the northern section. Large-medium mammal remains are also higher than expected for the northern section.

**Table 6.4: Total NISP without Dog Burial and Midden Remains
(Fish scales excluded)**

	South	North	Total
Fish	209	29	238
Reptile	37	8	45
Bird	14	16	30
Lg Bird	8	9	17
Mammal	154	39	193
Med Mammal	85	22	107
Med-Lg Mammal	5	6	11
Lg Mammal	249	72	321
UNID	78	21	99
Total	839	222	1061

**Table 6.5: Percentage Animal Remains without Dog Burial and
Midden
(Fish scales excluded)**

	South	North
Fish	25%	13%
Reptile	4%	4%
Bird	2%	7%
Lg Bird	1%	4%
Mammal	18%	18%
Med Mammal	10%	10%
Med-Lg Mammal	1%	3%
Lg Mammal	30%	32%
UNID	9%	9%

Table 6.6: Revised Haberman Residuals as Calculated in R without Midden and Dog Burial
(Results over +/- 1.96 are significantly higher or lower than expected and are highlighted)

	South	North
Fish	3.76	- 3.76
Reptile	0.53	- 0.53
Bird	- 4.43	4.43
Lg Bird	- 3.27	3.27
Mammal	0.27	- 0.27
Med Mammal	0.10	- 0.10
Med-Lg Mammal	- 2.76	2.76
Lg. Mammal	- 0.79	0.79
UNID	- 0.07	0.07

The kitchen midden was further compared to the known midden deposits analyzed by Warwick (2002) to determine whether the two are similar. “Kitchen midden” could have been an arbitrary term given by Barrett to a particularly rich feature deposit without further documentation. More evidence was needed to be able to justify excluding such a large amount of bone from the northern sample. A chi square test ($\chi = 165.941$, degrees of freedom = 6, p-value = $< 2.2e-16$) indicated there was a large difference between the kitchen midden and Warwick’s (2002) coarse mesh (Table 6.7, Table 6.8). Haberman residuals further confirmed this (Table 6.9). Only the coarse mesh data was used since it is a closer approximation of Barrett’s grab sample technique. There were large differences between the coarse mesh sample, and the grab sample from Barrett’s kitchen midden. The kitchen midden contained much more mammal than expected and much less of everything else. Categories were compressed to reflect Warwick’s four class

categories of “mammal”, “fish”, “reptile” and “bird”. There was no unidentifiable category with Warwick’s data, so zeros were used as placeholders in that row.

Table 6.7 Comparison of Known Midden Deposits (Warwick 2002) with Barrett’s Kitchen Midden

	Strata 5 (coarse)	Strata 11 (coarse)	Kitchen Midden
Mammal	265	1098	396
Bird	60	172	9
Fish	113	251	16
Reptile	8	77	0
UNID			2
Total	446	1598	423

Table 6.8 Percentage of Animal Classes in Midden Deposit Comparisons

	Strata 5 (coarse)	Strata 11 (coarse)	Kitchen Midden
Mammal	59%	69%	94%
Bird	13%	11%	2%
Fish	25%	16%	4%
Reptile	2%	5%	0%
UNID	0%	0%	0%

Table 6.9 Haberman Residuals of Midden Deposit Comparisons
(Results over +/- 1.96 are significantly higher or lower than expected and are highlighted)

	Strata 5 (coarse)	Strata 11 (coarse)	Kitchen Midden
Mammal	-6.16	-3.95	11.31
Bird	2.88	2.24	-5.79
Fish	6.41	0.54	-7.24
Reptile	-2.11	5.06	-4.26

Differences Between Features

I divided faunal remains into 6 categories based on Barrett's site report: an enclosure, refuse pits, hearths, midden deposits, special features, as well as for the unknown features. I then compared animal remains by NISP and class level (Table 6.10), and calculated the percentages for each of the categories due to differing sample sizes (Table 6.11). These were then compared via chi square analysis in the program R, and further refined with Haberman residuals to see which differences were significant between the feature types (Table 6.12). Chi square results show significant differences between features ($\chi = 1651.846$, degrees of freedom = 40, p-value is $< 2.2e-16$).

Each feature type seemed to have a majority of one type of animal class in the assemblage (Figure 6.2). Hearth features had by far the most fish of any of the features with 85% of the assemblage. The enclosure had the highest percentage of large bird remains (36%). The most significant source of mammal and large mammal remains were, unsurprisingly, the midden

features. The special features, which included the dog burial, had higher than expected medium mammal remains, as well as the highest significant percentage of reptile remains. Large mammals were well represented across all features with the exception of hearth features, where they were significantly under-represented.

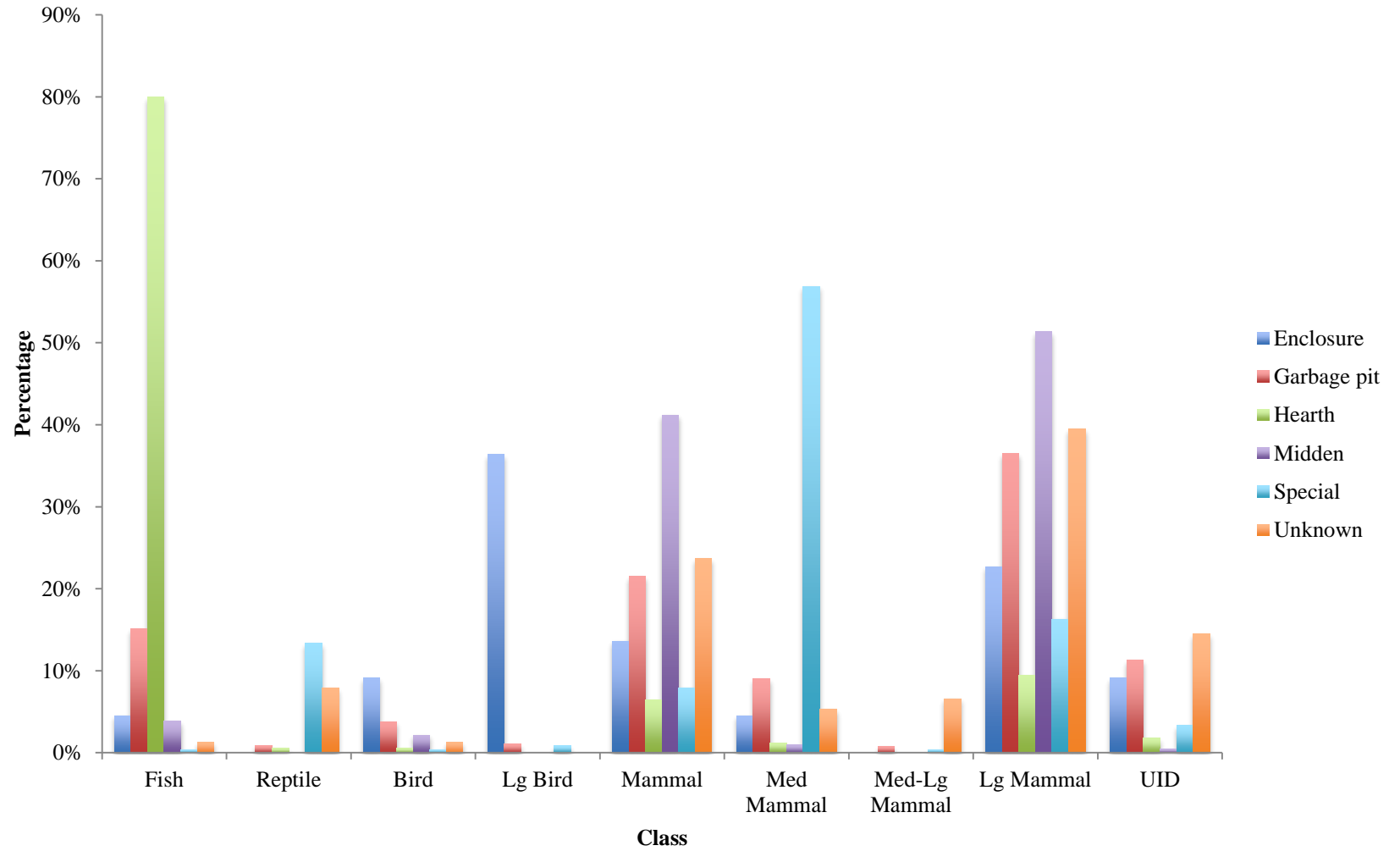
**Table 6.10: NISP by Feature
(Fish scales excluded)**

	Enclosure	Refuse Pit	Hearth	Midden	Special	Unknown
Fish	1	99	136	16	1	1
Reptile	0	6	1	0	32	6
Bird	2	25	1	9	1	1
Lg Bird	8	7	0	0	2	0
Mammal	3	141	11	171	19	18
Med Mammal	1	59	2	4	136	4
Med-Lg Mammal	0	5	0	0	1	5
Lg Mammal	5	239	16	213	39	30
UNID	2	74	3	2	8	11
Total	22	655	234	415	239	76

Table 6.11: Percent NISP by Feature

	Enclosure	Refuse Pit	Hearth	Midden	Special	Unknown
Fish	5%	15%	80%	4%	0%	1%
Reptile	0%	1%	0%	0%	13%	8%
Bird	9%	4%	0%	2%	0%	1%
Lg Bird	36%	1%	0%	0%	1%	0%
Mammal	14%	22%	5%	41%	8%	24%
Med Mammal	5%	9%	1%	1%	57%	5%
Med-Lg Mammal	0%	1%	0%	0%	0%	7%
Lg Mammal	23%	36%	9%	51%	16%	39%
UNID	9%	11%	2%	0%	3%	14%
Total	100%	100%	100%	100%	100%	100%

NISP of Animal Remains by Feature Type



Feature 6.2: NISP of Faunal Remains by Feature Type

Table 6.12 Haberman Residuals For Faunal Remains by Feature Type as Calculated in R
 (Results over +/- 1.96 are significantly higher or lower than expected and are highlighted)

	Enclosure	Refuse Pit	Hearth	Midden	Special	Unknown
Fish	-1.5	-1.00	23.9	-7.96	-7.01	-3.61
Reptile	-0.81	-3.93	-1.89	-4.09	10.89	2.69
Bird	2.00	2.86	-1.68	-0.49	-2.16	-0.67
Lg Bird	16.09	-0.05	-1.45	-2.49	-0.33	-0.94
Mammal Med	-1.07	-1.3	-5.46	10.16	-5.77	0.11
Mammal Med-Lg	-1.2	-4.11	-4.89	-8.57	22.41	-2.08
Mammal Lg	-0.4	0.25	-1.16	-2.00	-0.52	6.29
Mammal	-1.12	1.80	-7.16	8.72	-7.36	1.04
UNID	0.52	6.75	-2.61	-5.73	-1.94	2.96

Differences between known Historic Features and the North and South Sections

Faunal remains in Barrett's north and south sections (with all features included) were compared to faunal remains from known historic features. Hudson's (2004) zooarchaeology class identified approximately 570 faunal elements from Barrett's Feature 29, in Section II. I combined these with my identifications from Feature 29, as well as Feature 33 in Section II to come up with the total historic sample. The number of historic features at the site is small (N=4), so to have only two features is not unrepresentative of the whole (Table 6.13 and 6.14).

A chi square test of the three categories shows that the sample sizes differ from expected values ($\chi^2 = 424.0655$, $df = 10$, $p\text{-value} = < 2.2e-16$). Haberman residuals show that the historic features have much less mammal remains than expected and significantly more fish. The northern section is the most different from the historic features with more mammals and less fish than expected (Table 6.15). The southern features do not differ considerably from either of the two categories when the northern section is included.

In addition, the southern section was tested against the historic features without the northern section (Table 6.16). Because the historic occupation was in the same location as the southern features, it was necessary to see if the two samples were similar without the northern sample interfering. Even so, the sample from the southern features showed

significantly more mammal and reptile remains than the historic features.

The historic features had considerably more fish than the southern sample.

Table 6.13: NISP Comparison of North and South Sections with Historic Features

	Historic	South	North
Mammal	197	588	535
Bird	8	22	34
Fish	248	209	45
Reptile	5	37	8
Amphibian	1	0	0
UNID	121	78	23
Total	580	934	645

Table 6.14: Percentage of NISP of North and South Sections with Historic Features

	Historic	South	North
Mammal	34%	63%	83%
Bird	1%	2%	5%
Fish	43%	22%	7%
Reptile	1%	4%	1%
Amphibian	0%	0%	0%
UNID	21%	8%	4%

Table 6.15: Haberman Residuals of Historic Comparison with North and South Section

(Results over +/- 1.96 are significantly higher or lower than expected and are highlighted)

	Historic	South	North
Mammal	-15.70	1.51	13.57
Bird	-2.63	-1.46	4.13
Fish	13.00	-0.84	-11.68
Reptile	-2.72	4.44	-2.17
Amphibian	1.65	-0.87	-0.65
UNID	9.81	-2.58	-6.71

Table 6.16: Haberman Residuals of Historic Comparison with South Section

(Results over +/- 1.96 are significantly higher or lower than expected and are highlighted)

	Historic	South
Mammal	-10.97	10.97
Bird	-1.32	1.32
Fish	8.40	-8.40
Reptile	-3.57	3.57
Amphibian	1.26	-1.26
UNID	7.00	-7.00

White-tailed Deer Remains and Utility in the North and South Sections

White-tailed deer were a staple food animal for Aztalan inhabitants. To gain insights into butchering and hunting practices, as well as possible food provisioning, food utility for white-tailed deer elements was compared between the north and south sections (Table 6.17). Three categories – high,

medium, and low – were used to make comparisons. Using Lyman's (1994) modified food utility index, values were assigned to different elements.

Although Lyman gives separate values for proximal and distal metacarpals and metatarsals, I averaged the four values to give an MGUI for a single category, metacarpal/tarsal. Elements with a value of less than 20.00 were assigned a low utility. Values from 20.01 to 40.00 were assigned a medium utility. Any value greater than or equal to 40.01 was given high utility.

The total NISP of deer elements was N=240, with N=95 in the south and N=145 in the north. Each of the two areas of the site had relatively equal proportions of high and low utility elements (Figure 6.3, Table 6.18). There were no types of elements that were greater or less than expected (Table 6.19), and a chi-square test shows that there are no significant differences between the two areas of the site ($\chi = 0.1563$, $df = 2$, $p\text{-value} = 0.9248$). Counts by feature also showed relatively equal proportions of high, low and medium utility (Table 6.20, Table 6.21).

Table 6.17: MNE and MGUI* of Whitetail Deer

	MNE		MGUI*	Utility Ranking
	South	North		
antler	0	0	1.02	Low
skull	3	1	8.74	Low
mandible w/out tongue	10	4	30.26	Med
atlas	2	0	9.79	Low
axis	0	1	9.79	Low
cervical	0	0	35.71	Med
thoracic	0	0	45.53	High
lumbar	0	0	32.05	Med
rib	0	10	49.77	High
sternum	0	3	64.13	High
scapula	9	9	43.47	High
P humerus	0	2	43.47	High
D humerus	3	7	36.52	Med
P radio-ulna	5	5	26.64	Med
D radio-ulna	1	1	22.23	Med
carpals	2	2	15.53	Low
metacarpal/metatarsal	7	4	19.14	Low
innominate	10	9	47.89	High
P femur	1	3	100.00	High
D femur	0	2	100.00	High
P tibia	1	1	64.73	High
D tibia	4	2	47.09	High
astragalus	3	9	31.66	Med
calcaneus	2	9	31.66	Med
1st phalanx	0	6	13.72	Low
2nd phalanx	2	6	13.72	Low
3rd phalanx	3	7	13.72	Low
Total	68	103		

***Modified from Lyman 1994:Table 7.1**

Whitetail Deer Utility in South and North Sections

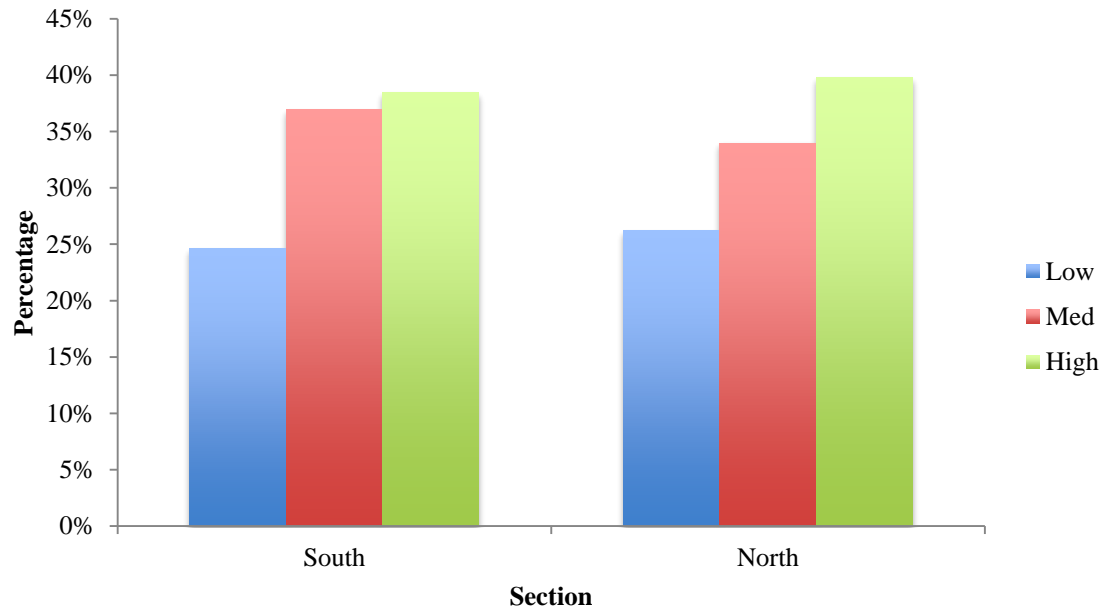


Figure 6.3: Percentage of Low, Medium and High Utility Elements in the South and North Sections of the Site

Table 6.18: Percentage of Low, Medium and High Utility Whitetail Deer Elements in the South and North Sections of the Site

	South	North
Low	25%	26%
Med	37%	34%
High	38%	40%

Table 6.19: Haberman Residuals of Whitetail Deer Utility
(Results over +/- 1.96 are significantly higher or lower than expected and are highlighted)

	South	North
Low	-0.23	0.23
Med	0.39	-0.39
High	-0.17	0.17

Feature counts were too low to compare statistically (Table 6.20, Table 6.21, Figure 6.4). Some features had only one white-tailed deer specimen. Percentages, then, are misleading. The results are varied and show no obvious pattern. For example, in Section II, Feature 34 and Feature 37 were both characterized as special features (Appendix A). Feature 34 has a majority of high utility white-tailed deer bones, while Feature 37 has none. The kitchen midden feature in Section V-A has an almost equal proportion of all three categories. Feature 23 in Section IV is the enclosure feature and has only two high utility elements. Features 15, 18, 27 and 28 in Section II were all refuse pit features, and all had a large proportion of low-utility bones. Feature 28, another refuse pit, had a large proportion of high utility bones. Such a small sample size is most likely inconclusive and more research with greater numbers of remains will need to be done to ascertain whether feature type has an effect on utility values of white-tailed deer remains.

Faunal Remains by Weight in the North and South Sections

Weight of bones is an accepted, although more ordinal than direct, proxy of meat weight (Hudson 1991, Uerpmann 1973). Weight in grams was compared between animal classes in the north and south sections (Table 6.22, Table 6.23, Table 6.4 and Figure 6.5). Unsurprisingly, large mammals contributed by far the most bone weight to the sample with 73% of the total

weight in the north section and 58% of the total weight in the south section. Differences between the two areas mirrored differences with the NISP (Table 6.1, Table 6.2, Table 6.3 and Figure 6.1). The north had significantly more large mammal and mammal remains than the south, while there were significantly more fish, reptile, and medium mammal remains in the southern portion of the site. The dog burial most likely contains the majority of weight for medium mammal counts, and is likely skewing the medium mammal numbers for the southern section, as was the case for the NISP data.

This information clearly shows a preference for mammals in the diet, especially large mammals. However, fish and reptiles both make statistically significant appearances in the southern section, indicating that they were at least an important supplement to large mammals for the people living there.

Table 6.20: Whitetail Deer Utility by Section and Feature
Sections are recorded in Roman numerals, features in Arabic.

	II,7	II,15	II,18	II,27	II,28	II,34	II,37	IV,23	IV,50	V,78	V,81	V,87	V-A, 32	V-A, K. M.
Low	1	5	6	2	12	1	2	0	6	0	0	0	4	21
Med	1	2	3	0	7	0	1	0	4	3	1	1	1	21
High	0	3	2	0	14	6	0	2	2	0	2	1	1	23
Total	2	10	11	2	33	7	3	2	12	3	3	2	6	65

Percentage Whitetail Deer Utility by Feature

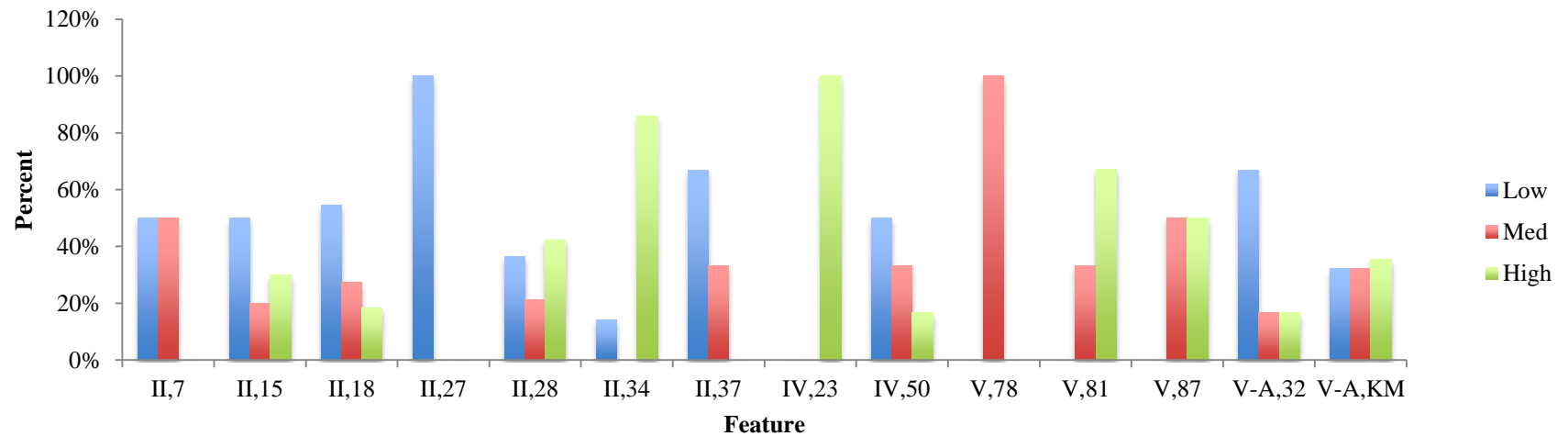


Figure 6.4: Percentage of Whitetail Deer Utility By Feature

Table 6.21: Percentage Whitetail Deer Utility by Section and Feature
 Sections are recorded in Roman numerals, features in Arabic.

	II,7	II,15	II,18	II,27	II,28,	II,34	II,37	IV,23	IV,50	V,78	V,81	V,87	V-A, V-A, 32	V-A, K.M.
Low	50%	50%	55%	100%	36%	14%	67%	0%	50%	0%	0%	0%	67%	32%
Med	50%	20%	27%	0%	21%	0%	33%	0%	33%	100%	33%	50%	17%	32%
High	0%	30%	18%	0%	42%	86%	0%	100%	17%	0%	67%	50%	17%	35%

Percentage Faunal Remains by Weight(g) in South and North Sections

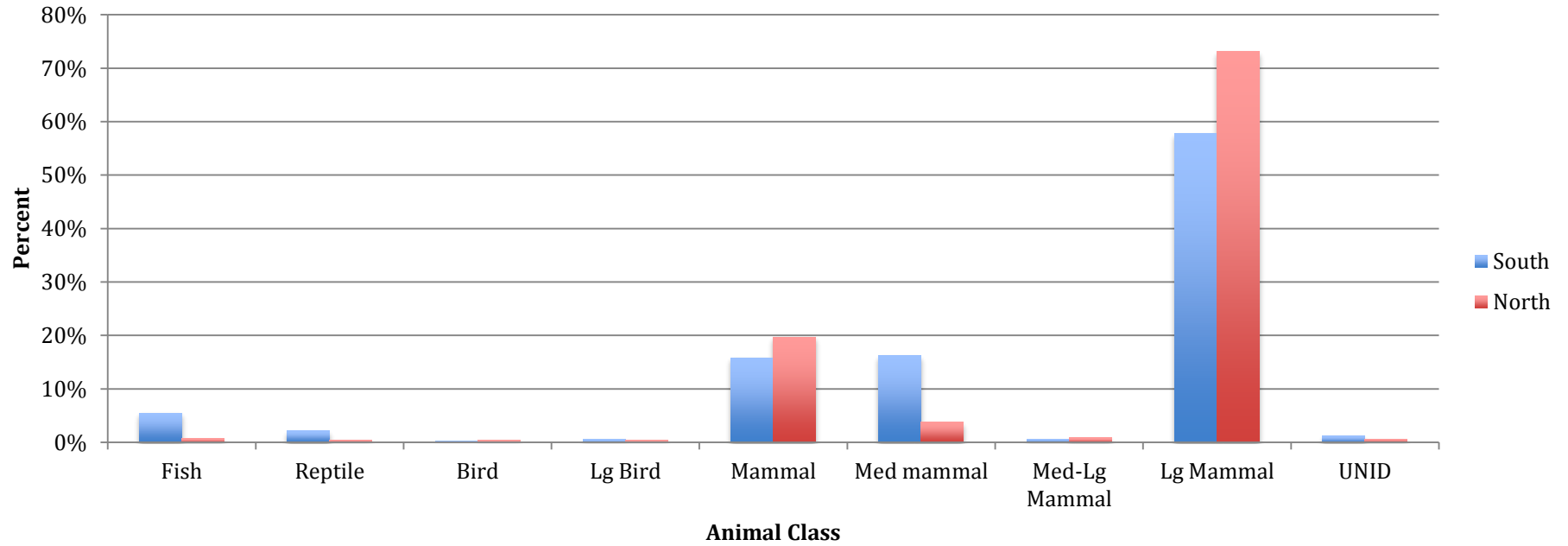


Figure 6.5: Percentage of Faunal Remains by Weight (g) in South and North Sections

Table 6.22: Faunal Remains by Weight (g) in South and North Sections

	South	North
Fish	306.01	37.42
Reptile	122.07	22.91
Bird	11.22	19.47
Lg Bird	28.13	17.50
Mammal	884.72	983.58
Med mammal	904.85	184.86
Med-Lg Mammal	35.41	41.76
Lg Mammal	3234.22	3644.26
UNID	66.24	31.94
Total	5592.87	4983.70

Table 6.23: Percent Faunal Remains by Weight (g) in South and North Sections

	South	North
Fish	5%	1%
Reptile	2%	0%
Bird	0%	0%
Lg Bird	1%	0%
Mammal	16%	20%
Med mammal	16%	4%
Med-Lg Mammal	1%	1%
Lg Mammal	58%	73%
UNID	1%	1%

Table 6.24: Haberman Residuals of Faunal Remains by Weight (g) in South and North Sections

(Results over +/- 1.96 are significantly higher or lower than expected and are highlighted)

Fish	13.67	-13.67
Reptile	7.61	-7.61
Bird	-1.81	1.81
Lg Bird	1.19	-1.19
Mammal	-5.27	5.27
Med mammal	21.06	-21.06
Med-Lg Mammal	-1.24	1.24
Lg Mammal	-16.47	16.47
UNID	2.91	-2.91

Conclusions

There are large differences between the class composition of faunal remains at the north and south ends of the site. Numbers of large mammal and large bird remains are significantly higher in the northern section, while medium mammals and fish are significantly more represented in the southern section. Bone weight also mirrors this.

Feature composition varies significantly by the type of feature. Hearth features have greater than expected amounts of fish remains, special features have greater than expected medium mammal remains, and the enclosure had greater than expected large bird remains. The midden was more likely to contain mammal and large mammal remains. Historic features contained more fish and less mammal remains.

There were no significant differences between whitetail deer element utility in the northern and southern sections of the site.

CHAPTER 7: DISCUSSION

This thesis evaluates spatial patterning in faunal remains within the domestic area of Aztalan. In Chapter 1 I outlined five specific questions. The first was whether a sample from the northern part of the domestic area differed from a sample from the southern part. The second was whether animal remains could be associated with ritual activity at the site. A third was whether faunal composition correlated with feature function; six functional categories were used: enclosure, refuse pit, hearth, midden, special/ritual and unknown. A fourth question concerned temporal variation among those features and midden areas that could be dated. The fifth question concerned use of white-tailed deer and whether body part distribution of this large and abundant animal provided evidence of status differences, ritual events at the site or logistical transport decisions by hunters.

These questions are significant because they focus on issues of difference and uniformity in cultural behaviors within the residential part of the site, and they rely on intra-site spatial analysis to do this. To date, there have been no wide-scale intra-site spatial analyses regarding faunal remains at Aztalan. Faunal assemblages are especially useful because they represent everyday behaviors such as eating and food procurement. In addition, because they often had symbolic values in as well as their utilitarian ones, animals can offer insights into the ritual activities at a site. The faunal

assemblage can be considered to represent everyday and ritual activities across the entire site.

It should be noted as a disclaimer here that this thesis is based on only two spatially discrete samples from the site. More spatial analyses will help to determine if the differences found here are representative of the entire site-wide faunal assemblage. These interpretations are speculations as to possible causes of the patterns found.

Differences in Faunal Remains by Section

Haberman residuals and chi square tests showed large, statistically significant differences between the northern features sample at Aztalan and the southern features sample. Specifically, there were more large mammals, birds and unidentified mammal remains in the north and many more fish, reptile and medium mammal remains in the south (Table 6.1, Table 6.2, Table 6.3 and Figure 6.1). This was partly due to three outliers: two midden-type features in section V-A (north) and a dog burial in Section II (south). However, when these three were removed from analysis, there were still significant differences. Unchanging were the greater than expected amounts of fish in the southern section, while without the large mammal outliers, greater than expected amounts of bird remains in the northern section became apparent (Table 6.4, Table 6.5, Table 6.6).

Because all of the site inhabitants had access to the same ecosystems surrounding Aztalan, intra-site variation is better explained by social rather

than environmental factors. That is to say, everyone living at the site would have been harvesting animals from the same river, the same forested uplands and any other environmental niches in proximity. If this were true, we would expect to see equal proportions of animal classes in the north and south of the site. This is not the case, so an ecological argument explaining these differences must be ruled out. In addition, deer body parts in both sections of the site reflect a pattern of bringing the entire carcass back to the site (Table 6.17, Table 6.18, Table 6.19, Figure 6.3). This indicates that people in both sections did not have to travel far for the deer they hunted, and probably were getting them from similar distances from the site.

Warwick (2003), looking at temporal patterns, found that fish, bird and small to medium mammal use slightly increased in the Mississippian-Late Woodland stratum compared to the earlier solely Late Woodland stratum, while reptile usage decreased (Warwick 2002). Therefore, an explanation that uses increased habitation in the southern section over time could account for the increased use of fish. We know that the northern section of the site was inhabited before the Mississippian occupation, as well as the plaza (Zych 2013). The influx of people from the American bottom would have necessitated more housing; perhaps this resulted in the expansion of the domestic area to the south. Different ethnic groups living in different areas of the site over time could have caused the differences we see in the assemblage. In addition to Warwick (2002), Hudson (2001) also found

increased use of fish over time. A diachronic explanation is a very plausible one, and should be further explored using other collections of faunal remains.

Social dietary differences are also a close fit with the results. In L. Kelly's (2000) dissertation looking at faunal remains in communities around Cahokia, she found that the outlying farmsteads relied most heavily on fish, waterfowl and smaller to medium mammals, the single mound centers relied on deer intermediately, while at Cahokia, deer remains were unusually high. Access to venison and one's social status seem to have had a positive relationship in Lohmann phase Cahokia (A.D. 1050 – A.D. 1100).

At Aztalan, we can see similar patterns. The northern end of the site contains a platform mound considered to be a sacred area, although not used for living space (Zych 2013). It stands to reason that those living near it would have held a higher status than other site inhabitants. If we were to consider that people living in the northern portion of the site had higher status than those living in the southern portion of the site, and higher status in Mississippian culture meant greater access to deer meat, the pattern of faunal remains would make sense. Those with lower status would have been more reliant on smaller, easier to access animals such as fish. Aztalan, however, cannot be used in a direct comparison with Cahokia or its outlying communities. Those inhabitants of the southern section still utilized deer for the majority of their animal diet. In addition, both the north and the south had similar proportions of high and low utility elements (Figure 6.3). It

seems the occurrence is unlike Cahokia in regards to food provisioning (Kelly 2000). If that were the case, the northern area should have a greater degree of high utility elements than the southern section as happened with the American Bottom hinterland communities compared to the main mound center.

Perhaps the patterns in the faunal assemblage can also be explained by integrative ritual between the two cultural groups living at the site, as has been posited to have happened at Cahokia (Alt 2012). The northeastern platform mound is presumed to be the site of ritual activities (Zych 2013). In addition, Richard's 2011 excavation and analysis of Feature 8, which was found in Barrett's section V-A, indicates a possible feasting or ritual episode (Picard 2013). Excavators found large amounts of copper, a nearly whole groundstone celt and dense floral remains including tobacco. Most interestingly, among the faunal assemblage of the feature were raptor, deer and canid remains.

The larger amounts of deer in the northern section could be explained by feasting events, instead of higher status. I only examined the animal bone; more research would be needed using multiple lines of evidence to determine features associated with feasting. The faunal remains as cataloged are not conclusive evidence.

Feasts have been argued to be have been integrative community builders and would have been important in a multicultural Cahokia

(Pauketat et al. 2002; Alt 2013). Ritual items containing trumpeter swan would have been important to a Cahokian-influenced community. If animals associated with ritual in Cahokia were found in the northern area of Aztalan, it reinforces the idea of ritual occurrences happening there. The 2011 Feature 8 described in Picard's thesis (2013) also reinforces the idea of integrative ritual, perhaps even one in which the site inhabitants blended their own belief systems. The raptor bones would have been important to those with knowledge of the Southeastern Ceremonial Complex ideology, while the canid bones could have been part of a local ideology that likely influenced later groups like the Ho Chunk.

This ties in with a larger body of research suggesting that Aztalan, like Cahokia, used rituals as a way to integrate different ethnic groups to form a cohesive community (Zych 2013; Alt 2012; Pauketat et al. 2002).

Feature Descriptions

Barrett (1933) describes each feature that he excavated in varying amounts of detail. Some features are accompanied by profile or detailed plan maps, which will be included in this section as well as a short description of the animal remains found. For a more detailed list of animal remains by feature, please see the Appendix A. For maps of feature types by section, please see Appendix B.

Enclosure

Feature 23 in Section IV was the enclosure feature. Enclosure is taken to mean any type of enclosed structure in the most general of terms.

Barrett describes it as:

“[a] line of post holes which is somewhat irregular, but which may be a portion of some sort of a building or enclosure or which may possibly be a portion of some sort of a further inner stockade. At the extreme southwestern edge of the trench at this point there was a pit containing a considerable quantity of shells.” (Barrett 1933:155)

Because it was located in the main habitation area at Aztalan, it is most likely that it was the remains of a house (J. Richards, personal communication 11/21/14). Animal remains found consisted of large mammals, deer, waterfowl, sternum fragments of an unidentifiable large bird and unidentifiable mammal fragments (Appendix).

Refuse Pits

Section II

Feature 14: Barrett found worked shell, fire blackened earth, ceramics, an articulated right arm, a right femur and other human remains, as well as animal bone fragments. There was a circle of cobbles around the top rim of the feature. The entire feature was 4 feet deep; according to the map, it was approximately 3 feet in diameter (Barrett 1933). Despite its size and described artifact richness, only three specimens were cataloged: two unidentifiable mammal bones and one unidentifiable bone fragment.

Feature 15: This pit was 32 inches deep and contained a large layer of mussel shells in its bottom layer. In an upper layer, there were burnt bones. Specimens cataloged with this feature include a large amount of fish bone (n=41) including elements from catfish and freshwater drum, as well as deer, beaver, raccoon, *Canis* sp., and burnt bird bones.

Feature 18: A cylindrical pit, Feature 18 measured 4 feet across and 3.5 feet in depth. Barrett (1933) found fire cracked rock, shell hoes, ceramics and fragments of a “particularly interesting and very small vessel” (Barrett 1933:119) that apparently warranted no further explanation or description. There were bird remains, fish from the catfish and sucker families, as well as deer, raccoon and bones from the genus *Canis*.

Feature 19: This was a roughly square pit, 5.5 in diameter and 5 feet deep. Barrett (1933) found small copper flakes, a large shell layer, and a layer of possible hearth sweepings (my interpretation) that included gravel, clay and charcoal. There were two bones cataloged for this feature: a large mammal rib fragment and a small unidentifiable fragment.

Feature 25: There were two bones cataloged for this feature: a raccoon tibia and a mammal vertebra. The pit was cylindrical, 4 feet wide and 5 feet deep (Barrett 1933). In a layer with a particularly organic soil were an angular-rimmed sherd, likely Mississippian; animal remains; fire cracked rock; ash; shell hoes; and other ceramic sherds. This was capped

with a layer of red clay and gravel. On top of this layer was a human mandible.

Feature 27: A small pit (in width 2 feet, in depth 3 feet), according to Barrett (1933) it contained only a small amount of refuse. There were two deer elements, a vertebra from a large turtle (possibly a snapping turtle), as well as a muskrat skull.

Feature 28: Adjacent to Feature 27, Feature 28 was a larger refuse pit (no diameter was given, but it was 3 feet in depth) (Barrett 1933). There were large amounts of animal bones found in the bottom layer. This layer was a dark black earth. Directly above was a clay layer. Barrett (1933) remarks upon the density of animal bone; indeed there were 274 bone fragments cataloged with this feature. The majority were deer, but beaver, fish and turtle were also present, as well as large bird remains.

Section IV

Feature 17: Barrett did not excavate to sterile soil. He went to a depth of 2 feet and found: “shells, ashes, bones and some sherds” (Barrett 1933:170). The only cataloged bone was a fish fragment.

Feature 24: Without giving dimensions, Barrett describes this as a “pocket of shells and pottery fragments” (1933:172). There were two mammal specimens cataloged.

Feature 65: There was one medium mammal phalanx cataloged with this feature. There is a one-sentence description from Barrett:

“At this point there was a relatively small pit which contained the usual refuse materials from which was taken a number of interesting specimens, particularly a broken flint spade” (1933:181).

Feature 81: This feature was a cylindrical pit with unusual preservation extending to a depth of 6 feet, with a width of 3 feet. The top layer shows evidence of the fire that must have destroyed Aztalan at the end of its occupation (Barrett 1933). After this were layers of ash, refuse, and yellow clay. Barrett found some copper fragments in these layers as well. The very bottom layer contained ear spools, pottery polishers, and at the very bottom, tree bark. Barrett thought that it resembled elm bark. There were deer and raccoon cataloged with this feature. The most notable was the right humerus of a deer that was approximately 90% complete.

Feature 87: Barrett describes 87 as:

“...a very small pit, three feet in depth...which contained the usual refuse remains consisting of ashes, potsherds and other items, and here again copper remains were found.” (1933:189)

There were mostly bird and fish fragments cataloged with the feature, but also some deer and unidentifiable mammal and large mammal.

Section V-A

Feature 18: This was 3 feet in diameter and 3.7 in depth (Barrett 1933). There were ashes, potsherds, broken firestones (fire cracked rock?),

shells and “other refuse” (Barrett 1933:197). There was a pipe as well. There were mammal remains, and an antler. Most notable was an elk foot bone.

Hearths

Section II

Feature 7: Barrett (1933) describes this as a fireplace or fire pit.

There was a large amount of ash and charcoal, as well as human and animal remains. There are two bones, a deer mandible and calcaneus, cataloged.

Feature 9: The description here suffers from Barrett’s pet cannibalism theory. He describes Feature 9 as a baking pit. It is in close proximity to Feature 8 (not covered here), which is also a hearth. In Feature 9 were ashes and an articulated hand. He believes that the hand was placed in the ashes to roast; he does not take into account that it was never retrieved to eaten, nor were the bones burned. Associated animal remains were unidentifiable rib fragments, as well as a canine tooth and an unfused epiphyseal fragment.

Feature 12: Barrett describes this as a considerable layer of firestones. There were a large number of animal bones found as well as charred squash seeds and charred matting. The matting was of twined reed or grass. Bone tools were also noted. Fish remains included freshwater drum, gar and catfish. There were also deer remains and unidentifiable mammal.

Section V

Feature 31: This “fireplace or hearth” was either found 2.5 feet below surface level or extended 2.5 feet below surface level (Barrett 1933:174).

There were bone awls, perforated shells, human remains, copper flakes, as well as ash and fire cracked rock. There was one medium mammal phalanx cataloged with this feature; it was burnt and in four pieces.

Special and Potential Ritual Features

Features categorized as special were those that had unusual characteristics of an intentional nature

Section II

Feature 37: Feature 37 in Section II was the most straightforward categorization since it contained a dog burial as well the burial of two children. It also contained 31 turtle shell fragments. Near the burials were a fireplace and a pit containing a burned layer with animal and human toe bones. The children were placed under a gravel “cone” or mound that was then buried. According to Barrett (1933:137): “The lower of these two skeletons was a child of about ten years of age. It was almost a full-length burial, the lower limbs only being flexed slightly. It lay directly on its back and had resting on its lower limbs a *large turtle shell*. The upper of these two

skeletons was that of a child of five or six years. It lay on its right side and was very strongly flexed.” (emphasis mine). The turtle remains cataloged in Feature 37 seem to be directly associated with the burial of the older child.

Barrett does not mention a dog burial, however, a mostly intact, male dog skeleton was also cataloged with Feature 37. It was an older individual, evidenced by pre-mortem healing of empty tooth sockets (these were molars so they were likely to not have been intentionally removed, as might be the case if the missing teeth were canines).

Dogs have a long history of ritual use in Eastern North American ethnography (Hall 1997; Oberholtzer 2000; Cook 2012). Historically, dog sacrifices were made with propitious or renewing intent (Cook 2012; Radin 1970). The Ho Chunk and other tribes practiced dog sacrifice and consumption in their Medicine Ceremony. The aim of the Ho Chunk ceremony was to ensure initiates’ reincarnation after death. A dog would be sacrificed at the beginning of the rite, and afterwards members would participate in the dog feast (Hall 1997). There are perhaps even older rites where a dog is sacrificed to the deity Disease-Giver in order to ensure health and success in war (Radin 1970). In other tribes’ Medicine Ceremonies, the dog sacrifice still occurred, but the purpose of the ceremony is for renewal (Hall 1997; Cook 2012). In many of these instances, the dog plays a role in petitioning a great spirit for matters regarding living and dying. In addition, this belief system was widespread throughout North American peoples (Hall

1997), indicating deep prehistoric roots. It is likely then that the dog in Feature 37 was buried in some sort of association with the children's deaths (Figure 4.2).

Feature 34: Feature 34 in Section II is a complicated feature to interpret based on Barrett's description. He describes both it and Feature 33 as refuse pits that are closely associated by sharing an upper stratum. Feature 33 had typical Mississippian artifacts (perforated mussel shells, possibly hoes, a Mississippian style clay bird effigy) as well as a small piece of iron near its surface (Barrett 1933). Barrett does not commit to whether the historic artifact is intrusive to a prehistoric pit, or whether the pit is itself historic. No historic artifacts were found in Feature 34, however. (Barrett 1933)

There were interesting things about Feature 34. The first that was apparent was the presence of another potential canid burial. Although there was a NISP of 16 bones, the minimum number of individuals was one. In addition, bones were present from the axial and radial skeleton, as well as from front and hind limbs. Small metacarpals were also found. Taken together, these suggest that a single animal was disposed/interred in a primary context, since its small bones were not lost and disperse elements of its skeleton are represented.

In addition to the dog, there were elk and deer remains, although not in amounts or portions to suggest a feast. There was, however, a stratum

composed mostly of mussel shells. This was capped off with a layer of clay and gravel. There were human bones among the rest of the refuse as well. In Barrett's words, the most striking part of this feature was a layer of grey ash, which had in its center "a large pocket of very red ashes, so red in fact, that they are striking feature of this pit" (Barrett 1933:135). What was burned with the rest of the debris to produce the red color, and why is this in the center of the other ashes? Are these red ashes or red ochre? If this were just a general refuse pit, we would expect to see things dumped in without regard to placement.

The question remains: is this feature the remains of some event that required a specialized placement of the refuse in the pit, particularly the red ash? Is the red ash really red ochre? Or is it simply a refuse pit that had a coincidental red ashy center in one of the strata? This is perhaps the most tentative classification, however, I believe that it is not a simple refuse pit.

Section IV

Feature 50: Feature 50 in Section IV contained a large plastered daub fireplace, about a foot high and 6 feet by 1 foot in interior measurements (Figure 7.1). According to Barrett: "The trench in the center of the fireplace was filled with blackened earth and ashes, mixed with considerable numbers of potsherds, points, shells and bones. Among the latter there was quite a number of human bones of various kinds, some of which were partly burned

while others showed no action of fire at all, as if dropped into the ashes after the fire had been extinguished.” (1933:161).

In addition to the human remains, some of which are a secondary internment, Barrett also found what could only be Ramey Incised pottery in the fireplace. He describes it as “a shallow dish, with out-curved rim, and with an elaborate scroll design in incised lines.” This, and a burned area containing at around 80 lithic projectile points right next to the fireplace indicate that this was the site of a ritual.

Some animal remains also point to ritual. The sacrum of a large swan or crane-sized bird was found. In addition to potential ritual bones, there were two juvenile deer and one very robust adult deer.

Perhaps this feature was a primary and secondary burial location. Even if it was not, it is not an ordinary refuse pit or fireplace, and points to some sort of ritualized action by site inhabitants.

Unknown Features

These are the features that had unusual descriptions from Barrett, or else not enough information to make a sure determination of presumed usage.

Section IV

Feature 54: This was an incomplete excavation. There could have been a refuse pit feature located in this spot for which Barrett did not define the boundaries. He encounters layers of shell and refuse as well as ashes. It is not located in the riverbank midden, and there was also a circular layer of daub above it. There was an elk toe bone, large mammal fragments and a muskrat mandible.

Section V

Feature 78: Again, this was an incomplete excavation. Barrett found charred logs and daub or plaster in one portion of the excavation unit. He also found a pit with a modified skull, as well as vitrified daub or plaster. It is unknown if the remains come from what sounds like a burned structure or the pit, or if they come from both. There were deer and mammal remains as well as turtle shell fragments.

Feature 92: This could be part of the remains of the stockade. It could also be part of a feature predating the stockade. Barrett describes an excavation unit with a section of daub 20 feet in length, but he also describes what could be considered midden. There were only a few fragments of mammal remains, as well an elk calcaneus associated with this catalog number.

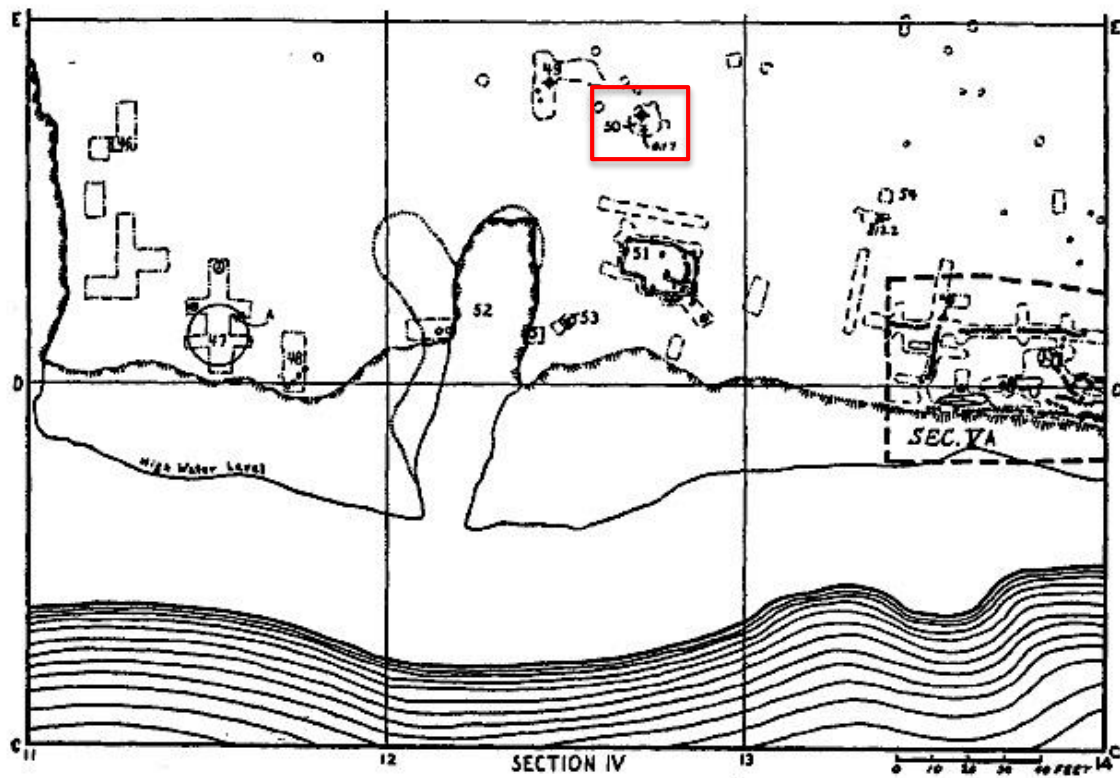


Figure 7.1: The location of Feature 50 in Section IV on Barrett's plat map. Feature 50 is outlined in red. (Adapted from Barrett 1933)

Section V-A

Feature 32: Feature 32 in section V-A had copperized bone. Deer and elk bones were both present. Barrett categorizes this as part of the larger midden; however I have categorized it as unknown. He describes it as a feature found within the midden:

“Here, as in many other places in this large refuse area, there was a distinct depression in which a larger amount of refuse than usual was deposited, though there was not a deep, straight walled pit as in some of the other instances. This depression measured about twelve feet in diameter and had a depth of 3.5 feet at its center. It was of particular interest because it contained such quantities of kitchen refuse rather than much ashes, charcoal, etc. and especially because it contained a considerable number of small fragments of copper, and several evidences of cannibalism in the form of dismembered bones, including a complete skull and two calvaria.” (Barrett 1933:201-202).

The copper artifacts included a knife 2.5 inches long. In addition to skull bones there were two adult legs, one of them articulated. The information Barrett gives about the skull bones is not indicative of a simple midden, which he acknowledges as well:

“At about the same level and two feet west of the [leg bones] were two calvaria of adults. These were so exactly placed, bottom up, side by side, the one facing toward the east and the other toward the west, that it seems hardly likely that they were carelessly cast into this pit and fell accidentally in these positions. It seems more probable that they were purposely placed in these positions for some reason, though why they should have been so placed in a lot of refuse is difficult to imagine.” (Barrett 1933:202-203).

Finally, the caption for the plate/picture of the entire skull found in the features indicates that it was perhaps a war trophy:

“Human skull showing a fractured occiput as if struck with a blunt instrument. There were also in place the upper three vertebrae. The lowest of the three showed cutting as might be produced in severing the head from the body...” (Barrett 1933:462).

Clearly this was no ordinary refuse feature: what Barrett describes sounds much like the 2011 Feature 8 feasting episode. There is one puzzling thing:

there were only 8 bones catalogued for the feature. In addition they are all low utility foot bones with the exception of a scapula. Because of Barrett's description, I could not catalog Feature 32 as a midden feature, but because of the cataloged assemblage, I could not categorize it as a ritual feature. It is, however, tantalizing. Should more evidence of the feature assemblage turn up, it could help support a view of the north end of the site having more feasting episodes.

Differences between Prehistoric Features Types

The most striking difference between the feature types was the high presence of fish bones associated with hearths (Table 6.11, Figure 6.2). There are a number of possible explanations for this.

In my own experience excavating in the Midwest on an Oneota site, hearth features seemed to have an abundance of fish bone. This could be because the basic pH of wood ash helped to preserve an otherwise fragile set of remains. It could also be that fish were small enough to not necessitate sharing of food, and that individual families just made meals of them by their hearths, and having finished, tossed the bones back in. It could be that there were less of the large mammal remains found in middens, and so fish bones were more likely to stand out to the excavator due to a lack of more distracting large bones. Finally, there is also the idea of different activity

zones. Binford's (1978) work among the Nunamuit showed that smaller bones were most likely to be found in the area of consumption, or hearth (Figure 2.2). Meanwhile, larger bones would have been left in areas of butchering or disposed of separately. Small fish bones, therefore could have just been tossed into the fire, while large mammal bones might have dumped in refuse pits or the midden.

The composition of other feature types is more straightforward. Midden features contained a lot of mammal and large mammal bones. This could be due to meat sharing and butchering among community members. That the statistics showed medium mammal bones were most likely to show up in ritual features is due to the one outlier of the dog burial. If the burial were excluded, medium mammal bones would have been more present in refuse pits and unknown features.

Finally, and most frustratingly, many of the large bird bones occur in an unidentified enclosure called Feature 23 in Section IV. There was a hearth in the unit according to his plan maps, as well as pit full of shells (Barrett 1933). However, Barrett gives no more information on it other than that the excavation could not follow the full line of postholes, so the boundaries of the enclosure are incomplete. There are no dimensions given.

Differences Between Historic and Prehistoric Features

Because there were historic features in the southern portion of the site, I believed it worthwhile to compare the known historic features (Feature 29 and Feature 33 in Section II) with the presumed prehistoric ones to determine if there were similarities. Because we don't know the dates of the features excavated, we have to rely on feature assemblages to determine cultural affiliation. Although faunal remains alone would not have done this, similar animal assemblages would have put a note of caution in: perhaps the people who made the historic features had also made the ones we thought were prehistoric. The two assemblages were vastly different.

The main difference came down to one of fish and mammals. All of the prehistoric features had much more mammal remains than the historic features, while they had much less fish. Even though the southern section had much more fish than the northern section, the historic features had much more fish than the southern features.

This could be the result of a couple things. Perhaps the historic tribe camping at the site was only there long enough to fish, not to mount hunting expeditions. Perhaps there were hostile groups in adjacent territory, curtailing any far-ranging food gathering. There is not enough evidence about what tribe was there or for how long to make any definite conclusions.

Conclusions

Using a collection that was almost 100 years old, I was able to trace feature level proveniences for an Aztalan faunal assemblage. So far, this is the only spatial analysis of animal remains at the site. It is now possible to see that faunal remains differ markedly depending on which part of the site is being analyzed, as well as the context the remains were found in. We are perhaps closer to identifying the area near the northeast mound as the location of feasting episodes and other community building rituals. We know that the assemblage as a whole is quite different from the assemblage from individual features, as well as the clusters of features.

I believe differences in faunal remains between northern and southern features points to different activity areas at the site. The northern domestic area, close to a mound, had much more white-tailed deer than the southern domestic area. The southern features, while still having a majority of white-tailed deer, had more fish than northern features. In addition, the northern features are known to contain feasting deposits from the Richard's 2011 excavations (Picard 2013). The large amount of large mammals (mostly deer) were the results of people consuming more of them in the northern section – perhaps this was in part due to feasting activities. It could also coincide with a later occupation in the southern section.

In addition, faunal remains differ based on the types of features they are found in. Barrett's monograph points to three possible ritual features at

the site, which were further confirmed by the types of faunal remains identified therein. There is evidence that inhabitants at Aztalan used dogs in conjunction with burials. Large birds may also have been used in ritual activities. Other types of features had specific types of animals that were more likely to be found in them. Hearth features were most likely to contain fish, in addition to being most likely to be in section II.

Future avenues of research could include using different artifact types in a spatial analysis as well. Most productive would be a ceramic spatial analysis using Barrett's collection, especially since Middle Mississippians had different styles for utilitarian and ritual vessels (Richards 1992). In addition, clusters of shell tempered (Mississippian) and grit tempered (Late-Woodland) sherds might point the way for discovering ethnic neighborhoods at the site.

In the event that the collection would be open for destructive dating, or should non-destructive dating techniques emerge, it would be invaluable to test the southern features to definitely determine historic or prehistoric affiliation.

This study represents the productivity of re-visiting old collections with new questions. It underscores the importance of curating artifacts that in the past have been considered as not useful (faunal remains, for example) for material culture analyses. The spatial analysis of the Barrett collection faunal remains has, however, given insights on the spatial and ritual

behaviors present at Aztalan during the Middle Mississippian/Woodland occupation.

REFERENCES CITED

- Alt, S.M.
 2012 Making Mississippian at Cahokia. In *The Oxford Handbook of North American Archaeology*, edited by T. R. Pauketat, pp. 497-508. Oxford University Press, Oxford.
- Barrett, S.A.
 1933 *Azatalan*. Bulletin of the Public Museum of the City of Milwaukee XIII. Milwaukee Public Museum, Milwaukee.
- Baeris, D.A.
 1958 Azatalan Revisited: An Introduction. *The Wisconsin Archeologist* 39:2-4.
- Benden, D.
 2004 The Fisher Mounds Site Complex: Early Middle Mississippian Exploration in the Upper Mississippi Valley. *The Minnesota Archaeologist* 63:7-24.
- Binford, L.R.
 1978 *Nunamiut Ethnoarchaeology*. Academic Press, New York.
 1983 Ch. 7: People and their Lifeways. In *In Pursuit of the Past*, pp. 144-192. University of California Press, Berkeley.
- Binkley, M.
 1974 Preliminary Faunal Report on Azatalan Site, Jefferson County, Wisconsin. Unpublished manuscript.
- Birmingham, R.A.
 2010 *Spirits of the Earth: The Effigy Mound Landscape of Madison and the Four Lakes*. University of Wisconsin Press, Madison, WI.
- Birmingham R.A. and L. G. Goldstein
 2005 *Azatalan: Mysteries of an Ancient Indian Town*. Wisconsin Historical Society Press, Madison, WI.
- Boszhardt, R.F.
 2004 The Late Woodland and Middle Mississippian Component at the Iva Site, La Crosse County, Wisconsin in the Driftless Area of the Upper Mississippi River Valley. *The Minnesota Archaeologist* 63:60-85.

- Brown, J.A.
2003 The Cahokia Mound 72-Sub 1 Burials as Collective Representation. *The Wisconsin Archeologist* 84:81-98.
- Chaplin, R.E.
1971 *The Study of Bones from Archaeological Sites*. Seminar Press, New York.
- Clauter, J.A.
2012 Effigy Mounds, Social Identity, Ceramic Technology: Decorative Style, Clay Composition, and Petrography of Wisconsin Late Woodland Vessels. Unpublished Ph.D. Dissertation, Department of Anthropology, University of Wisconsin, Milwaukee.
- Cook, R.A.
2012 Dogs of War: Potential Social Institutions of Conflict, Healing and Death in a Fort Ancient Village. *American Antiquity* 77:498-523.
- deFrance, S.D.
2009 Zooarchaeology in Complex Societies: Political Economy, Status and Ideology. *Journal of Archaeological Research* 17:105-168.
- Durrheim, K. and C. Tredoux
2013 *Numbers, Hypotheses and Conclusions: A Course in Statistics for the Social Sciences*. University of Cape Town Press, Cape Town.
- Freeman, J.E.
1986 Aztalan: A Middle Mississippian Village. *The Wisconsin Archeologist* 67:339-364.
- Gifford-Gonzales, D. and K.U. Sunseri
2007 Foodways on the Frontier: Animal Use and Identity in Early Colonial New Mexico. In *The Archaeology of Food and Identity*, edited by K.C. Twiss. Southern University of Illinois Carbondale Occasional Paper No. 34, Center for Archaeological Investigations, Carbondale, IL.
- Gilbert, A.S. and B.H. Singer
1982 Reassessing Zooarchaeological Quantification. *World Archaeology* 14:21-40.
- Gilbert, M.B.
1990 *Mammalian Osteology*. Missouri Archaeological Society, Columbia, Mo.

- Goldstein, L. and J. Freeman
1997 Aztalan – A Middle Mississippian Village. *The Wisconsin Archeologist* 78:223-249.
- Goldstein, L. and J.D. Richards
1991 Ancient Aztalan: The Cultural and Ecological Context of a Late Prehistoric Site in the Midwest. In *Cahokia and the Hinterlands*, edited by T. E. Emerson and R. B. Lewis, pp. 193-206. University of Illinois Press, Urbana and Chicago.
- Grayson, D.K.
1973 On the Methodology of Faunal Analysis. *American Antiquity* 38:432–439.
- Green, W.
1997 Middle Mississippian Peoples. *The Wisconsin Archeologist* 78:202-222.
- Griffin, J.B.
1985 Changing Concepts of the Prehistoric Mississippian Cultures of the Eastern United States. In *Alabama and the Borderlands*, edited by R. Badger and L. Clayton, pp. 40-63. University of Alabama Press, Tuscaloosa, AL.
- Gumerman, G.
1997 Food and Complex Societies. *Journal of Archaeological Method and Theory* 4:105-139.
- Hall, R.L.
1997 *An Archaeology of the Soul : North American Indian Belief and Ritual*. University of Illinois Press (pps. 145-154).

1993 Red Banks, Oneota and the Winnebago: Views from a Distant Rock. *The Wisconsin Archeologist* 74:10-79.
- Hastorf, C.A. and M. Weismantel
2007 Food: Where Opposites Meet. In *The Archaeology of Food and Identity*, edited by K.C. Twiss. Southern University of Illinois Carbondale Occasional Paper No. 34, Center for Archaeological Investigations, Carbondale, IL.

Hill, J.D.

1995 *Ritual and Rubbish in the Iron Age of Wessex: A Study on the Formation of a Specific Archaeological Record*. B.A.R. British Series 242. Hadrian Books Ltd, Oxford.

Hudson, J.

2004 A Sample of Bone from the Aztalan Site (47JE1), Wisconsin. *The Wisconsin Archeologist* 85(2):50-59.

1991 Nonselective Small Game Hunting Strategies: An Ethnoarchaeological Study of Aka Pygmy Sites. In *Human Predators and Prey Mortality*, edited by M.C. Stiner. Westview Press, Boulder, CO.

Hurley, W.M.

1977 Aztalan Revisited. *The Wisconsin Archeologist* 58:256-294.

Jackson, H.H.T.

1961 *Mammals of Wisconsin*. The University of Wisconsin Press, Madison, WI.

Kelly, L.S.

2000 Social Implications of Faunal Provisioning for the Cahokia site: Initial Mississippian, Lohman Phase, PhD dissertation, Department of Anthropology, Washington University, ProQuest Dissertations and Theses.

2001 A Case of Ritual Feasting at the Cahokia Site. In *Feasts: Archeological and Ethnographic Perspectives on Food, Politics and Power*. Edited by M. Deitler and B. Hayden. Smithsonian Institution Press, Washington D.C.

Knight, V.J. Jr., J.A. Brown and G.E. Lankford

2001 On the Subject Matter of the Southeastern Ceremonial Complex. *Southeastern Archaeology* 20:129-141.

Kotwasinski, J.M.

2014 Understanding Use and Function: an Intra-site Comparative Analysis of the 2011 UWM Aztalan Ceramic Assemblage. Theses and Dissertations. Paper 361. University of Wisconsin-Milwaukee Digital Commons. Accessed on October 14, 2014.

Lyman, R.L.

1985 Bone Frequencies: Differential Transport, *In Situ* Destruction and the MGUI. *Journal of Archaeological Science* 12:221-236.

1992 Anatomical Considerations of Utility Curves in Zooarchaeology. *Journal of Archaeological Science* 19:7-22.

1994 *Vertebrate Taphonomy*. Cambridge University Press, Cambridge, UK.

Lapham, I.A.

1973 *The Antiquities of Wisconsin*. AMS Press, Inc. New York. Originally published 1855, Smithsonian Institution Publication 20.

Madrigal C. and J.Z. Holt

2002 White-Tailed Deer Meat and Marrow Return Rates and Their Application to Eastern Woodlands Archaeology. *American Antiquity* 67:745-759.

Maher, R.F.

1958 The Excavation and Reconstruction of the Southwest Pyramidal Mound at Aztalan. *The Wisconsin Archeologist* 39:77-100.

Marchinton, R.L. and D.H. Hirth

1984 Ch. 6: Behavior. In *White-Tailed Deer: Ecology and Management*, edited by L.K. Halls, pp. 129-168. The Wildlife Institute. Stackpole Books, Harrisburg, PA.

Marshall, F. and T. Pilgrim

1993 NISP vs. MNI in Quantification of Body-Part Representation. *American Antiquity* 58:261-269.

McElrath, D.L, T.E. Emerson and A.C. Fortier

2000 Social Evolution of Social Response? A Fresh Look at the "Good Gray Cultures" After Four Decades of Midwest Research. In *Late Woodland Societies: Tradition and Transformation across the Midcontinent*, edited by T .E. Emerson, D. L. McElrath and A. C. Fortier, pp. 3-36. University of Nebraska Press, NE.

Milner, G.R.

1998 *The Cahokia Chiefdom: The Archaeology of a Mississippian Society*. Smithsonian Institution Press, Washington D.C.

Mollerud, K.J.

2005 Messages, Meanings and Motifs: An Analysis of Ramey Incised Ceramics at the Aztalan Site. Unpublished Master's Thesis, Department of Anthropology, University of Wisconsin-Milwaukee.

Olsen, Stanley, J.

1964 *Mammal Remains from Archaeological Sites*. Papers of the Peabody Museum of Archaeology and Ethnology, Vol. 56, No. 1, Harvard University Press, Cambridge.

Overstreet, D.F.

2000 Cultural Dynamics of the Late Prehistoric Period in Southern Wisconsin. In *Mounds, Modoc, and Mesoamerica*, edited by S. R. Ahler, pp. 405-438. Illinois State Museum, Scientific Papers Series Vol. XXVIII, Springfield.

Parmalee, P.W.

1960 Animal Remains from the Aztalan Site, Jefferson County Wisconsin. *The Wisconsin Archeologist* 41:1-10.

Pauketat, T.R.

2005 The Forgotten History of the Mississippians. In *North American Archaeology*, edited by T. R. Pauketat and L. D.D.P., pp. 187-211. Blackwell, Malden, MA.

Pauketat, T.R. and T.E. Emerson

2000 Introduction: domination and ideology in the Mississippian world. In *Cahokia: Domination and Ideology in the Mississippian World*, edited by T. R. Pauketat and T. E. Emerson, pp. 1-29. University of Nebraska Press, Lincoln, NE.

Pauketat, T.R., L.S. Kelly, G.J. Fritz, N.H. Lopinot, S. Elias and E. Hargrave

2002 The Residues of Feasting and Public Ritual at Early Cahokia. *American Antiquity* 67:257-279.

Picard, J.L.

2013 Northern Flint, Southern Roots: A Diachronic Analysis of Paleoethnobotanical Remains and Maize Race at the Aztalan Site (47-JE-0001). Theses and Dissertations. Paper 439. University of Wisconsin-Milwaukee Digital Commons. Accessed October 14, 2014.

- Price, C.R.
1985 Patterns of Cultural Behavior and Intra-Site Distributions of Faunal Remains at the Widow Harris Site. *Historical Archaeology* 19:40-56.
- Radin, P.
1970 *The Winnebago Tribe*. Johnson Reprint Corporation, New York. Originally printed 1923 in the Thirty-Seventh Annual Report of the U.S. Bureau of Ethnology to the Secretary of the Smithsonian Institution 1915-16.
- Redmond, E.M. and C.S. Spencer
2011 Chiefdoms at the Threshold: The Competitive Origins of the Primary State. *Journal of Anthropological Archaeology* 31:22-37.
- Reilly, F.K. III
2007 The Petaloid Motif: A Celestial Symbolic Locative in the Shell Art of Spiro. In *Ancient Objects and Sacred Realms: Interpretations of Mississippian Iconography*. Edited by F.K. Reilly III and J.F. Garber, pp.39-55. University of Texas Press, Austin, TX.
- Reitz, E.J. and E.S. Wing
1999 *Zooarchaeology*. Cambridge University Press, New York.
- Richards, J.D.
2007 Viewing the Ruins: The Early Documentary History of the Aztalan Site. *Wisconsin Magazine of History* 91(2):28-39.

2003 Collars, Castellations and Cahokia: A Regional Perspective on the Aztalan Ceramic Assemblage. *The Wisconsin Archeologist* 84:139-154.

1992 Ceramics and Culture at Aztalan, A Late Prehistoric Village in Southeast Wisconsin. Unpublished Ph.D. Dissertation, Department of Anthropology, University of Wisconsin, Milwaukee.
- Rowe, C.W.
1956 The Effigy Mound Culture of Wisconsin. *Milwaukee Public Museum Publications in Anthropology No. 3*.

1958 A Crematorium at Aztalan. *The Wisconsin Archeologist* 39:101-109.

Rosebrough, A.L.

2010 Every Family a Nation: A Deconstruction and Reconstruction of the Effigy Mound "Culture" of the Western Great Lakes of North America. Unpublished Ph.D. Dissertation, Department of Anthropology, University of Wisconsin, Madison

Salkin, P.H.

2000 The Horicon and Kekoskee Phases: Cultural Complexity in the Late Woodland Stage in Southeastern Wisconsin. In *Late Woodland Societies: Tradition and Transformation across the Midcontinent*, edited by T. E. Emerson, D. L. McElrath and A. C. Fortier, pp. 525-542. University of Nebraska Press, NE.

Schiffer, M.

1976 *Behavioral Archaeology*. pp. 1-26. Academic Press, New York.

Somers, A.N.

1920 Prehistoric Cannibalism in America. *The Wisconsin Archeologist* 19:20-24.

Styles, B.W.

1985 Assessment of Faunal Remains from Flotation Samples from the 1984 Excavation at the Aztalan Site, Jefferson County, Wisconsin. In *The Southeastern Wisconsin Archaeological Project: 1984-1985*, edited by L. Goldstein, pp. 151-156. Report to the Historic Preservation Division, State Historical Society of Wisconsin. vol. 81. University of Wisconsin-Milwaukee Archaeological Research Laboratory, Milwaukee, Wisconsin.

Torgerson, O. and W.R. Porath

1984 Ch. 21 Midwest Oak/Hickory Forest. In *White-Tailed Deer: Ecology and Management*, edited by L.K. Halls, pp. 411-426. The Wildlife Institute. Stackpole Books, Harrisburg, PA.

Uerpmann, H.

1973 Animal Bone Finds and Economic Archaeology: A Critical Study of 'Osteo-Archaeological' Method. *World Archaeology* 4:307-322.

Welch P.D. and C.M. Scarry

1995 Status-Related Variation in Foodways in the Moundville Chiefdom. *American Antiquity* 60:391-419.

Warwick, M.C.

2002 A Diachronic Study of Animal Exploitation at Aztalan, a Late Prehistoric Village in Southeast Wisconsin. Unpublished Master's Thesis, Department of Anthropology, University of Wisconsin-Milwaukee.

Winters, H.D.

1981 Excavating in Museums: Notes on Mississippian Hoes and Middle Woodland Copper Gouges and Celts. *Annals of the New York Academy of Sciences* 376:17-34.

Wittry W.L. and D.A. Baerris

1958 Domestic Houses at Aztalan. *The Wisconsin Archeologist* 39:62-76.

Yerkes, R. W.

1980 Flotation, Fish Scales, and Seasonal Patterns in the Abundance of Charcoal, Maize, and Nuts at the site of Aztalan, Jefferson County, Wisconsin. Unpublished manuscript.

Zych, T.J.

2013 The Construction of a Mound and a New Community: An Analysis of the Ceramic and Feature Assemblages from the Northeast Mound at the Aztalan Site. Theses and Dissertations. Paper 189. University of Wisconsin-Milwaukee Digital Commons. Accessed on April 14, 2014.

APPENDIX A : FAUNAL LIST

Please see supplemental file

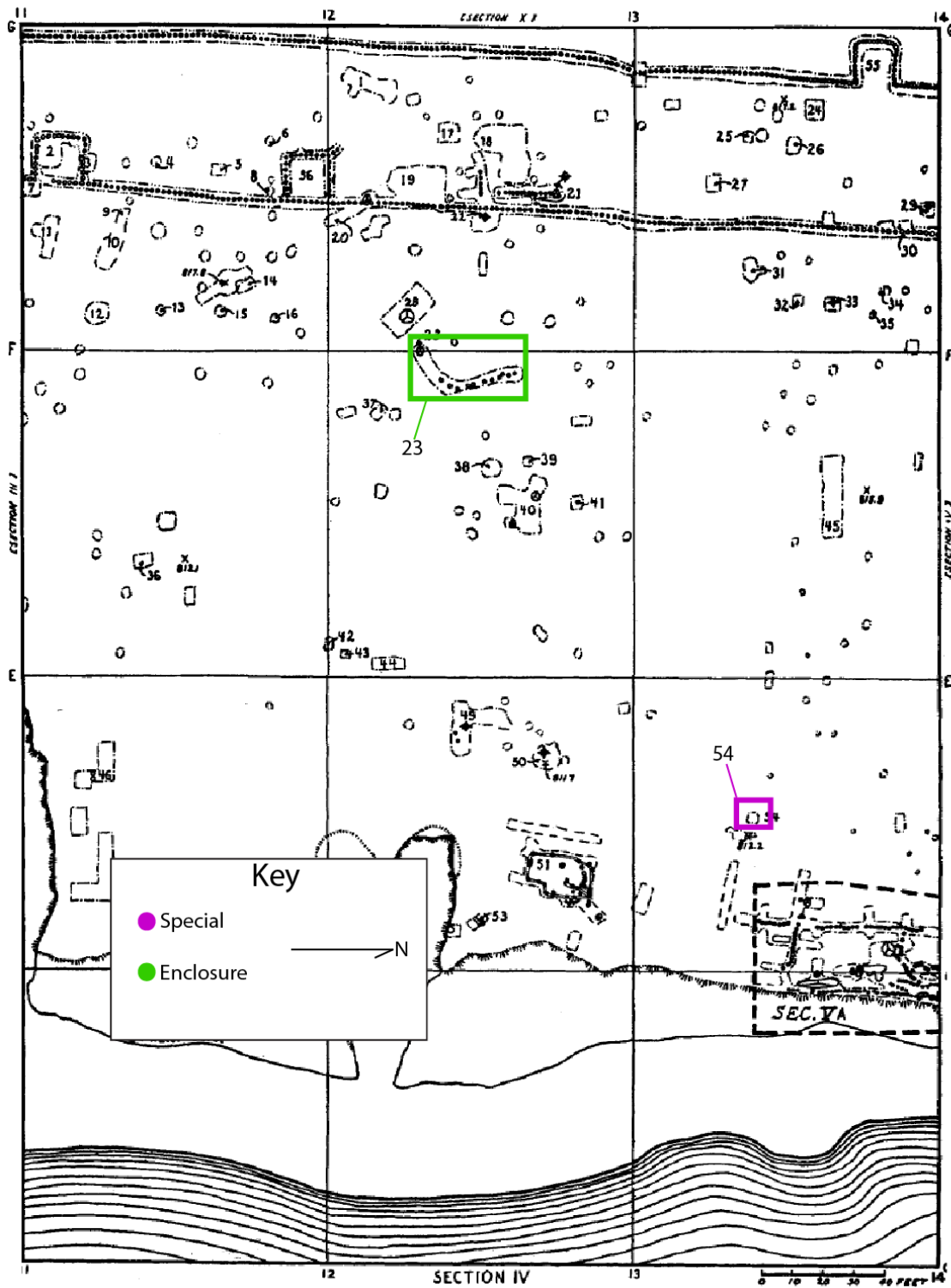


Figure B.2: Section IV features by type and location

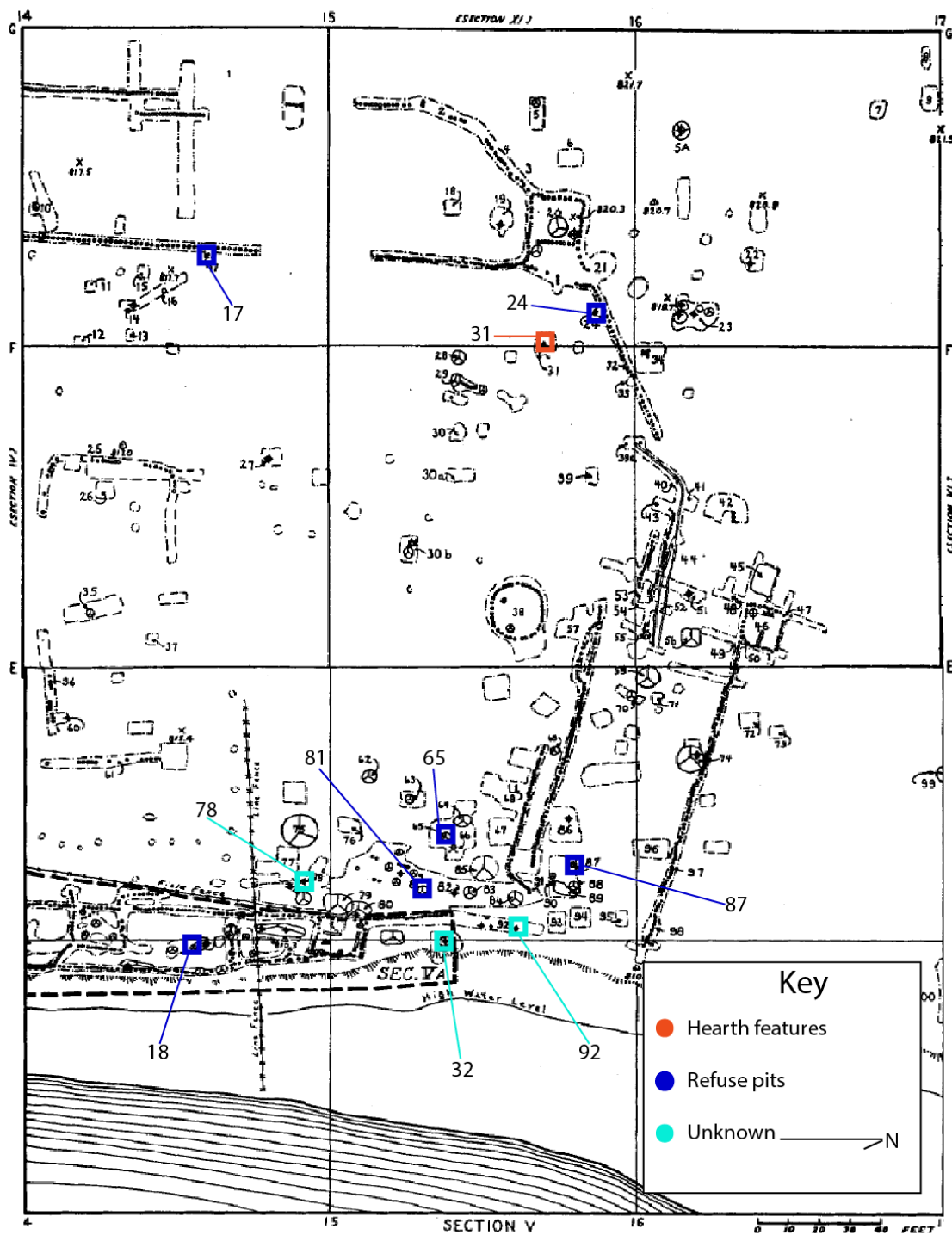


Figure B.3: Section V and V-A features by type and location