A Spatial Analysis of 24HL1085: A Prehistoric Site in the Bear's Paw Mountains

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A SPATIAL ANALYSIS OF 24HL1085: A PREHISTORIC SITE IN THE BEAR’S
PAW MOUNTAINS

By

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Thesis

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This thesis is a spatial analysis of 24HL1085 and attempts to discern the use areas of two prehistoric components, Late Archaic and Late Prehistoric, through the identification of spatial patterns created by the excavated lithics, faunal remains, and fire cracked rock (FCR). I also wanted to show that understanding the spatial layout of FCR is just as important as understanding the spatial layout of lithics and faunal remains. In order to complete this analysis the three ring model developed by Stevenson (1985) was adapted and combined with the trend surface analysis created by Hodder and Orton (1976). Theory behind this analysis was based heavily on work done by Binford (1978, 1979, 1980, 1983, 1987). Results from this study showed that both components were comprised of several discernable use areas that provided a better understanding of how the site was created and used. Despite being separated by several thousand years, both components are representative of campsites at which people were hunting and gathering resources locally before leaving. Without the spatial data obtained from the FCR, a spatial analysis would have been almost impossible to complete to the same degree of certainty.
I wish to thank Dr. Anna Prentiss for all of her support and guidance during the completion of this project. Thank you to the members of the Rocky Boy Reservation who allowed us to excavate the site and enthusiastically supported our work. I also wish to thank the students of the Rocky Boy field school, Nicole Crossland, and Bob O’Boyle for their help, support, and good work. Finally, I wish to thank my parents for being there for me during this project and supporting me when I needed it the most.
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One of the major goals of archaeology today is to understand the cultural behaviors that are behind the formation of archaeological sites and to understand how, through these behaviors, sites are created. Beginning with Binford (1978, 1980) there has been a strong movement by archaeologists to develop models that will help us to interpret the spatial structure of prehistoric hunter-gatherer sites. These models tend to focus on the spatial distributions of cultural materials on various types of hunter-gatherer sites (campsites, kill sites, quarries, and other logistical sites) in order to link ethnographic data with what is found after the site is abandoned, barring non-cultural site formation processes.

One such model is the three zone model, which was used by Stevenson (1985) to understand occupation phases at the Peace Point site. The three zone model is based on the theory that hunter-gatherer sites go through three separate phases of occupation: the initial phase, exploitation phase, and abandonment phase (Stevenson 1985:64). During each of these phases of occupation, lithic refuse is disposed of and reduced in different ways. In order to determine which phase/s are represented at a particular archaeological site, the lithic debitage is identified as being primary, secondary, or tertiary debitage and then the size and vertical distribution is considered (Stevenson 1985:65).

After identifying the lithic refuse at a particular site, the three zone model can then be applied using spatial data. This model allows archaeologists to identify three specific zones (toss, drop, and displacement) that can help in the interpretation of artifact assemblages that have been found near hearths and other features. Two of the three
zones used in this model, the ‘toss zone’ and ‘drop zone’, were initially identified by Binford (1978, 1983) during his time with the Nunamiut. Stevenson added the ‘displacement zone’ to account for debris that was moved during an episode where there was a large build up of refuse, or the site was reused (1985:75). By applying this model to artifact assemblages and the spatial data recorded from excavated sites, not only can specific activity areas be identified, but hypotheses can be made about how many times the site was occupied and what types of activities were taking place.

This model is especially appropriate for helping to identify prehistoric archaeological sites in the Great Plains region. Sites in this area are often composed of a similar range of artifact types; the most common artifacts found at these sites are lithics, faunal remains, and fire-cracked rock (FCR). I will interpret the lithic, faunal, and FCR data in light of the three ring model in order to better understand the formation of 24HL1085 and to allow for easier comparability between it and other campsites in this region.

The similarity between sites in the Great Plains region over a broad time scale and environment type gives archaeologists the unique opportunity to create a catalogue of site types, allowing the prediction of spatial patterns and artifacts to be found at each site. This does not mean that every prehistoric site found in this region will fit exactly, but there are enough patterns between these sites that once a broad scale comparison is achieved it will provide a basic guideline for identifying and assessing variability in site formation and occupational history.

FCR is one of the most important, and often overlooked components of prehistoric sites in this region and is usually only considered when identifying the
presence of an archaeological site; very little is done with the FCR in terms of answering broader archaeological questions. This is unfortunate because FCR is a common artifact type found at sites in this area. By taking a closer look at the spatial distribution of FCR, and by applying models, like the three zone model, that deal with the distribution of refuse, FCR has the potential to provide archaeologists with additional information about site creation and use.

In order to demonstrate the importance of mapping, and in some cases, collecting FCR from sites in this region, I intend to use Binford’s site formation theories, and Stevenson’s method for identifying occupation phases, relying upon the data collected from site 24HL1085. 24HL1085 is a prehistoric site in the Bear’s Paw Mountains, on the Chippewa-Cree Reservation, in north central Montana. This area is interesting because the Bear’s Paw Mountains are an anomaly rising out of the surrounding plains. They would certainly have stood out to the prehistoric people who inhabited the area, and therefore sites within this mountain range may be able to provide insight to archaeologists about resource use and seasonal movement patterns on the Great Plains.

This site is also important because limited archaeology has been done in the area, even though people have occupied these mountains for thousands of years and there is evidence to suggest that there are even Paleoindian sites in the vicinity. This means that the Bear’s Paw Mountains have the potential to offer archaeologists a continuous view of prehistoric life on the plains and insights into broader patterns of resource use, mobility, and possibly even cultural changes.

A field school run through the University of Montana excavated 24HL1085 during the summer of 2007. Two areas of the site had previously been identified through
the excavation of test pits and the site was excavated in order to mitigate expected adverse effects associated with reservoir construction in the valley. During the excavation of this site, lithics, faunal remains, and FCR were mapped in place and collected from two separately identified cultural areas. Data from all artifacts collected will be examined in light of the three zone model in order to understand how the site was used and created.

Previously completed research (Prentiss, et.al. 2008) indicates that 24HL1085 has at least two separate occupations with about two thousand years between them. This is important because even though the two occupations are distinctly separate in time, they are very similar in artifact type and distribution. A spatial analysis of this site will provide new information about campsites in the region and will help to further develop models for more accurate site interpretation, especially with the inclusion of the FCR data. This analysis will also allow for inferences to be made regarding the reuse of campsites in this region over time.

Following this introduction, the second chapter is the theory chapter in which there is an outline of the theoretical background behind spatial analyses. After the overview, the rest of the chapter will be focused primarily on concepts created by Binford, and the model developed by Stevenson. The next chapter is an analysis chapter where I explain, step by step, the methods I used to complete this analysis. I also take time to explain why I took the steps I did in order to provide the most accurate interpretation of this site. The fourth chapter of my thesis is the discussion chapter in which I elaborate on the conclusions of the analysis and explain why I interpreted the spatial analysis as I did. The final chapter of my thesis is the conclusion, which not only
summarizes the results of the study, but also proposes areas where future research and changes can be made to improve upon my conclusions.
CHAPTER 2

THEORETICAL BACKGROUND

One of the goals for this chapter is to provide the reader with a short overview of
the theory behind the development of spatial analysis and why it is an important step in
the understanding of archaeological sites. While there are a variety of theories on how to
best complete a spatial analysis, this chapter is also intended to provide an in depth
exploration of Binford’s theories, which are the foundation for this study. The final goal
of this chapter is to explain Stevenson’s three ring model and the theory behind its
application since this is the model that is applied to the spatial data from 24HL1085.

Background of Spatial Analysis

Every archaeologist knows that it is not just what you find in the ground that is
important, but where you find it and what is found nearby. Archaeology is a discipline
that derives most of its information from the spatial relationships of artifacts that are
found in situ. The belief that the spatial positions of artifacts are important to the overall
interpretations of an archaeological site, and can provide unparallel revelations about past
cultures, comes from anthropological spatial theory, which is the idea that
“archaeological remains are spatially patterned as the result of the patterned behavior of
the members of an extinct society, thus the spatial structure is potentially informative
about the way the society organized itself” (Clarke 1977:18). From anthropological
spatial theory, archaeologists have turned to spatial archaeology as a way to get as much
information as they can from archaeological sites and to further our understanding of past
cultures.
Spatial archaeology is the “retrieval of information from archaeological spatial relationships and the study of the spatial consequences of former hominid activity patterns within sites, site systems, and their environments” (Clarke 1977:9). In other words, archaeologists look at the different elements that are either found at a site or are a part of the creation of a site, such as raw materials, artifacts, features, structures, routes, resources, and people, and try to determine how the relationship between all these elements lead to the creation of the site as it was found (Clarke 1977:9).

There are three levels at which archaeologists can perform a spatial analysis, the micro level, semi-micro level, and the macro level. With a micro level analysis spatial relationships within one site are examined and it is based roughly on personal versus social space, and individual versus cultural factors (Clarke 1977:11). To analyze a site at the micro level, relationships between artifacts and artifacts, artifacts and features, artifacts and resource spaces, features and features, and resource spaces and resource spaces must be considered (Clarke 1977:16).

The semi-micro level of spatial analysis also takes place within sites but there is a greater emphasis on social and architectural models. For example, a single dwelling would be considered at the micro level, but the entire neighborhood or city is considered at the semi-micro level. So, while social and cultural factors are important, economic location plays a bigger role than it would at the micro level (Clarke 1977:11). Comparisons at this level occur between artifacts and artifacts, structures and structures, structures and resource spaces, and resource spaces and other resource spaces (Clarke 1977:16).
At the macro level, spatial analysis is done between different sites. Geographic and economic models are the most commonly used to explain similarities and differences (Clarke 1977:13). Comparisons between artifacts and other artifacts over regions, artifacts and sites, artifacts and resource spaces, sites and other sites, sites and resource spaces, and resource spaces and other resource spaces are considered (Clarke 1977:16). While this level of spatial analysis is beneficial for the understanding of broader cultural patterns and influences, it can only be completed with some success if the two other levels have previously been completed on multiple sites in the region being studied.

Even though many concepts of spatial analysis in archaeology are commonplace while completing excavations and analyses today, this was not always the case. It is only in the last half a century that the full potential of spatial analysis has been explored. Spatial analysis had its beginning in the Austro-German school between 1880 and 1900. These men, who called themselves ‘Anthropo-geographers’, developed formal methods for the mapping of attributes and artifacts at archaeological sites (Clarke 1977:2). The American approach to spatial archaeology began around the same time as the Austro-German school, but was more heavily focused on settlement patterns and spatial organization (Clarke 1977:3). This focus can be seen in American archaeology today because there is a strong movement to understand the settlement and social organization patterns of prehistoric America.

When doing a spatial analysis it is not enough that the archaeologist examines the static location where artifacts are found, but the analysis must attempt to examine the movement of the artifact before it ended up at its final resting place. According to Clarke, “spatial information comes not only from knowing the locational relationship of
various items but also from tracing their relative movements and flow – the dynamic aspect” (Clarke 1977:8). It is through tracing the movement of artifacts that important cultural concepts, about how artifacts were used and regarded by the people being studied, can be discovered and understood. It is important to remember when doing a spatial analysis not to forget to examine the artifacts found on an individual level because, “there is archaeological information in the spatial relationships between things as well as in things in themselves” (Clarke 1977:5).

Before delving further into the theory behind spatial analysis, it is important to define some terms that will be used throughout this thesis. ‘Activity’ is a common word in today’s vernacular vocabulary, but what does it mean in reference to archaeology? According to Binford, an activity can be defined as “an integrated set of tasks, generally performed in a temporal sequence and in an uninterrupted fashion”; tools that are used to complete tasks are considered to be a part of a toolkit (Binford 1983:147-148).

Each activity can be divided into one of four types: discrete, generalized, single, or repetitive. Discrete activities refer to specialized activities that are task, or even season specific. Generalized activities are more subject to variation, since they tend to occur on a regular basis and are not dependent upon specific seasons or locations. Single activities are isolated events, and repetitive activities occur as a part of ongoing site formation (Newell 1987:136-137). Certain activities can even have phased behaviors, behaviors that have distinct phases of activity, which can leave distinct indicators in the archaeological record of their presence. Some examples of activities that have phased behaviors are butchering and tool maintenance (Ferring 1984:117).
The lifecycles of durable elements like lithics and pottery are associated with five processes: procurement, manufacture, use, maintenance, and discard. Each of these processes requires at least one type of activity to take place. Consumable elements resulting in faunal and floral remains are associated with four processes: procurement, preparation, consumption, and discard (Schiffer 1995:27). Understanding the phases that different types of artifacts go through is important to the overall understanding of how artifacts are related to variety of activities, and their eventual discard into the archaeological record.

Activities take place at a site within spatially and culturally defined activity areas, which Binford defines as, “places, facilities, or surfaces where technological, social, or ritual activities occur” (Clarke 1977:148). There are at least four major variables that can affect where activity areas are placed within a site and should be considered when trying to identify activity areas during analysis. First, there is a dependence on structures or other fixed features; second, there is a dependence on locational precedence; third, there is no dependence on either of the above mentioned variables; and fourth, there is representation of activities that initially took place elsewhere; for example storage sites (Newell 1987:137).

Once activities and activity areas are identified, archaeologists must then consider how many people were located at the site, and using the various activity areas, in order to complete an analysis as accurately as possible. Ferring (1984:117) defined a group as “an aggregate of persons who carried out multiple activities in proximity, especially relative to others during the same occupational episode” and subgroups as when “two or more groups occupied a site simultaneously, leaving spatially discrete remains of their
activities”. With groups and subgroups there can then be clustering of activity areas, some of which may be multi-functional. Specifically, subgroup clusters tend to have overlapping activity areas, which indicates an intensive utilization of space. Group clusters on the other hand tend to be represented by single clusters and most often indicate a “single occupation by a single functionally diverse group” (Ferring 1984:117-119).

**Current Theoretical Work/Case Studies**

Since the basis for this thesis is a spatial analysis of a prehistoric hunter-gatherer site, it is important to review the theory behind spatial analysis that was the basis from which the research of 24HL1085 was completed. Spatial analysis is essentially the study of space, and according to Gamble, “space can be recognized, measured and related to past behavior study” (Gamble 1991:2). There are different types of space in which people operate, prehistorically and historically, and these spaces can be divided into residence space, “area within which residential buildings are located” and occupation space, “cleared ground, adjacent to the buildings, which is crossed by pathways and may also be the location of service functions, dumps, and places where people occasionally congregate” (Fletcher 1991:397). Theoretically, different cultural constructs impact the behavior and activities that occur in each type of space and so there should be different and even recognizable artifact clusters within each space. In other words, patterns within the spatial arrangement of artifacts can be directly related to a patterned behavior, and will therefore show the impacts that outside influences have placed upon those behaviors (Gamble 1991:3).
One important factor to consider when looking at spatial patterns is that how people see and use space is directly related to the size and shape of the human body. The human body has remained relatively the same in shape and size for thousands of years and is therefore a constant factor that can help archaeologists understand the use of space even in societies that no longer exist. Binford is a proponent of this theory and believes that “the simple mechanics of the body contribute to both these basic repeated situations and, since these properties are the same for all humans, it is no wonder that there is a tremendous degree of repetiveness in the spatial measurements of camps used by hunter-gatherers” (Binford 1983:173). Fisher and Strickland also concluded that the human body is an important factor in determining how far the outside hearth is from the hut and other exterior fires in Efe camps (Fischer and Strickland 1991:227).

Environmental factors and the presence of immobile features at a campsite can also impact the spatial arrangement of camps and their future activities. The type of environment inhabited by a culture group directly impacts the size of base camps and other sites. The Efe live in a heavily forested area and so their camps are constrained by the dense foliage, while the !Kung, though they live in a more open savannah, keep their camps small to protect themselves from predators (Fisher and Strickland 1991:228-230). The type of environment and natural features not only have an impact on how a site is arranged, but will also have an impact on what type of site is created. For example, the Nunamiut look carefully at the local environment before selecting and setting up hunting blinds for the procurement of caribou (Binford 1978:287).

Permanent, manmade features also heavily influence the spatial structure of a site. Leroi-Gourhan (1984) in his Pincevent model defines two different types of features that
can have an impact on the site sturcture; evidentes structures, which are hearths and other well defined features, and latentes features, which include, but are not limited to, areas of chipped stone, bone refuse, FCR, etc. (in Gamble 1991:11-13). These features, once created, impact the future use of space, and may have in turn been impacted by a past use of the site.

The basis of an analysis of site structure is to look at “how spatial models mesh within the structure of a site as an entity in its own right” (Binford 1983:172). When undertaking the analysis of site structure there are two things that, according to Binford, archaeologists must consider; first, the archaeologists must determine which analytical techniques are the most appropriate for identifying the patterns present at the site being studied, and second, what behaviors, in the form of “relationships between various forms of recognized patterning and the organization of life and work among the humans responsible”, are represented (Binford 1987:461).

In order to understand the behavior behind artifacts and their spatial location, archaeologists must first identify the behavioral context in which the artifacts became the part of the archaeological record and the stage of ‘life’ at which the artifact enters the archaeological record (Newell 1987:113). Nicholson and Crane (1991:268) did a study with the Aborigines in Australia in which while looking at rock shelters and campsites they tried to match behaviors with specific artifact patterns. Based on this study they concluded that the size of hearths might not accurately represent what activities were taking place and what was being cooked at the hearths. For example, they hypothesized that the largest hearths were being used to cook meat, but upon further examination and through ethnographical research, they concluded that the largest hearths were in fact
being used to cook tubers (Nicholson and Crane 1991:330). Boismier, on the other hand felt that his study with subarctic sites showed that “features do actually reflect the differences and similarities in the behavioral contexts of use that occurred between the houses and the kashim” (1991:204).

Regardless of how accurate the hypotheses and theories of archaeologists are, one fact remains and that is that “humans are creatures of patterns – our cultural material is patterned, our behavior is patterned, our culture is patterned and the interrelationship among cultural material, behavior, and culture is patterned” (Kent 1987:3). Individual behavior, despite unique individuality, is not random, but is determined by a large number of cultural and physical factors that influence how humans create spatial patterns. Conversely, Hodder and Orton argue, “non-random behavior is often not apparent in the spatial patterns. Many of the observed archaeological patterns have a form which is similar to patterns produced by a random process”, so that archaeologists cannot assume that all random patterns are created by random processes (Hodder and Orton 1976:9).

If Hodder and Orton were correct in this assumption then there would be no way to determine behavior from spatial patterns; non-random behavior, to some extent, must create non-random archaeological spatial patterns. Within hunter-gatherer societies, and even human nature as a whole, very little of what people do and create is random and purposeless. Therefore, most behavior is not random and so the patterns created cannot be random either, though the resulting spatial patterns may seem random. Curry proposed, “every decision may be optimal from a particular point of view and yet the resulting actions as a whole may appear as random” (1964:138).
This does not mean that every time a specific activity occurs that a conclusive debris pattern is created. There will always be differences between every site despite being the result of a similar behavior. It also must be considered that different behaviors can have similar debris patterns occurring in the archaeological record and, vice versa, similar behaviors can have different debris patterns occurring in the archaeological record, especially as they occur between different cultures (Binford 1987:503). To fully understand the patterns in the archaeological record, archaeologists must “understand the interrelationships between behaviors, and their integration with other behaviors” (Binford 1987:503). Schiffer promoted the idea that even though artifacts and their spatial patterning is a somewhat distorted reflection of past behaviors, because cultural and even non-cultural factors, which influence these patterns and the distortions of these patterns, are patterned in of themselves that there are recognizable patterns between archaeological remains and the behaviors and cultural systems that created them (Schiffer 1995:35).

Non-cultural site formation processes can also have a huge impact on the spatial patterning of artifacts at sites, though the extent of this impact varies from site to site in regards to environment type, weather patterns, the movement of water, and local fauna. The spatial patterns left at the camp compared with what the archaeologist finds could be changed enough to lead to significant misinterpretations; “the reconstructive challenge to archaeologists is daunting” (Bartram et al. 1991:110). Hodder and Orton identify “spatial variation in site survival” as being one of the greatest problems with using spatial analysis to understand archaeological sites (Hodder and Orton 1976:237). But, as Schiffer argues, many of these non-cultural factors can be understood and measured.
scientifically making them more predictable and their impact on archaeological sites more understandable.

One process developed by Schiffer (1995) to link archaeological data with behavior theories follows a relatively linear line of thought. The researcher should begin with statements about past organizations, and then determine their accuracy and relevance to the data at hand. Once accuracy and relevance are determined, activity structures can be identified. From activity structures, the site formation processes are identified leading to archaeological context data (Schiffer 1995:33). Brooks and Yellen argue that the process cannot be so simple and “a knowledge of such factors as hunting technology, topography and hydrology, prey animal habits and predator pressure, factors which demonstrably structure the spatial arrangement” also need to be considered and can help archaeologists to “predict major aspects of the spatial organization of activities for past cultural systems” (Brooks and Yellen 1987:68).

Activity Areas

When trying to understand the spatial patterns at a site, it is important for the archaeologist to identify activity areas, and subsequently the activities that were occurring in those areas. This is especially important at prehistoric sites where there is often nothing to help with the interpretation of the site but the identification of activity areas. That being said, “the prehistorian cannot reconstruct any activity undertaken by a given society unless that activity produced some preserved material evidence” (Freeman 1968:265). This has led many archaeologists to develop and use theories that allow them to construct intangible parts of a culture from tangible items and their spatial arrangement.
Before activity areas are recognized, the artifacts found at a site need be classified. To identify artifacts, archaeologists need to look not only at what a specific item is and what it is made out of, but if it can be placed within certain categories that provide additional cultural information. For hunter-gatherer societies, Binford created three categories relating to types of gear based on his work with the Nunamiut. The first type is personal gear. Personal gear is anticipatory in nature and is “carried by individuals in anticipation of future condition or activities” (Binford 1979:276). The Nunamiut based their personal gear on what type of trip they were planning on taking, hunger and warmth needs, and they planned for any potential problems that may have been encountered.

Because personal gear is anticipatory, all manufacturing and repair is done at residential camps, not in the field (Binford 1979:277-278). Binford noted that personal, and household, gear is often manufactured in steps. He related these steps to transport junctures in which an item was potentially processed at one site, moved, processed again, moved, so on and so forth until finally being discarded (Binford 1979:282). This means that throughout the life of an artifact, bits and pieces of it are left behind at different locations throughout the landscape and this can provide clues to archaeologists not only about how sites are connected to one another, but can also help archaeologists identify types of sites based on what pieces of artifacts are found and which are not.

The second type of artifact identified by Binford is site furniture. Similar to personal gear, site furniture is anticipatory in nature, but instead of being carried from site to site it stays at one place and is considered, at least by the Nunamiut, to be a part of the site itself. Examples of this type of artifact include hearths, hearthstones, anvils, etc.
Artifacts of this nature also tend to be larger and more awkward to carry from site to site, so they are scattered throughout the landscape in locations where they will be the most useful to traveling hunter-gatherers (Binford 1979:278).

The third and final type of artifact is situational gear. Unlike the other two categories, situational gear is responsive, not anticipatory. Specifically, situational gear is “gathered, produced, or ‘drafted into use’ for purposes of carrying out a specific activity” (Binford 1979:280). Expedient tools that are made from nearby raw materials are a common type of situational gear (Binford 1979:280).

In addition to artifact type and its use, or uses, the raw material that an artifact is made out of can have a significant impact on how and where an item ends up spatially. Newell believes that the “location of execution of these modes are in part determined by the properties of the raw materials themselves” (Newell 1987:111). Raw materials can also have an impact on the spatial arrangement of camps and the behaviors that occur while moving from site to site. Binford identified two ways in which hunter-gatherers locate and gather raw material resources, logistically organized groups and embedded procurement. Logistically organized cultures include groups that leave base camps to gather resources; in the process they create smaller, short-term camps that are identifiable in the archaeological record (Binford 1979:285). Groups that practice embedded procurement gather raw materials as they come upon them while moving or completing another task, which creates less variation in site types (Binford 1979:273-274).

Even though artifacts must be placed into categories and identified as to having a specific use, it cannot be forgotten that the identification of tools and other artifacts is not always easily definable and that some may fall into different categories, or may have
been used in different ways throughout their lives. Nicholson and Cane concluded that the “impromptu use of artefacts must not be disregarded in the interpretation of prehistoric assemblages” after they discovered that a handstone and block of ochre had been used to smash bones, even though this was not the traditional use for these items (Nicholson and Cane 1991:339). Archaeologists also have to keep in mind that even though artifacts may have been found together, that does not mean that they were used together; many processes act upon artifacts after they enter the archaeological record that can significantly impact the integrity of the site (Gamble 1991:14).

In order to complete a spatial analysis, once the artifacts have been identified, activity areas need to be located within the site. This can be done in several different ways by looking at spatial maps of the excavated area. One possible method that can be used to locate activity areas is the point pattern analysis. This analysis lets archaeologists use the mapped coordinates of artifacts to identify clustering of artifacts (Hivernel and Hodder 1984:100). Hodder and Orton (1976) also suggest using a trend surface analysis in order to find activity areas within large and random seeming artifact distributions. This method uses contour lines to help isolate areas with dense numbers of artifacts; for example, they suggest using contour intervals of five finds per meter, but depending on each site an appropriate interval should be chosen accordingly (Hodder and Orton 1976:155-160).

In addition to using artifacts as suggested above in the identification of activity areas, Newell proposes that three additional variables need to be considered in relation to artifacts and activity areas. These variables are the number of diagnostic artifacts, the spatial integrity of the artifacts, and the curative, or recyclable value of the artifacts.
These variables, though not directly related to finding activity areas, are important to consider when identifying activity areas and their relation to one another within the boundaries of the site.

According to Ferring (1984), there are two different types of intrasite spatial patterning, spatial clustering and compositional patterning, that can be used to identify and co-associate activity areas. Spatial clustering is the “areal extent as well as the absolute and relative spatial density of things within the minimum dated horizon” (Ferring 1984:116). This is similar to the trend surface analysis mentioned above because they both use artifact density to locate activity areas. Compositional patterning on the other hand lets archaeologists look at the “spatial distribution of selected categories of artifacts or ecofacts within the minimum dated horizon” (Ferring 1984:117).

While looking for activity areas, it is important for the archaeologist to constantly consider the surrounding environment of the site and what type of site they are expecting to find. Hayden (1979) identifies two types of debris patterns that vary depending on the type of site. A dispersed pattern is “characteristic of open sites where little or no use is made of shelters”, and restricted patterns are “produced when movement is restricted by shelters or rock-shelters” (in Nicholson and Cane 1991:267). He proposes that restricted patterns are also more commonly found at cold, or wet weather sites and could therefore help determine the seasonality of the site (in Nicholson and Cane 1991:267).

The potential reuse and/or reoccupation of a site can also have a large impact on the spatial patterns of a site and the problems that may be encountered when trying to identify activity areas. The reuse of a site refers to space that is “organized and used in a pattern which is spatially congruent with previous occupations”, while reoccupation is the
“redundant use of space without spatial congruence” (Brooks and Yellen 1987:69). At sites with reuse, one would expect similar activities to take place in relatively the same areas and so activity areas can be easier to identify, and may appear consistently throughout each component of the site. Unfortunately, with reoccupation, the opposite is true; activity areas are harder to identify because of significant overlap and possible destruction of the integrity of the site by the later occupants (Brooks and Yellen 1987:69).

After having identified clusters on the spatial maps, Hivernel and Hodder suggest the next step is to see if one artifact cluster relates to another in relation to types of artifacts present and cluster location within the site. Accordingly, clusters with resorting and random intermingling could indicate a home base; distinct clusters in spaced locations and little versatility in artifact type indicate short-term occupations, or special activity areas; distinct clusters with many different artifact types most likely belong to middens (Hivernel and Hodder 1984:100). Not all activity areas will relate to one another within the site and these have been identified as monofunctional activity areas that tend to be segregated from other activity areas at the same site (Brooks and Yellen 1987:74).

But, oftentimes relating clusters and activity areas is not as simple as suggested by Hivernel and Hodder. Brooks and Yellen (1987) propose several questions that should be asked when looking at the clustering of activities:

1. To what extent is some activity equally likely to be located at any point within the general area of group activity?
2. If activity events are clumped within the patch, then to what degree are the clumps differentiated?

3. Do all within site activity areas sustain the same range of activities?

4. Are any activities segregated from all others in space?

By asking and trying to find the answers to these questions archaeologists are taking more factors into consideration about the relationships and spacing between activity areas and artifact clusters (Brooks and Yellen 1987:74).

In order to identify what type of activity was occurring at each activity area, “each activity type must first be assumed to be the result of the behavior of a distinct party type” (Freeman 1968:267). In order to determine what type of behavior created specific activity areas, Brooks and Yellen also created five debris-generating behavior categories.

1. Procurement – gathering, hunting, harvesting, collecting.

2. Processing – butchering, peeling, cracking shells, roasting, and any other activity that has to do with preparing food to be eaten.

3. Consumption – eating of food within social conscripts.

4. Manufacturing – the processing of non-food items.

5. Middens – the creation of refuse areas. (1987:70-71)

Additionally, there are activities that modify the land itself through construction, excavation, and compaction (Brooks and Yellen 1987:71). When considering which activities should be placed within each of the above categories, Brooks and Yellen attempted to determine what levels of activity patterning affected each activity type, and concluded that there are three major types; techno-economic, sociologic, and ideologic.
Activities at the techno-economic level are heavily influenced by environmental factors, technology, and the spatial requirements needed to complete each activity, the sociologic level deals with age, sex, and status, and the ideologic level has to do with ritual activities (Brooks and Yellen 1987:69-70).

Activity areas can also be differentiated into intensive use areas and extensive use areas. Extensively used areas are parts of the site that had been permanently segregated for sleeping and other domestic tasks; these spaces are often defined by enclosure in a shelter of some type. Intensively used areas are places where several different activities occur, but at different times throughout the day, these areas are greatly impacted by the amount of light and heat they receive (Binford 1983:185).

According to Yellen (1977), there are three types of classifications for activity areas: communal, nuclear, and special. He came up with these three classifications because he believed that “an individual…sees a threelfold spatial division: the area belonging to him and his family, the similar places occupied by other families, and the area shared by all camp members” (Yellen 1977:89). By locating these activity areas within a site, Yellen believed that the relationship between an activity and its place could be discovered by first determining which areas were communal and which were nuclear, and second by drawing a line between the family areas and areas that were used for special activities (Yellen 1977:85). By following those two steps, Yellen created the Ring Model, which was based on his work with the !Kung.

The ring model allows archaeologists to divide a site up into specific areas and then make determinations about how the site was used; for example, Yellen believed that the size of the inner ring directly corresponded to the number of people that had occupied
the site, and the outer ring was an indication of how long the camp was occupied (Yellen 1977:125-126). He believed that even though this model was based on one particular group of people, he also argued that it could be used at sites with ‘meaningless’ scatters of artifacts. The model would help to identify clusters and once they were identified they could be measured in size and richness, and then compared to each other (Yellen 1977:131).

Different tasks take varying amounts of time to complete and so it would make sense that task that will take long periods of time to complete would be done in special areas so that they would be kept out of the way of other activities occurring in the vicinity. During his time with the Nunamiut, Binford found this to be true and noted that “those tasks expected to take some time are therefore generally relegated to areas where they can monopolize space, while not interfering with tasks which require shorter periods of time” (Binford 1983:187). We can also assume that many of these time consuming tasks would occur outside of the shelters so that they would not be in the way of cooking and sleeping.

While completing work at a prehistoric/early historic Inupiat village, Newell came up with four hypotheses about outside activity areas.

1. Structures, fixtures, furniture, and features indicate specific activities. The location, horizontal dispersion, and nature of the respective activities are defined by the structure and/or the state of utilization of the artifacts.
2. Spatially contiguous association of functionally related, single function (specialized) tools and waste products indicate specific intentional activities.
3. Some activities which clearly took place outside the house are not confined to a specific locus, i.e., do not cluster. They are characterized by a lack of functionally specific artifacts and a lack of specific locations of waste. Such activities are incidental, dispersed, of expedient disposal and are not the result of a single event, but rather the cumulative result of many repetitive events, lacking discrete spatial parameters.
4. Some activities which did not take place at the site are represented on the site, e.g., hunting or whaling. (Newell 1987:139)

Based on these hypotheses, Newell concludes that there are cultural influences and planning behind how outside space is used at the Utqiagvik village (Newell 1987:134-135). Even though these hypotheses about outside activity areas are based on a specific village site, they are generic in nature and can be considered when looking at a variety of prehistoric sites.

Brooks and Yellen developed another model to aid in the identification of activity areas and understanding the formation of sites by foraging groups. This model was tested on sites in the northwestern portion of the Kalahari, an area that has been occupied by humans for over 80,000 years (Brooks and Yellen 1987:66). By basing this model on ethnographic data they looked at activity overlap, or spatial redundancy by considering five different aspects.

1. The role of spatial redundancy in the creation of large debris concentrations.
2. If a site is reoccupied, activity debris in the archaeological record are more likely to reflect activity areas if the same activities are performed in the same areas and if the occupations are short enough that there is no or limited secondary disposal.
3. Spatial redundancy and activities are severely impacted by organizational and environmental factors.
4. Sites associated with the procurement of a specific resource or special landscape feature are more likely to be reoccupied and therefore have more spatial redundancy versus open-air camps.
5. Activities associated with spatial redundancy will be disproportionately represented in the archaeological record (Brooks and Yellen 1987:68-69).

Even though this work was based on a hunter-gatherer society in Africa, these aspects are relevant to the consideration of hunter-gatherer societies as a whole, especially in terms
of the reoccupation and/or reuse of prehistoric sites and will be considered during the analysis of 24HL1085.

At the end of his work with the Nunamiut, and taking into consideration much of what was described above, Binford came up with two conclusions about activity areas at hunter-gatherer sites. First, general work areas can be differentiated from specialized activity areas by size, which is determined in a large part by what position the worker is in (sitting versus standing), and the size of the work that is being done. Second, that sites that are planned to some extent have general work areas and special activity areas arranged so that the specialized, and possibly uncommon activities, will not interfere with daily tasks (Binford 1987:500).

Despite the tools archaeologists have at their disposal when completing a spatial analysis, there are some potential problems that can occur when using this type of analysis, though they should in no way prevent archaeologists from doing spatial analyses. As Boismier states,

the mapping relationship between items of material culture, individuals, and activities have been shown to change as items move from one behavioral context to another in relation to the organizational characteristics of the division of labor and that these changes in the context of activity performance produce variable patterns of association and covariation between items (Boismier 1991:211).

The variation that can occur between artifacts, activity areas, and behaviors can cause many problems with the accuracy of archaeological assumptions about past cultures and how specific sites were created. For example, at one site in Australia, Nicholson and Cane studied a modern stone working site that also had a hearth feature and artifacts generally associated with habitation sites. They believed that had this site been a prehistoric occupation, it would have likely been identified incorrectly because even
though it was specifically a stone working site, domestic activities had also been done there (Nicholson and Cane 1991:338).

In addition to the identification of activity areas, spatial analysis is also a tool that can be used to determine the spatial extent of a site and estimate the size of the population. In turn, understanding the size of the site and population size can also help in the identification of the type of site that is being examined. There are a variety of factors that can affect the size of a site and the spatial arrangement of debris including, but not limited to, “warmth, group size, length of stay, type of activity, anticipated mobility, abandonment behavior” etc. (Banguilan 2001:13). The population that inhabits a site conditions how the site will be used through cultural norms and behaviors, but only to a limited extent and it does not determine the pattern of space used for specific activities (Binford and Bertram 1977:84).

One basic conclusion is that the larger the population inhabiting a site, the larger the site will be, and the more varied the activities that took place. While this statement is true to some extent, the size of the population that once inhabited a site cannot be exclusively determined through one or two factors of the site, but must be considered after looking at the entire spatial arrangement of the site. While doing their work with the Australian Aborigines, Nicholson and Cane determined that the smaller the sleeping area, the less people that had inhabited the camp, but that the size of the working area remained relatively the same in size despite an increase in population (Nicholson and Cane 1991:319).

They also noticed that the number of cooking hearths present at a site does not necessarily correspond with the number of people who stayed at the site, but that sleeping
hearth can be a much better indicator of population size (Nicholson and Cane 1991:319). The !Kung are similar to the Aborigines in that an increase in population size does not necessarily mean that the size of the cooking area and number of hearths will also increase (O’Connell 1987:100).

Nicholson and Cane also made several observations about the number of artifacts and their relation to population size and length of stay. At the Aborigine camps, the number of artifacts had no relation to the number of people occupying the site; instead the discard rates of artifacts are more directly related to the function of the site resulting from “changes in the internal organization of activities” (Nicholson and Cane 1991:347). They also noted that the number of artifacts did not relate to how long the camp was occupied (Nicholson and Cane 1991:339). While this may be true for camps that vary in occupation time by a few weeks, or even months, eventually the length of stay will have an impact on the number of artifacts present and so should not be totally discounted as an indicator of occupation duration.

Being able to predict the size of the population that once inhabited a site, and its duration of occupation is an important step in connecting the data from a spatial analysis to the more intangible aspects of the culture. As the number of people in a place increases, the more complicated the social rules that begin to exist. According to Ferring, “functional differentiation among socioeconomic subunits at a single site may be expected to increase as the number of subunits increases. Thus for a larger settlement unit, greater task differentiation is expected as a mechanism to reduce competition and maximize efficiency of task scheduling” (Ferring 1984:119). This is also true for mobile communities, such as would have lived at 24HL1085. Fletcher (1991:412) notes,
“conspicuous simple, spatial patterns may be necessary in very large mobile communities, to make the positioning of people more predictable and to assist the predictability of route activity within the settlement”. Even though Fletcher refers specifically to ‘very large mobile communities’, this should be true to some extent for all mobile people. Moving from place to place throughout the year takes a certain amount of planning and organization so that all needs are met.

Understanding the social factors behind spatial patterning is necessary to help in the interpretation of prehistoric sites, especially of cultures that have no written records and/or modern counterparts. People do not just see and use space based on physical characteristics of the environment and the tasks they wish to accomplish, but it is also based on the human need to constantly segregate different categories of activities and people of different social status (Fletcher 1977:48-49). Schiffer has designated these cultural influences as c-transforms. A c-transform is a cultural formation process that can help archaeologists to understand how people interact with material objects that eventually end up in the archaeological record; “only c-transforms can be used to predict the materials that will or will not be deposited by a system” (Schiffer 1995:37). Any other factor is considered an n-transform, or a non-cultural formation process, which help archaeologists understand the interaction between cultural materials and the environment (Schiffer 1995:37-38).

The patterns of settlement created by humans are not only reflections of social rules and constructs, but they are physical manifestations of the society (Parkington and Mills 1991:355). This can help archaeologists gain insights about the state of relationships between members of the group. According to Cribb, “a nomad camp will
directly reflect in its spatial organization the current and transitory state of relationships and relations between its constituent households” (Cribb 1991:371). The social patterns that are manifested in the spatial arrangement of living quarters can vary with how sedentary a group is. The spatial arrangements of herder camps tend to reflect culturally determined ranks and status of individuals, while camps for hunter-gatherers are more likely to be constructed around kinship patterns (Parkington and Mills 1991:363). This differentiation between the two groups may be a result of property and ownership values that tend to accompany herder groups.

In societies that only have oral traditions, the material culture is the device through which ideas are represented, retrieved and disseminated, so material culture, even though influenced by social constructs, in turn influences the social relations of a community and its physical organization at a site (Parkington and Mills 1991:365). In San camps, dwellings are close together and doorways face one another in an effort to limit privacy, which enforces community sharing (Parkington and Mills 1991:357). The Efe also keep dwellings close together at camps in order to promote sharing, but this is not the case with the Australian Ngatatjara, who set up camps with large distances between dwellings, but has the same value of community sharing (Fischer and Strickland 1991:229-230). Therefore, the spatial layout of a settlement not only helps to sanction behaviors, but it also projects rules about how the society should function (Parkington and Mills 1991:366).

Beyond identifiable cultural rules, there are less understandable reasons for the spatial layout of a settlement. Though culturally impacted in some ways, people tend to prefer particular dimensions in structures and settlements for reasons that have to do with
comfort and personal preferences (Fletcher 1977:57). Often these preferences cannot be measured, but are estimated by the people who create them, “regularities in the spaces between people of within and around structures need not, therefore, depend on conscious recognition of order, or on the use of any measuring device other than visual estimation” (Fletcher 1977:49). This is relevant when trying to understand the spatial structure of a site, because the space between different features is likely to be inconsistent and not the product of exact measurements.

Anticipated mobility is a factor that deals with how long a group of people intend to occupy a specific site and is extremely influential in terms of the spatial patterns of the site; it “accounts for a larger percentage of site structure variability than does subsistence procurement strategies” (Kent 1991:35). This means that when considering how material remains are patterned at a site, archaeologists must evaluate how, why, and the speed at which people left the site (Lange and Rydberg 1972:430). Since mobile people occupy sites for shorter periods of time, by allowing for anticipated mobility, archaeologists can directly relate what is left at a site to how the site was created, used, and abandoned (Gamble 1991:2).

Many of the theories and assumptions proposed in the preceding pages comes not only from excavated archaeological sites, but from working with modern hunter-gatherers and studying ethnographies. Hodder and Orton believe that prehistoric archaeological sites cannot just be understood through excavation and lab analyses, but “one must look to non-spatial evidence to corroborate or disprove theories about spatial processes” (Hodder and Orton 1976:8), and there are many examples of successfully completed studies. During Boismier’s work with the Ingalik in Alaska, he used
ethnographic accounts and field reports in order to understand parts of the culture, such as sexual division in labor, that are less likely to leave physical evidence, but still have a role in spatial patterns (Boismier 1991:192).

Despite the obvious benefits to using ethnographies as an aid in the interpretation of spatial patterns, some archaeologists feel that their benefits are limited in value. Nicholson and Cane believe that ethnographic studies only consider the “broad issues of living space rather than concentrating on the precise measurement of spatial relationships within camps” (Nicholson and Cane 1991:268). Binford has problems with using ethnographic analogies on sites that are in different culture areas because “it fails to take into account the archaeological consequences of similar behaviors that may be organized differently” (Binford 1987:451). Binford’s concern is understandable, but in areas where there are no ethnographies to aid in site interpretation, parallels between cultures with similar subsistence patterns should be used to help understand spatial patterns with the acceptance that there is a possibility for error.

Refuse/Site Maintenance

Archaeology is a study of what people have left behind, sometimes unintentionally, but more often it is a study of garbage. Any item that has been discarded from a cultural system is considered refuse, and so when completing a spatial analysis it is important to understand how people throw things away and treat refuse. Schiffer defines refuse as “the post discard condition of an element – the condition of no longer participating in a behavioral system” (Schiffer 1995:28). There are three categories of refuse that an artifact can fall into, primary, secondary, and de facto. Primary refuse describes all artifacts that were discarded where they were used (Schiffer 1995:31).
Newell classifies primary refuse as primary disposal. Finding primary disposal is a good indicator of an activity area, and any artifacts found should not be diagnostic or the product of said activity (Newell 1987:144).

Secondary refuse includes artifacts that were used in one place but discarded in a different location (Schiffer 1995:31). Similar to primary refuse, Newell describes secondary refuse as secondary disposal; “the intentional collection and disposal of waste collected elsewhere and intentionally deposited in one or more places reserved for that purpose” (Newell 1987:144). He also stresses that once items have been placed in a midden, or refuse area, it can still be removed from the midden and reused, or acted upon by scavenging (Newell 1987:144). Nicholson and Crane propose that secondary discard typically occurs at sites with longer occupations and sites that have been reused, or reoccupied (Nicholson and Cane 1991:264).

According to Binford, “understanding the organizational relationships among items recovered from the site depends on teasing out structural patterns in the observed data, not on some conventional separation, made on purely formal grounds, but with primary and secondary refuse” (Binford 1983:190). Understanding the spatial relationship of primary and secondary refuse, not only to each other, but the rest of the site is an important step to understanding how the site was created, used, and eventually abandoned.

De facto refuse describes all artifacts that have entered the archaeological record, but are still usable, or may have entered prematurely, including, but not limited to, lost items, grave goods, ceremonial items, etc. (Schiffer 1995:29). The presence of de facto artifacts can be a good indicator of whether or not a site was abandoned suddenly, or if it
went through an abandonment process; “we would expect to find relatively fewer elements in prediscard processes of systemic context, that is, less de facto refuse, in sites which undergo differential abandonment” (Schiffer 1995:30). Comprehending the abandonment of a site is essential to completing a spatial analysis, because where the artifacts were left at this last stage of the occupation is, generally, where they are found.

There are many different categories of activities that can produce refuse at a hunter-gatherer site. While working with the Hadza, O’Connell et al. (1991:69-70), identified four types of activities that produce refuse; weapons maintenance, clothing maintenance, tool maintenance, and food processing. They discovered that while women did all clothing and tool maintenance, and the food processing, they made up only 35% of the refuse left behind. They also noted that 86% of these activities took place in communal areas, and that this is opposite from the Alyawara who do most of their activities in non-communal areas.

Processing, a “timed series of activities comprising several processing steps” (Binford 1987:495), is another type of activity that can lead to specialized dumps at the site. These dumps should be relatively easy to identify within the archaeological record because all artifacts found within that spatial area should be associated with the task that was accomplished. For example, if food processing is occurring, then these specialized dumps will have broken and discarded tools associated with the processing of food and faunal remains, because according to Binford, “the density plots of bones betray locations of activities as well as something of the character of refuse disposal” (Binford 1987:477).

Unlike primary and de facto refuse, secondary refuse is often impacted by site maintenance activities. Binford divided site maintenance into two possible categories,
preventative maintenance, which is “the disposal of items away from intensively used spaces”, and post hoc maintenance, “the actual cleaning up of areas and the transport of the debris collected to special dumping areas” (Binford 1983:189). Schiffer proposes that the decision between using the different types of site maintenance is based on whether or not it is easier to move the activity creating the byproducts, or if it is easier to move the refuse (Schiffer 1995:31).

The length of time that a site is occupied will also have a significant impact on site maintenance activities and amount of refuse present. The longer a group stays at a site, the more site maintenance that will take place so that refuse buildup will not get in the way of future activities, and it is more likely there will be special activity areas on the periphery of domestic areas (Binford 1987:498-499). While this concept is true much of the time, it should not be followed blindly. Many other factors, such as site type, number of people, and natural site formation processes have an impact on the amount of refuse found at a site and should be considered accordingly.

Another factor that needs to be taken into consideration when doing a spatial analysis of a site and its refuse patterns is the method of disposal being used. For hunter-gatherer cultures, Binford identified three modes of disposal, “dropping discrete items in situ, tossing away discrete items, and tossing away aggregated items en masse” (Binford 1983:156). Using these three modes, Binford created the men’s outside hearth model. Focusing on a central hearth, the model differentiates toss zones and drop zones, with the toss zones representing preventative maintenance because objects are immediately moved out of the way of the continuing activity (Binford 1983:153).
In addition to Binford’s modes of disposal, Kent identified three specific variables that should be considered when trying to understand the spatial patterns of discarded artifacts. First, the archaeologists should look at the relationship between mass-produced, bulky, and durable items and the disposal patterns; second, the length of stay, type of site, and the size of the site; third, whether or not there is evidence for a planned reoccupation, or reuse, of the site (Kent 1987:45). In addition to those three variables, to fully understand refuse disposal and abandonment, the “degree of sedentism, size and bulkiness of objects, size of habitation, mode and length of site abandonment, transportation available, and specialization present” also have to be taken into account (Kent 1987:47). Being able to take all of the above variables into account while completing a spatial analysis of a site with a lot of refuse is somewhat idealistic, and not all of the variables can be known at every site.

The size of a campsite can also determine when site maintenance begins. Theoretically, at a smaller camp the cleanup should begin sooner than at a larger camp because smaller spaces get filled up with trash sooner, assuming the same types of activities are taking place (Fischer and Strickland 1991:231). According to Kent, “middens and other specialized trash areas at prehistoric sites are used in increasing frequency as the relationship between size and length of occupation increases proportionately with the prevalence of mass produced, bulky, and durable objects” (Kent 1987:45).

Locating middens and refuse areas can go beyond helping to predict site size and length of occupation, it can also help to locate other features within the site. It has been noted ethnographically that many people of different cultures ‘breakfast in bed’, which
can leave small trash piles near the sleeping areas, or all the breakfast debris are collected and dumped together creating a ‘breakfast dump’ (Binford 1983:164-165). Dumps are also often found outside where the door to a dwelling would have been located, like at the Clean Lady site in Alaska (Binford 1983:151).

By using ethnographic data, archaeologists can create a list of relationships between campsite features and refuse deposits, and the spatial consequences of such relationships at hunter-gatherer sites (Fischer and Strickland 1991:224). The work done by Fischer and Strickland with the Efe pygmies in the Ituri Forest, Zaire, is a good example of how this method is put into practice. The goal of their research was to try to reconstruct the location of dwellings at hunter-gatherer campsites by analyzing the location of hearths and refuse. This work is important because the location of dwellings at camp sites help to determine the “placement of fires, trash heaps and other discarded materials, and indeed the locations where people perform campsite activities” (Fischer and Strickland 1991:216). This is also likely to be true for other hunter-gatherer groups besides the Pygmies, and so the research is relevant to other research areas.

Considering the spatial patterns of the Efe camp can aid in the interpretation of the spatial patterns at 24HL1085, because even though these two sites are representative of very different cultures, they are similar enough in mobility and lifestyle that the ethnographic information should be taken into consideration. Similar to the Plains natives, the Efe are a highly mobile people that inhabit campsites for an average of six weeks, though they can stay for as little as a couple of days and as long as several months, and the population of the camps tends to range from one nuclear family to about 50 people. The Efe hunt large game with bows and arrows, and spears, and supplement
their diet with smaller game and plant food that they sometimes obtain through trade (Fischer and Strickland 1991:218). The mobility pattern for the Efe is constrained, meaning that they “establish new camps frequently, but within a limited geographic area”, and so they often reoccupy abandoned camps (Fischer and Strickland 1991:218).

Hitchcock proposes, “the distance separating dwellings from trash dumps relates to the degree of mobility”; for example, the San of the Kalahari, a sedentary people, have dumps that are placed farther from their dwellings, compared to the Efe, who position their trash dumps near their huts (in Fischer and Strickland 1991:231). Though not necessarily true for all cultures, this presumption makes sense because people who are staying in one place for longer periods of time will produce more trash and need larger dumps situated away from dwellings so that activities can proceed unimpeded.

Fisher and Strickland’s work with the Efe also led them to suggest that differentiated versus undifferentiated trash heaps can help identify if collectors or foragers occupied a site. They explain that foragers, like the Efe, meet needs on a day to day basis and so “they conduct few campsite activities in special activity areas, and discard all varieties of refuse on trash heaps without segregation” (Fischer and Strickland 1991:231), creating undifferentiated trash heaps. Collectors create differentiated trash heaps because they have more segregated activities that are a part of planning for future needs.

The last cultural factors to act upon middens and refuse at a site are site abandonment behaviors. Site abandonment behaviors play an important role in the site formation processes and are often the activities most represented by what is found at a site by archaeologists. There are some archaeologists who see evidence of site clean-up
and abandonment behaviors as an impediment to an accurate interpretation of a site because it disrupts the original spatial patterns and moves artifacts, but Gamble believes that “site maintenance behavior is not a filter on spatial patterns but rather a part of the behavioral process responsible for the observed distributions” (Gamble 1991:14). Newell considers the pre-abandonment of a site to have had very little impact on “the nature, content, or frequency of the materials which entered the archaeological record” (Newell 1987:149). Site abandonment activities, though potentially disruptive to the spatial patterns originally created, are still a cultural process that can provide information about how that site was viewed, such as if the people cleaned up because they intended to return, and is the best reason for archaeologists to work at understanding how hunter-gatherers treated their trash.

Stevenson’s Three Ring Model

While drawing from the spatial theories and models identified above, the bulk of the analysis of site 24HL1085 will be accomplished through the use of Stevenson’s three ring model. This model is based on Binford’s men’s outside hearth model described in the previous section (Stevenson 1985:75). While Binford’s model is a good place to start for understanding the semi-circular patterns that are found at many hunter-gatherer camp sites, Stevenson felt that this model could not account for all debris patterns at camp sites and added the displacement zone. This additional zone is “where items additionally discarded in their areas of use were displaced towards the periphery of activity areas because of the potentially disruptive nature of refuse buildup in the ‘drop-zone’” (Stevenson 1985:75). In other words, Stevenson was trying to account for artifacts that
were moved after being discarded, such as O’Connell (1987) describes during his work with the Alyawara.

In order to show the viability of his model, Stevenson used it to complete a spatial analysis of the Peace Point Site. Peace Point is located along the Peace River in northern Alberta, Canada. The site was dated to about 2,500 B.P. and is fairly well preserved due to rapid sedimentation from the river. Approximately 95% of the lithics found are primary and secondary debitage indicating that the site was used for the manufacturing of stone tools (Stevenson 1985:69). This site is similar in many respects to 24HL1085 and because of the success Stevenson had using the model at Peace Point, I feel that the model is also appropriate for 24HL1085.

One important aspect of this model is that it allows Stevenson to “take into account the distinct possibility that remains produced at various times during the occupation of a site are not subject to identical degrees or type of cultural disturbance” (Stevenson 1985:68). He allows for the fact that not only are artifacts acted upon by site formation processes after the site has been abandoned, but that even before the site is abandoned artifacts can be moved, reused, or broken even further.

Through his model Stevenson attempts to not only identify the locations of the three rings at a site, but also by using the three ring model Stevenson proposes that the phase of occupation the site was in when abandoned can be identified. He has recognized three periods of activity that make up hunter-gatherer campsites; initial phase, occupational (exploitation) phase, and final or abandonment phase (Stevenson 1985:64 and Stevenson 1991:282). The initial phase is when site preparation activities are performed. If a site was abandoned, or only a certain area used during this phase, then
the artifacts typically associated with this phase are worn or curated tools that are made from non-local raw materials and tertiary flakes from these tools will be present as the tools are repaired or resharpened. Large artifacts tend to remain on the surface, while smaller items have been pressed into the soil. Primary debitage is also common from the manufacturing of expedient tools made from local raw materials; little or no secondary debitage should be present (Stevenson 1985:66-67). Tools discarded during this phase show evidence of construction and gearing up activities; there is very little formal disposal of refuse (Keeley 1991:258-259).

The occupation, or exploitation phase, is when all procurement, processing, and maintenance activities occur (Stevenson 1991:282). If a site was abandoned during this phase, there should be even numbers of primary, secondary, and tertiary flakes found. Both local and non-local raw materials were being made into higher numbers of expedient tools. Because a wider variety of activities took place at this phase, a wider variety of tool types should be found and there should be evidence for the formal disposal of refuse (Keeley 1991:258-259). A site in this phase should also have much more evidence of processing activities and food remains, faunal and/or floral. Similar to the previous phase, large artifacts should be disbursed on the surface and smaller ones have been pressed into the soil (Stevenson 1985:6).

The final phase of a site, barring an earlier desertion, is the abandonment phase. This phase is controlled by the awareness of needs at future locations and there is a decreased care about maintenance of the currently occupied site (Stevenson 1991:282). According to Stevenson, this phase is “characterized by stone tool replacement and manufacturing sequences in anticipation of projected needs” (Stevenson 1985:68). Tools
that will be taken to the new site are prepared and old tools, made from local and non-local raw materials, are discarded. Artifacts entering the archaeological record at this phase tend to remain clustered and may be “functionally and spatially unrelated to previous site activities” (Stevenson 1985:68). Because this phase usually indicates the end of formal disposal, artifacts tend to remain where they were placed, or dropped (Keeley 1991:258-259).

Within each of these phases, one of two types of refuse disposal, identified by Stevenson, takes place. In the initial and abandonment phases people engage in expedient disposal. This type of disposal is opportunistic without conscious thought or efforts to organize refuse, and such it is considered to be casual, low energy maintenance. This type of disposal is caused by the brushing aside of debris, which goes into the displacement zone, or the tossing aside of debris. Debris that has been tossed aside enters the toss zone and can be identified by two major characteristics. First, toss zones tend to be less dense artifacts clusters with proportionally more large sized artifacts. Second, these zones tend to occur further away from activity areas than the other zones, with the exception of toss zones on the downwind side of hearths (Stevenson 1991:275).

During the occupation, or exploitation phase, most hunter-gatherer societies tend to practice systematic refuse disposal, which is a planned, intensive, and scheduled activity. This type of disposal often involves storage and transportation, and “produces secondary refuse deposits on the periphery of intensively or repeatedly occupied activity areas” (Stevenson 1991:275) creating a crescent shaped refuse area that can overlap toss zones. Systematic disposal is also common at sites that are occupied for longer periods of time, such as campsites versus kill sites which tend to be inhabited for shorter periods.
of time and so people are “more likely to discard elements near their locations of use, particularly when occupying outdoor living space” (Stevenson 1991:276).

In addition to using the zones developed by Binford for the three ring model, Stevenson also uses the McKellar principle in his model. The McKellar principle deals with the impact size (the size-sorting effect) has on the movement, or lack thereof, of artifacts during clean-up activities (Stevenson 1991:274). Large objects often get moved to the edges of trafficked areas and eventually get impeded by vegetation, which stops further dispersal and creates increased concentrations of artifacts. Small objects are more often trampled and embedded into the soil of trafficked areas; small artifacts that tend to be overlooked during cleanup activities are classified as ranging between 2 and 9 centimeters in size (Stevenson 1991:272).

The tendency for larger, potentially more disruptive, refuse to be located further away from hearths and other outside features in dispersed arrangements is a tendency that can be observed at hunter-gatherer sites all over the world (Stevenson 1985:75). According to Stevenson, “size sorting within domestic and intensively occupied areas may be one of the few recurrent phenomena we can expect to find at hunter-gatherer campsites” (Stevenson 1991:269-270). This means that distribution of artifacts by size at sites around the world should be comparable to a certain degree, and that despite misgivings mentioned earlier, some cross-cultural comparisons with regard to spatial analysis are valuable to understanding broader patterns at hunter-gatherer campsites.

The cultural deposition of refuse can also be considered in terms of intentionally versus unintentionally dispersed artifacts. Intentionally dispersed artifacts have been consciously moved to clear activity areas, footpaths, etc. The playing of children can
also be considered intentional dispersal, and has been documented as occurring at !Kung and Inuit sites in areas peripheral to domestic activities. While the playing of children tends to have little effect on smaller artifacts, it can cause extreme movement and dispersal of larger objects (Stevenson 1991:273). Unintentionally dispersed artifacts are unconsciously moved by people “as a consequence of two major processes: scufage (displacement of artifacts due to foot traffic) and trampling” (Stevenson 1991:271), and they tend to be dispersed vertically as well as horizontally (Stevenson 1991:271).

Stevenson notes that the types of resources being used, and the intensity at which they are being used also impacts the dispersal of artifacts. Therefore, as resources are used around a camp there will be an increased efficiency in how they are processed, for example the decrease in game animals near a site may cause the bones of animals being processed to be heavily fragmented for the extraction of bone grease, and as mentioned before smaller artifacts are more likely to be trampled and embedded effecting their dispersal (Stevenson 1991:283).

How dispersed an artifact type is can provide archaeologists with a greater understanding of how a site was used throughout its occupation, as well as shed insight onto the length of occupation. According to Stevenson, “the more dispersed an artifact accumulation, and the more it is damaged by occupational disturbance, the greater the likelihood that it was produced during activities earlier than those producing artifacts less damaged and dispersed” (Stevenson 1985:77). Providing that this is consistently true throughout a site, by comparing the dispersal of different activity areas, middens, and artifact types, a comprehensive picture can be gained about what activities were taking place at relatively the same time in the history of the site.
Understanding the dispersal of refuse objects is not only important when using this model to aid in the understanding of horizontal spatial patterns, but can help provide insight into vertical spatial patterns. Based on Schiffer’s concepts of primary, secondary, and de facto refuse, and his own model, Stevenson concludes that “if constant, embedded artifacts, regardless of zone would probably result from activities earlier that those that produced artifacts left on depositional surfaces” (Stevenson 1985:77). This is consistent with the general archaeological notion that the earlier the object, the deeper it should be.

The three ring model was created with the intention of being used on short-term hunter-gatherer sites, but before applying this model to a site, Stevenson cautions archaeologists in labeling a site as short-term, because the definition of a short-term site is as of yet unclear. He argues that a short-term site cannot be labeled as such just on evidence of the duration of occupation, but that the rate of refuse production in relation to the intensity of occupation may be a key variable. Stevenson equates the intensity of occupation to such variables as length of stay, size of the site, number of people, and what type of activity is occurring (Stevenson 1991:276). Stevenson argues that a site is not a short-term camp if the occupants are only participating in systematic disposal, and if secondary refuse deposits are the most common type of deposit in area, volume, and number of artifacts (Stevenson 1991:276).

Based on the three zone model, Stevenson offers four theoretical assumptions that can be made about hunter-gatherer sites:

1. Large artifacts on the surface of drop zones occurred with later activities than similar refuse in toss zones.
2. Artifacts embedded in displacement zones occurred with earlier activities than similar refuse in drop zones.

3. Embedded artifacts, regardless of zone, occurred with earlier activities than similar refuse on the surface.


These four assumptions allow for variation in size and dispersal of artifacts within a site and could be used when completing a spatial analysis of a hunter-gatherer site to make basic assumptions about the types of artifacts occurring within each zone and a timeline regarding activity areas and use.

Like all archaeological theories and models, Stevenson’s three ring model has its limitations and can be negatively impacted by exigent factors. Substantial reoccupation of a site, with very little sediment laid down between the occupations, can negatively impact this model by creating a large amount of debris and a high potential for intermixing. Despite this potential problem, Stevenson argues that his model is still viable for use at hunter-gatherer sites for three reasons. First, debris left by later occupations should have greater integrity than that of earlier occupations, so that some items could be distinguished as to when they were deposited. Second, most hunter-gatherer societies have a tendency to avoid camping at places where debris from previous occupations is present, or the existing debris is cleared leaving only the current occupational debris in place. Third, groups that are considered foragers, a majority of hunter-gatherer societies, are much less likely to reoccupy a site than groups that are considered collectors (Stevenson 1991:294).
In order to accurately use this model in the interpretation of a hunter-gatherer site, Stevenson stresses the idea that artifact assemblages are not, and should never be considered, fossilized records of short-term campsites, on the other hand neither are they completely distorted manifestations of past behaviors. Instead, artifact assemblages fall somewhere in between because they “only reflect unambiguously the operation of a past behavioral system as it continually modifies, rearranges, depletes, and destroys matter it has created” (Stevenson 1991:292). It is only through this realization that archaeologists can continue to explore and understand how spatial arrangements are related to past behavioral systems.

Stevenson does not proclaim that his model is perfect, but he believes that by applying this model to a wide variety of sites, and making changes in the process, that this model should be able to allow for the monitoring of the “gross spatial and temporal formation of artifact assemblages in the vicinity of outside hearths and other external features” (Stevenson 1985:74). With additional refinement, this model may eventually be used to help archaeologists identify the sequential processes behind artifact assemblages and could provide valuable insights into resource use and processing strategies over the lifetime of a site (Stevenson 1985:78).
CHAPTER 3

ENVIRONMENTAL AND CULTURAL BACKGROUND

In order to fully understand 24HL1085 and complete an accurate spatial analysis using Stevenson’s three ring model, a brief exploration of the local environment and cultural history of the area needs to be examined. Only by understanding the cultural and natural environment in which the site was created and used can we begin to understand the artifacts that were left behind and what their spatial patterning indicates about resource use and use of space at the site.

Environmental Background

Site 24HL1085 is located in the Bear’s Paw Mountains of north-central Montana. These mountains are an anomaly within the surrounding landscape of open short grass prairie and would have likely have stood out to people occupying the plains not only for their variety in available resources, but also for spiritual and cultural reasons. It is the variety of resources that would have been accessible to prehistoric people in the Bear’s Paw Mountains that is of particular interest when examining this site. The location of 24HL1085 differs from the surrounding plains and therefore separates this site from other common types of sites in the Great Plains region by allowing for a unique opportunity to understand seasonal movement and resource procurement.

The Bear’s Paw Mountains are not as large as nearby ranges in the Rockies, but are sizeable enough to provide ample space for groups choosing to inhabit the area. From north to south the mountains are approximately 8 miles in length, and 36 miles from east to west. The range is over 4,000 feet above sea level, with the tallest peak, Mt. Baldy,
reaching almost 7,000 feet (Brumley 1988:1). The range was formed between 40 and 50 millions years ago through volcanic activity (Montana Department of Transportation 2009:1).

Depending on the season of occupation, the Bear’s Paw Mountains offer not only a wide variety of fauna and flora, varying significantly from the surrounding plains, but provide shelter, water, and raw materials. Animals that can be found in this range have varied throughout history, but we do know that at some periods in these mountain’s history, mammal species not found on the plains themselves could be found; for example big horn sheep are no longer present in the range, but archaeological evidence shows that they were present at some point in the past several thousand years (Prentiss et al 2008:48). Archaeologists also know that prehistoric people on the plains hunted the big horn, and the Bear’s Paw Mountains would have provided this resource.

Greiser mentions several different climatic episodes that would have had an impact on plains cultures over the past several thousand years, and would have impacted the people staying at 24HL1085. There were two episodes in the past in which dry warm conditions were prevalent, the Atlantic climatic episode circa 6500-2730 B.C. and the Scandic climatic episode circa A.D. 280-870 (Greiser 1994:35; Pielou 1991:291). During these episodes grass would have been in poor condition and bison numbers low, forcing people to rely on other sources of food.

The hunting of big horn and other large mammals would have especially been prominent during dry seasons when less rain would mean less grass, and less bison for hunting, creating a reliance on other animals to help make up the meat deficiency. The short grass plains are considered the “most variable climate in North America” and while
semi-arid most of the time, with less than 15 inches of annual rain, often become arid during droughts making dry seasons a common occurrence and influence on prehistory (Reher 1977:25). As Reher puts it, “when grass and moisture decrease, we can expect concomitant decrease of dependence on buffalo, less frequent integrative periods, and increasing dependence on buffering strategies” (Reher 1977:23).

Besides the dry climatic episodes, there were also wet climatic episodes that promoted grass growth and large bison populations. One such episode was the Milankovitch cycle of the Neoglacial climatic episode, which began in North America between 4000 and 5000 B.P. (Pielou 1991:291). This episode caused an increased amount of rain to fall in the plains and prairies causing more grasses to grow in these areas as opposed to the desertlike plants that had previously existed (Pielou 1991:291). The Neo-Boreal climatic episode circa A.D. 1550-1850, was a period of wet and cool weather that greatly increased bison numbers and archaeologists have found an increase in bison kill sites dating to this period (Greiser 1994:35). Pielou (1991:308) also refers to this episode as the Little Ice Age, with dates ranging from 1350 to 1870.

Besides the animals exclusively found in the Bear’s Paw Mountains, bison and other plains mammalian species would enter the range for reasons similar to the prehistoric people; food, water, and shelter. Again, this would especially be true during dry periods on the plains and according to Reher, there are factors indicating that during past droughts, bison were “constrained during most years to riverine areas, montane situations, and new short grass areas to the north and east, with sporadic forays onto the High Plains after a number of good years” (Reher 1977:30). The mountains would also have provided a cooler climate during the hot summer months for the animals.
Understanding the mobility and needs of prey animals is an important step to understanding how people moved about the environment and chose locations for sites, this is especially true on the Great Plains where bison were such an integral factor in subsistence and mobility patterns (Reher 1977:21).

The dry climate of the plains would also mean a varying dependence on plant resources, some of which would have been found in the Bear Paw’s Mountains. Despite the cultures of the plains being known for their heavy reliance on meat, ethnographic research and archaeological remains also show the people on the plains processed a wide variety plants to supplement their diet. For example, the Cheyenne harvested between 35 and 40 different plants and also ate from rodent seed caches (Reher 1977:20). Riverine areas and juniper-scarp enclaves are found dispersed throughout the plains and were often utilized seasonally; there is no reason to believe that this would not also be true for areas like the Bear’s Paw Mountains (Reher 1977:20).

In addition to the fauna and flora, the Bear’s Paw Mountains would have offered other resources to prehistoric people including water, wood, and raw materials for the manufacturing of stone tools. The volcanic activity that created the mountain range left large deposits of igneous rocks that could have been used in the manufacturing of stone tools. For example, large quantities of basalt stone tools and lithics were found at 24HL1085 resulting from expedient tool manufacturing (Prentiss et al 2008:36-37).

Environment is an important factor to consider when trying to understand past behavior because it sets many conscriptions and boundaries. Gamble notes that even though “settlement patterns vary they are repeated at different times, duration and places as the selective forces in regional environments recur” (Gamble 1991:5). This is
especially true for mobile people like hunter-gatherers since it is through mobility that their population is etched into the environment by the aversion of resource shortages and conflict with other societies (Gamble 1991:5).

**Cultural Background**

Prehistoric activity in the Bear’s Paw Mountains spans an immense period of time and artifacts from Paleolithic sites to the historic period have been found and recorded (Brumley 1988:1). In addition to these sites, the area is still used by local natives who belong to the Chippewa-Cree reservation. Despite the long history in this area, I will only be providing a cultural background on the periods relevant to site 24HL1085, the Late Plains Archaic and the Late Prehistoric. These periods are taken from Frison’s plains chronology (*in* Hannus 1994:179).

Within the Late Plains Archaic and Late Prehistoric periods, the Pelican Lake and Old Women’s cultural complexes will be the focus of this part of the chapter. Even though several other point types were found, ranging from Oxbow to Plains side-notched, the diagnostic points from the Pelican Lake and Old Women’s complexes match radiocarbon and thermoluminescence dates from the two identified occupations at the site.

People who were a part of the Late Plains Archaic, 3000 to 1500 B.P., were extremely sophisticated in their use of jumps and corrals, such as the Ruby site and Muddy Creek, to trap and kill bison. Tipi rings found near Late Archaic kills are often considered to be camps associated with the bison kill sites. Artifacts found at these sites are the result of great workmanship and show a selective choice in raw materials, with a high percentage of quartzite and chert being used (Frison 1991:209-211). Prentiss also
identifies people during this time as exhibiting collector-like behavior (Prentiss et al. 2008:16).

The Late Archaic is associated with the Neoglacial climatic episode, 4000 to 1700 B.P., which saw cooler, wetter weather and an increase in bison populations that led to an increase in bison hunting by people on the plains (Prentiss et al. 2008:16). Besant is one cultural complex that has been identified from this period, and although no Besant points were found at 24HL1085, Besant sites have been found in the vicinity of this site, like the bison kill site Wahkpa Chu’gn, and these people are believed to have been contemporaneous with the Pelican Lake cultural complex (Frison 1991:101-102).

Besant is present in the archaeological record beginning about 1000 years after Pelican Lake, but Besant people were also extremely adept at hunting bison and Frison refers to them as an “extremely sophisticated bison hunting manifestation” (Frison 1991:103). Besant people are known for their heavy use of local raw materials, but they are also known to use large amounts of Knife River flint and Avon chert from Montana. Their use of obsidian is rare. Large tipi rings, averaging 6.8 meters in diameter, are common at Besant campsites, though there is some evidence that they also lived in more permanent structures, such as at the Mortlach site where the postholes from a structure were excavated (Vickers 1994:11).

Pelican Lake cultural complex is considered by archaeologists to be a part of the Late Plains Archaic period and is believed to have appeared on the Great Plains around 3000 B.P. when it replaced the McKean complex (Frison 1991:110). Pelican Lake points are typically wide with open corner notches that end in sharp barbs (Frison 1991:110); one of these points was found in the lower component of 24HL1085. Like Besant,
Pelican Lake is believed to have strong affiliations with northern tribes, and may have moved south into the area replacing local groups (Frison 1991:111). Schlesier believes that this transition was completed by 3250 B.P. (Schlesier 1994:310).

The Pelican Lake complex was first identified at the Mortlach site in 1955. They are believed to have covered an area from southern Alberta, Saskatchewan and Manitoba, through Montana and into northern Wyoming, and can be found as far east as North and South Dakota (Hannus 1994:182). Even though the Pelican Lake cultural complex was mostly based on the communal hunting of bison, there are a number of sites indicating that there was also a strong Pelican Lake presence in more mountain areas hunting elk, deer, and sheep. It is important to note that Frison has identified that other types of corner-notched points found in the foothill and mountain areas date to this same period, and are often associated with firepits, tipi rings, simple chipped stone tools, and grinding stones (Frison 1991:105). Whether these corner-notched points should be identified as Pelican Lake or were the result of a completely different culture group remains to be determined.

Hannus proposed that the spread of Pelican Lake points into the mountain areas was due to a population increase that was the result of wet weather and a large bison population during the Sub-Atlantic climatic episode. As a result, people were inhabiting multiple habitat zones with a “concomitant and expectable set of expanded resource utilization schemes” and exhibited a “broader spectrum of faunal utilization” (Hannus 1994:182). This increase in the hunting of bison and other prey animals indicates that the people associated with the use of Pelican Lake points were extremely competent hunters.
Hannus, Lereck, Winham, and Lippincott all mention that the Pelican Lake complex shows a refinement of hunting techniques that made use of the diverse topographic features found in the Northern Great Plains, which makes them different from other prehistoric people at this time (Hannus 1994:182). The increase in bison procurement by the Pelican Lake people means that these people were the first to use many bison kill sites. According to Dyck (1983:107), “although they were certainly not the inventors of bison jumps and pounds, Pelican Lake peoples were the first to use some mass kill locations that were used repeatedly, in some cases, more intensively in later times”.

Pelican Lake people were also on the plains when the transition between atlatl and bow and arrow was made. Schlesier believes that Pelican Lake made the switch about A.D. 250. Points that are identified as belonging to the Pelican Lake transition are often labeled as Keaster II or Epi-Pelican Lake. Interestingly, Schlesier notes that Keaster II points are often found with Avonlea points, Avonlea being a cultural group contemporary with Pelican Lake, and suggests that Pelican Lake peoples may have gotten the bow and arrow technology from the Avonlea (Schlesier 1994:312-313).

The reason for the disappearance of Pelican Lake culture on the Plains is a cause for some debate. Reeves (1970) proposed that Pelican Lake was displaced by the Besant culture group and eventually became Avonlea (in Greiser 1994:35). Greiser, on the other hand, believes that both Besant and Avonlea moved into the area displacing Pelican Lake (Greiser 1994:35-36). Regardless of the real reasons behind the disappearance of Pelican Lake on the plains, they remain a part of the archaeological record until about A.D. 800-1000 (Schlesier 1994:311-313).
The Late Prehistoric period (1500 to 400 B.P.) began around A.D. 500, and similar to the Late Plains Archaic, saw an increase in population and large scale bison kills. Part of this increase can be attributed to “unusually good conditions” and the now more common use of the bow and arrow (Frison 1991:111). The peak in large bison kills comes from a more intensive use of bison jumps and other variations of large kill sites (Frison 1991:211). This period also saw expanded variation in rock art (Prentiss 2008:17). Similar to the Besant in the earlier Late Archaic phase, Late Prehistoric people had a tendency to use local raw materials at site, except for the increased use of obsidian from Obsidian Cliff in Yellowstone (Frison 1991:216).

Avonlea appears on the plains around A.D. 150 – 250 in Alberta, Saskatchewan, and the Montana border area, and then expanded south into Montana. Vickers proposes that based on the straight base of the points that Avonlea developed from Pelican Lake (Vickers 1994:15-18). Until about A.D. 1150, Avonlea was mainly focused in upland areas and is associated with sites that represent small group hunting (Vickers 1994:19). Important Avonlea sites in the southern plains include Beehive and the Wardell site (Prentiss et al. 2008:18). Many archaeologists also believe that Avonlea points are contemporaneous with Prairie side-notched points, at least along the Milk River. Whether or not this is the result of one culture group or two is still undetermined (Greiser 1994:46).

Around A.D. 1200, Old Women’s phase enters the archaeological record of the plains. It has been mentioned before that some archaeologists feel that Old Women’s phase descends from the Besant, but Greiser believes that they entered the plains from the east, bringing Mississipian influences into the area (Greiser 1994:44). Forbis first
identified this phase from the excavation at the Old Women’s Buffalo Jump in 1962. The presence of this phase in Montana is believed to stretch from about A.D. 950 to approximately 1700 (Hannus 1994:191). General characteristics of the Old Women’s phase include ceramics, split pebble technology, and the use of petrified wood for making tools (Vickers 1994:20-21). According to Hannus, the Old Women’s phase represents an “extremely specialized cultural adaptation principally focused on upland game animals, specifically bison” (1994:191). Approximately 57% of upland campsites excavated in Montana have Old Women’s phase diagnostics found at them, indicating a strong presence by this cultural group in the northwestern plains (Hannus 1994:191).

The Blackfeet, Plains Cree, and Assiniboine occupied the area around 24HL1085 and further north in the protohistoric era. In the spring, these groups would often move their camps upland from the winter river valley camps to avoid the rising water levels of the rivers from melting snow and rain. At the beginning of summer they would move back onto the plains to hunt bison. By midsummer, the driest time of the year, plains natives would then move to campsites that offered secure water sources, like the Bear’s Paw Mountains, and hunt alternative game animals, or solitary bison and collect berries (Vickers 1994:5-6). This coincides with 24HL1085, which we know to be a summer campsite where animals were being butchered and people were processing plant materials.
CHAPTER 4

ANALYSIS AND DISCUSSION

Throughout this chapter I will go through each step that I took in the spatial analysis of this site, and I will then explain my results and conclusions. This analysis was a focus on applying Stevenson’s (1985) spatial analysis to the data collected from 24HL1085 and including the methodology from the trend surface analysis created by Hodder and Orton (1976). In the discussion I will go through each step that I took and present my conclusions and how I came to them.

Site Summary

Preliminary work on 24HL1085 has already determined that for both components this site was most likely a summer campsite, of undetermined length, in the Bear’s Paw Mountains. Based on test units that had been previously excavated, two distinct areas of the site were excavated, area A and B (Figure 1).

![Figure 1. Spatial layout of 24HL1085.](image-url)
Area A is at the north end of the site and Area B is closer to the east fork of Beaver Creek that runs adjacent to the site. The integrity of Area B was significantly less than that of Area A and there were fewer artifacts in Area B, so this paper will only be focused on the finds of Area A.

The site was occupied at least once during the Late Plains Archaic and possibly twice during the Late Prehistoric. Identification of the separate components was made after examining a backplot of recovered artifacts; see Figure 2. The back plot shows the vertical distribution of artifacts and indicates the presence of at least two distinct occupations, with some mixing occurring, most likely due to the slow rate of sedimentation at the site, and other site formation processes.

![Figure 2. Backplot of mapped artifacts.](image)

The Late Plains Archaic component was found at Stratum II, Level 3, 4 and 5, or approximately 30 to 50 cm below the surface of the site. Four diagnostic points were found in association with this component, two Pelican Lake points, one Duncan point, and one Oxbow point. Because the radiocarbon and thermoluminescence dated the occupation to about 3000 B.P., it was concluded that most of the remains associated with this component are from a Pelican Lake occupation. An earlier settlement may have existed at the location before the Pelican Lake occupation, but was destroyed and/or absorbed by the later campsite (Prentiss 2008:33).

The final component of 24HL1085 is a Late Prehistoric element that has possibly two distinct occupations. This component is comprised of Stratum II, Levels 1 and 2, which ranges from 10 to 30 cm below the surface. The first Late Prehistoric occupation
dated to around 1600 B.P. and contained three Keaster II, or Epi-Pelican Lake points and two arrow points similar in style to Avonlea. The second occupation dated to approximately 500 B.P. and one Prairie Side-Notched point was found that corroborates this date. Mixing between these two possible occupations was to the extent that the Late Prehistoric component was treated as one occupation in the analysis of the site and will be treated as such in this paper.

The conclusion that 24HL1085 is a residential campsite is based on several different factors relating to the lithics found at the site and the faunal remains. The presence of a variety of tool types, including points, scrapers, knives, and a grindstone, is a strong indication that this is a residential campsite where many different activities were taking place. This would differ from a hunting camp where typically there is less variety in the types of tools found and lower numbers of lithics present at the site. The types of tools found, such as endscrapers, knives, and groundstone, also indicate the presence of women, who are typically associated with the processing of various food items at base camps (Wood 1974:4-5).

The large amount of FCR also points toward 24HL1085 as a residential camp. Few other types of Plains prehistoric sites would produce the amount of FCR that is seen at this site; certainly, hunting camps and transitory camps would not produce this amount of FCR. The only other type of site that might contain large amounts of FCR would be processing sites near large kill sites, but so far no large kill sites have been located in the immediate vicinity of 24HL1085. The amount of FCR found at the site, for both occupations, also indicates an occupation of at least several days; if not longer, which is more characteristic of a residential camp that any other type.
The faunal remains of bison in the Late Archaic component and bison, deer, and bighorn sheep in the Late Prehistoric component are another strong indicator that this site was used during both occupations as a residential campsite. The bison fragments from the Late Archaic contained fragments typically found from the processing of choice sections of the bison (Prentiss et al. 2008:56). The presence of appendicular and axial parts indicates that a kill was made locally and a variety of parts brought to the camp for processing, whereas if the kill had been made far from the camp, the pieces brought back to 24HL1085 would have reflected more selectivity. It is important to note that while the faunal remains indicate all of this, the decomposition of the bones was extreme and the full picture of animal processing at this site will never be known.

Similar to the Late Archaic component, faunal elements in the Late Prehistoric component represent not only traditionally preferred sections of the animals, signified by long bones, but also represent other sections indicating kills likely made relatively close to the camp; these remains include mandibles, vertebrae, phalanx, and tarsals. Even though faunal remains from this component were much better preserved than in the previous component, they were still heavily fragmented and worn; this fragmentation may not only be from site formation processes, but could be the result of bone grease processing.

The seasonality of the site was also identified through the faunal remains found at the site. For both components, the bison faunal remains represented adults, and subadults with one immature animal represented in the Late Archaic component. The presence of these juvenile animals points towards the site being a summer residential site, which was created after the calving season, though the presence of juveniles at a site is
not a guarantee that the site was created during the summer. The presence of these animals in the Bear’s Paw Mountains would also indicate a summer occupation because these animals would have entered the higher elevations for reasons similar to the humans, cooler temperatures, water, and plant resources.

Application of the Three Zone Model

Even though the dates of occupation, type of site, and season of occupation were identified for the two components, the location of activity areas, middens, and structures was not discussed in the site report. Initial analysis of the spatial distribution of the artifacts at the site led Prentiss to propose that this part of the site was used as a midden and that the actual space used for activities and living areas are somewhere adjacent to the site, not having been excavated (Prentiss et al. 2008:58-59). The goal of this spatial analysis will be to take a closer look at the spatial arrangement of artifacts in each component and determine if the excavated area does represent a large midden, or if there are also activity areas and living spaces present.

If, as proposed by Prentiss, the site only represents a midden from a nearby residential camp, there remains a lot that can be determined about the site through this spatial analysis using the three ring model. By looking at visual spatial patterns, where specific artifact types are found, and the density of artifacts it will be possible to identify the types of middens that are represented at this site, which can in turn provide further information about how the site was used and length of occupation.

The first step taken to complete this analysis was to create maps that would allow for the identification of spatial patterns. The maps created and used for this analysis are point plotted maps of the artifacts found at 24HL1085 (Figure 3).
Figure 3. Point plotted maps of upper and lower component of 24HL1085.

These maps were created by scanning in all the field maps, cleaning them up, and then piecing together the maps in order to create a composite map of Area A. These maps do not represent all of the artifacts excavated from the site, but ones that were a certain size and/or diagnostic in nature.

Stevenson’s three ring model was then applied to the maps by identifying potential toss, drop, and displacement zones. These zones were identified based on two different factors: visual spatial patterns and the locations of artifacts recovered from the site. First, I looked at the two point plotted maps in order to complete a general visual analysis of the spatial patterns and to identify particular ‘areas of interest’ on the maps. These ‘areas of interest’ were chosen based on distinct clusters of artifacts, and the
location of crescent shaped artifact patterns that may indicate features and/or activity areas.

Next, lithics were classified into primary, secondary, or tertiary debitage. This classification of lithic artifacts was based on the amount of cortex present on the debitage. Once the debitage was classified they were then used to identify the phase/s present at 24HL1085, which will be discussed in the next chapter. I then considered the horizontal location of the lithic tools and faunal artifacts to each other in hopes that any present activity areas would become apparent, or if the site is representative of a midden that there would be significant mixing of artifacts from a variety of activities. Both the lithics and faunal remains were considered separately and then in conjunction with each other.

Once the information from both the visual identification of patterns and the artifact classification was collected, it was then used to identify and mark toss, drop, and displacement zones around features and activity areas. The lack of these zones in a component at 24HL1085 would in turn be an indication of middens and intensive cleanup activities. Any similarities or differences between the visual and artifact data sets were noted and will be explained in the following chapter.

In addition to the formation processes associated with the three ring model identified by Stevenson, I also considered the information from several density maps created of the site. For each component there is a lithic, faunal, small FCR, and large FCR map. I will also make use of the Trend Surface Analysis applied by Hodder and Orton to add the density data collected from the site to the analysis (1976:155-160). By using the density data collected from the site, I will be able to use the three ring model
not only in conjunction with the artifact data regarding specific pieces that were mapped and collected, but can look at the broader artifact patterns of pieces that were too small, or insignificant to be mapped in place. This will allow for a more complete picture of the use of space at 24HL1085 and reduce the risk of an incorrect interpretation based only on a small percentage of the artifacts found at the site.

All conclusions from the application of the steps described above to the data from 24HL1085 will be discussed in the next chapter. The rest of this chapter will show the process of analysis for each component and the initial results. As mentioned previously, the point plotted maps for the Late Plains Archaic component, stratum II, levels 2 and 1 have been combined due to significant mixing of the two possible occupations, the problems and consequences of this will be discussed in the next chapter.

**Late Plains Archaic Analysis: Stratum II, Level 3-5**

Identifying ‘areas of interest’ for the earliest component of 24HL1085 was relatively straightforward. The artifacts tended to cluster in one of four defined areas, with few falling in the outlying areas, as shown in Figure 4.
This component seems to be intact and free from severe mixing, and it looks to be representative of just one, distinct occupation. Based on these identified areas, this component of the site seems to be oriented to the southeast, facing the creek.

The next group of data to be collected and presented for the analysis of 24HL1085 is the cortex information from the debitage. For the Late Archaic component, there was a total of 270 lithics and each flake was given a label of primary, secondary, or tertiary based on the amount of cortex present on each individual item. Table 1 shows the numbers of primary, secondary, and tertiary pieces, and their percentage of the total.

<table>
<thead>
<tr>
<th>Type</th>
<th>Totals</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>15</td>
<td>5.6</td>
</tr>
<tr>
<td>Secondary</td>
<td>49</td>
<td>18.1</td>
</tr>
<tr>
<td>Tertiary</td>
<td>206</td>
<td>76.3</td>
</tr>
</tbody>
</table>

Since most of the debitage was categorized as tertiary, I next figured out how much of the tertiary debitage was from local, or nonlocal raw materials. Local raw materials are defined as any raw material that could have been found within the Bears Paw Mountains; nonlocal raw materials would have been collected away from the area and brought to the site. For example, local raw materials collected from the site were basalt and quartzite, while a majority of nonlocal raw materials consisted of madison chert and other miscellaneous cherts.

Of the tertiary debitage 75.2% was made of nonlocal raw materials, and 24.8% from local raw materials. The percentage of nonlocal and local resources for primary and secondary lithics is dramatically different; 42.8% of the secondary lithics were of local raw materials and 57.1% were of nonlocal materials, and 80% of the primary lithics were
from local raw materials and 20% were from nonlocal raw materials. This is important because it shows that the nonlocal raw materials that were being brought to the site were already in cores or performs in anticipation of creating the tools that would be needed at the site.

The last step completed before identifying the toss, drop, or displacement zones, was to create maps showing only the locations of faunal remains, lithics, and tools. These maps are essential to this analysis because the FCR is such a strong feature of the point plotted maps that patterns created from the lithics and faunal remains are virtually impossible to identify. The faunal and lithic map created for this component is shown in Figure 5.

![Faunal and lithic map for the lower component.](image)

Figure 5. Faunal and lithic map for the lower component.

The location of tools is especially important to this analysis and despite all the information that can be gleaned from the point plotted maps, many of the tools found at 24HL1085 were not found in situ, and therefore cannot be mapped. In order to make sure
that the general locations of all the tools found are considered in this spatial analysis, I created a map showing what types of tool were found in each excavated unit (Figure 6).

![Figure 6. Locations and types of tools found in lower component.](image)

Interestingly, the patterns on this map strongly correspond with the ‘areas of interest’ identified in Figure 4. A map with the combined point plotted faunal and lithic data, and the tool data can be found in the appendices of this paper.

Using the data collected above, the locations of the potential three zones, drop, displacement, and toss, were identified on a map that also contained the point plotted data, as shown in Figure 7.
Figure 7. Identified zones for the lower component.

Conclusions as to what these zones indicate about use within specific areas of the component and about the site as a whole will be presented in the next chapter.

Late Prehistoric Analysis: Stratum II, Level 2 and 1

The identification of ‘areas of interest’ in the later component of 24HL1085 was much more complex than the earlier component. There are many more artifacts and clusters present within this component, and there even seems to be some areas of overlap, as shown in Figure 8.
From earlier examinations, we know that this component of the site was most likely representative of two occupations and that mixing between the occupations would have a strong impact on the spatial patterns. The ‘areas of interest’ in this component seem to confirm that initial hypothesis and show a variety of areas oriented to the northern end of the site.

The numbers of primary, secondary, and tertiary debitage for the Late Prehistoric component were very similar to the numbers from the Late Archaic component, as shown in Table 2. The total count of debitage for this component was 401.

<table>
<thead>
<tr>
<th>Type</th>
<th>Totals</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>18</td>
<td>4.5</td>
</tr>
<tr>
<td>Secondary</td>
<td>60</td>
<td>15</td>
</tr>
<tr>
<td>Tertiary</td>
<td>323</td>
<td>80.5</td>
</tr>
</tbody>
</table>

Again, since most of the debitage from this component was categorized as tertiary I figured out how much of the tertiary debitage came from local and non-local raw material resources. For this component, 31.8% of the tertiary debitage was made of local raw
materials, and 68.2% from non-local sources. The secondary lithics of this component were comprised of 25.4% local raw materials and 74.6% nonlocal materials, and the primary lithics were composed of only 38.9% local raw materials and 61.1% nonlocal materials.

The lithic and faunal map for this component showed a much higher presence of these items within this component, at least in terms of being found in situ, and mapped during the excavation (Figure 9).

Unlike Figure 5, Figure 9 has a less patterned distribution of faunal remains and lithics. This coincides with the hypothesis that this component possibly represents two mixed occupations, or may be representative of a midden.

The tool map created for the Late Archaic component followed patterns similar to the other maps for this component, in that there was very little obvious patterning at all (Figure 10).
There does seem to be an association between units with projectile points and units that had contained cores, but further discussion will wait until the identification of the three zones has been completed. Figure 11 shows the combined data of Figure 9 and Figure 10.

Due to the complexity and mixing within this component, the variety of maps and data used in this analysis was especially helpful in helping to identify the three zones.
Figure 12 shows a much more complex array of zones, and in general much smaller individual areas of use.

Density Maps

The maps and interpretations created and compiled above were based on the maps created during the excavation. These maps documented the locations of artifacts that had been considered large and/or distinct enough to be mapped. This means that a significant number of lithics, faunal remains, and FCR are not represented on those maps and could have an impact on the interpretation of spatial patterns and the outcome of the three ring model.

During the excavation of 24HL1085, totals of lithics, faunal remains, cobble size FCR, and pebble size FCR were collected for each stratum and level, of each unit. By taking these totals, I was able to create four separate density maps for each component. After completing the three ring analysis, I used the density maps, combined them with the
point plotted maps to better test the three ring model (Figures 13, 14, 15, 16, 17, 18, 19, 20).

Figure 13. Faunal density map for the lower component.

Figure 14. Lithic density map for the lower component.
Figure 15. Cobble size FCR density map for lower component.

Figure 16. Pebble sized FCR density map for the lower component.
Figure 17. Faunal density map for the upper component.

Figure 18. Lithic density map for the upper component.
The comparisons were interesting, and not far from what was expected based on
the results of the other maps. Overall, the density maps did not strongly contradict my
conclusions based on the preceding analysis, but they did serve to pose some interesting
questions about site use and they spread of artifacts based on size.
Hypotheses

The hypothesis behind the three ring model is that hearths should have a recognizable pattern of toss, drop, and displacement zones. These rings are determined not only by the spatial patterns and the size of artifacts, but by the physical qualities of the human body. This is important because spatial analyses are based on an understanding of trash, and how garbage is treated not only by people during different phases of occupation and at different sites, but also how refuse is impacted after it has entered the archaeological record.

As useful as this model is for determining the location of hearths and similar features through the presence of lithics, Stevenson notes that the model is most useful at sites in which lithic procurement was a factor in site location, and tool manufacturing was a major activity (Stevenson 1985:63). By using this model in conjunction with the data collected from 24HL1085, a site at which neither lithic procurement and/or tool manufacturing seem to be major activities, I believe that the same theories behind the model can be applied not only to the lithic artifacts recovered from the site, but also the faunal remains and FCR. I would argue that this would lead to a more composite and accurate interpretation of the spatial patterns at the site because it takes into account a variety of factors, all of which must be considered before making determinations about the spatial remains of a site and its prehistoric use.

Even though hearths are one of the most common features of prehistoric sites on the Great Plains, and often have easily recognizable toss, drop, and displacement zones, Stevenson does not identify the spatial patterns that could be expected from these zones in regard to activity areas and places where shelters, or structures, once stood. I believe
that each area would have its own placement of zones, because all areas would have the
discard of artifacts occurring within them, or associated with them. While most shelters
would probably have fairly similar patterns, activity areas would have some variation due
to the type of activity occurring and its location in association with other features of the
site. Before examining the spatial patterns of the two components of 24HL1085, I came
up with several hypotheses about the association of toss, drop, and displacement zones
with activity areas and shelters.

The presence of tipi rings, or circles of rock, which were used to help secure the
base of hides covering the shelter, often identify areas that were once the location of tipis
at prehistoric sites (Frison 1991:95). While tipi rings are extremely common, how do
plains archaeologists identify areas that once supported shelters without the presence of
stone rings? It would be foolish to assume that a lasting tipi ring would be the result
every time a tipi was constructed and used. Because artifacts would have been used daily
in and around the shelters, there should be visible patterns of toss, drop and displacement
zones to identify these areas.

I hypothesize that these areas would appear as relatively open areas, free of large
amounts of artifacts, and circular in nature. In the center of the circular area would be the
drop zone, and artifacts within this zone, similar to artifacts found in the drop zone from
around hearths, should be relatively small and broken in nature, and embedded in the soil
from trampling. Around the drop zone should be a ring of more distinct artifacts, larger
in size that represents a toss zone. This ring represents the edge of the tipi where items
were moved intentionally, or unintentionally, as the center was cleared to prevent trash
from impeding future tasks. Artifacts would be relatively small as a whole, since any large trash items would most likely have been removed from the interior of the tipi.

I would also expect artifacts to be highly variable from different types of artifacts to faunal remains and FCR. This variety of artifact types would probably make identifying this area difficult at first because it would seem a hodgepodge of random items, with little or no clustering. In addition to the identification of zones, nearby clusters of artifacts and identified zones should be considered before making a final determination. The location of the possible shelter area in relation to hearths, activity areas, and middens should generally coincide with what is known about hunter-gatherer camps as a whole, and specifically for this region. For example most shelters should have an associated hearth either within them or next to them.

As mentioned before, I would hypothesize that activity areas, though similar in nature, would have a more variable pattern of toss, drop, and displacement zones determined by the type of activity that had taken place. In general I would expect activity areas to be circular in nature, with concentric rings ranging out from the center representing the different zones. Within the very center would be the drop zone containing the smallest, and most fragmented artifacts embedded into the ground. Next would come the displacement and toss zones, though as Stevenson (1985:66) notes, the less intensely an area is used the less likely there will be a displacement zone.

The types of artifacts present would vary from activity area to activity area, but I would propose a cohesiveness that is not present in middens, even though the scatter of artifacts may at first suggest that this is what the area was used for. This means that one would expect the tool types and any other artifacts to be representative of a specific
activity. For example, if the area was used for the butchering and processing of an animal there should be faunal remains, knives, and scrapers present. Lithics should also reflect the making of expedient tools and/or the sharpening of edges on used tools. Similar to shelter areas, the presence and location of hearths, middens, and other features should be considered before labeling any use area as an activity area.

Based on the hypotheses presented above, and the hypotheses proposed by Stevenson, I attempted to see if specific areas within each component of 24HL1085 could be identified, and if so, what they could tell us about how the site was used and eventually abandoned. A lack of patterns would indicate either the presence of a large midden, or disruption of the site to an extent that very little integrity remains. Regardless of the results, this site will serve as a positive example in the importance of FCR when completing a spatial analysis of sites in this region, and will hopefully help to begin the composition of expected spatial patterns of prehistoric sites in the Great Plains that will aid in future site interpretation.

**Interpretation of Late Archaic Component**

Based on the analysis completed in the previous section I came to several interesting and significant conclusions about the Late Archaic component at 24HL1085. The identification and spatial patterns of multiple toss, drop, and displacement zones has led me to conclude that this component is comprised of a large hearth area, a midden, and an activity area where the butchering of animals took place. The presence of the midden and the variety of materials, including tool types, found within the component would indicate that this site was occupied for a duration of time and was not just an overnight or
traveling camp, but a predetermined destination. The process that led me to these conclusions is outlined below.

‘Areas of Interest’

The first step in the analysis of this component was to look at the point plotted map and see if any artifact patterns and/or concentrations were apparent. I circled ‘areas of interest’ so that during the continuation of the analysis I would not miss, or forget about areas. This also allowed me to look not only for areas with high concentrations of artifacts, but areas lacking artifacts that could be representative of activity areas, shelters, or the perimeter of the site. Identifying areas with a low density of artifacts is just as important as identifying areas with a high density of artifacts, because it can be a determining characteristic of nuclear and special activity areas. For example, during Yellen’s time with the !Kung, he noticed that nuclear areas can be later identified by a high density of artifacts; on the other hand, Binford’s research with the Alyawara showed the opposite that activity areas, not nuclear areas, were identifiable by a high density of artifacts (Binford 1987:477-478).

While completing this task I attempted to do it with little expectations for the results, and wanted to add as little bias as I could. This was important to me because I did not want to be creating the spatial patterns that I expected, or wanted to see. Marking the ‘areas of interest’ within this component was straightforward and a total of four large areas were encircled. These four areas ended up encompassing most of the artifacts shown on the map. I hypothesize that this component is not just comprised of a midden, but has distinct use areas that can be identified.
Phase Identification

Following Stevenson’s formula for the determination of occupation phase/s for this component of 24HL1085, a table with primary, secondary, and tertiary data was collected. Based on the numbers in Table 1, I would propose that this component of the site experienced all three phases of occupation and was not deserted suddenly, but went through the abandonment phase as the inhabitants prepared for their next destination.

According to Stevenson, the abandonment phase is characterized by the making of or preparation of tools for the next site, throwing away tools that will not be needed or are unusable, large amounts of primary and/or tertiary debitage, and lithic debris (along with other types of debris) tend to remain clustered as cleanup activities cease; these clusters may be functionally and spatially unrelated to earlier site activities (Stevenson 1985:67-68). All of these characteristics seem to be present in this component of the site.

In preparation for coming to this site, the inhabitants brought in non-local raw materials, and as such they make up the majority of debitage and tools found at the site. These non-local raw materials were probably brought into the site in the form of established cores, tool preforms, and already manufactured tools. This would explain the large amount of non-local, tertiary debitage (75.2% of the total) associated with this component. This also indicates that this site was not occupied because of an association to nearby lithic raw material resources, but was chosen for providing additional resources, such as fauna, flora, water, shelter, etc. This in turn implies that the inhabitants were familiar with the area and knew to anticipate the need for raw materials of a higher quality than could be procured in the Bear’s Paw Mountains area.
During the abandonment of the site, transported cores that were no longer viable, or considered unnecessary depending on the next destination, were discarded at the site along with large numbers of various tools, which fits with Stevenson’s classification. Based on the density maps, which will be discussed in more detail later, there also seem to be lithic cluster areas that do not fit with the use areas established so far in this analysis. Stevenson’s characteristic of functionally and spatially unrelated lithic debris for this phase would explain those anomalies.

In addition to the lithic evidence for the phases that a site goes through, Stevenson notes that archaeologists should be able to determine if activities were related to the later phases because as resources were depleted in the area, more effort would have been made to use those resources to the fullest extent. This includes not only the use of lithics until no longer usable, but also the presence of highly fractured faunal remains that indicate the processing of bone grease (Stevenson 1985:78). While there were highly fragmented faunal remains found at 24HL.1085 that could confirm the conclusion that this site went through the abandonment phase, I would hesitate to label the phases of this site based on that one characteristic, especially since the soil was unfavorable to the preservation of organic materials.

**Tool and Faunal Maps**

Next I considered the data from maps that were comprised only of the spatial data of faunal remains, lithics, and tools. I wanted to see if a map only showing the spatial location of faunal remains and lithics would reveal different spatial clusters than I had identified initially. After looking at this map, I determined that the clusters of these artifacts were similar enough to the earlier ‘areas of interest’ that any faunal or lithic
remains would not contradict with identified zones based on the ‘areas of interest’. This further confirmed my belief that the entire component is not comprised of a single midden, but several distinct use areas. If the whole site had been a midden, I would have expected to see either a much more diverse spread of these artifacts, or a significant difference in spatial arrangement than the already marked areas.

The tool maps also provided some interesting information that would eventually go a long way to helping me identify what particular areas were used for. Keeley (1991:258) identified three factors that influence where tools are used and then discarded; first, “special disposal considerations such as the cleanup of intensely used domestic areas, immediate tossing of large or troublesome waste, etc.”, second, “length of a site’s occupation and the timing of an activity within the span of occupation”, third, “the retooling of hafted artifacts”. I would also argue that the overall layout of the site and use areas in terms of the type of site and environment would also have an impact on where tools were used and eventually discarded.

In order to determine if this component was one large midden, or comprised of different use areas I marked onto a map the locations of where particular tools were found. I was hoping that if there were activity areas, that certain tool types would only be found within, or on the periphery of those areas. Surprisingly, the locations of tools discarded at the site follow a pattern very similar to previously identified areas. This may be a result of the size of individual tools, for example small tools are more likely to be missed during cleanup activities and so remain where they were dropped. Larger tools are usually removed from highly used areas and transported to middens, which would
explain the high density of tools in the midden area of this component (Keeley 1991:258-259).

In regards to the spatial locations of particular tools, I noticed that tools identified as bifaces are found only along the southeastern perimeter of the site. Scrapers on the other hand are spread throughout the site. The displacement of tools, like the scrapers, out of context with a specific work area is another indication of the abandonment phase and was also a characteristic of the Peace Point site (Stevenson 1985:70). There is also a clustering of a variety of different tools where a large cluster of FCR is also located. I believe that the patterns shown in this map are indicative of a site that is comprised of several use areas, and was not just a part of a midden from a nearby campsite.

Identification of Zones

After looking at the maps discussed above and considering the various characteristics of the three different zones, I marked a number of toss, drop, and displacement zones that I believe once belonged to a large hearth area, activity area, and midden (Figure 21).
Overall, this component seems to be facing the southeast, facing the creek that runs nearby. The clarity between each use area of the site indicates that it is the result of one occupation, and that after abandonment the area was not reused until sedimentation filled in. Rationale for my identification for each of these three areas follows below.

The large hearth area is located at the northeastern end of the site and zones identified for this use area are consistent in shape with the zones identified by Stevenson and Binford as relating to an exterior hearth. There are three well-defined crescent shaped zones composed of an outer toss zone, middle displacement zone, and an inner drop zone. The area circumscribed by the toss zone is where the hearth would have been located, and I believe that some of the large FCR cobbles located in that area indicate the presence of a fairly large and intensely used hearth. The area opposite of the hearth from the three crescent shaped zones is another toss zone.

During the excavation of this section of Area A, no direct evidence was found indicating that a large hearth once occupied the area. Charcoal was scattered throughout the sediment covering the component, but never in enough quantities to pinpoint the hearth location. The wide spread of charcoal throughout the sediment could be because this hearth was an outside hearth, as opposed to an inside hearth. Binford observed that when people cook on an outside hearth they search through the ash looking for fallen items and this results in the “considerable smearing of ash, charcoal, and other hearth debris” (1983:158). The lack of a distinct charcoal concentration is probably also the result of strong wind coming through the valley, scattering ash, and water running through the site spreading the soot. Despite the lack of a distinct hearth feature within this section of the component, I still believe that a hearth once existed here and that
through a variety of site formation processes was eventually destroyed, scattering the remaining ash.

The size of this hearth area is quite large, about three meters in length within the drop zone. Because of the size of the drop zone, I would suggest that this hearth was used not by just one person, but was used by several people simultaneously. Based on ethnographic examples, when working near a hearth it is common for people to sit at a right angle to the hearth and to be within arms reach. The more people around the hearth creates a wider, circular debris pattern, which is what can be seen around the hearth of this component (Binford 1983:149-150). The wide debris scatter around the hearth could also be a result of activities performed while standing. For example, the roasting of meat is traditionally an activity completed while standing and if this was being done within this hearth area it could explain the size of the hearth and the extensive debris ring behind the hearth area (Binford 1983:169).

Cores, projectile points and scrapers are the most common tool types found in association with the toss and displacement zones around the hearth. This indicates that several different activities may have taken place around the hearth, and as such the hearth was an intensively used area probably requiring clean up activities in preparation for future use. The cleaning of hearths can be comprised of “pushing or sweeping the contents away from the opening of the…windbreak”, which can create a large ash scatter, and the “shoveling of hearth contents”, which can create ashdumps, primarily along the periphery of camps and/or is placed with a general camp midden (Bartram et al. 1991:97).
West of the hearth is an area that is comprised of two crescent shaped toss zones, and a circular drop zone. Within this drop zone the remains of a bison mandible were excavated. The toss zones around the drop zone contained lithics, FCR, and faunal remains. Within the drop zone itself there were relatively small amounts of FCR and lithics, with a majority of the artifacts from this zone being faunal remains. Based on the lack of artifact diversity within the drop zone I propose that this area is an activity area that was used for the butchering of at least one bison if not multiple animals.

The butchering of a large animal is also considered a standing activity and as mentioned before usually creates a wider debris scatter than a sitting activity. During the butchering, the person performing the activity usually walks around the carcass in a circle which creates “an empty walk/work space focused around the animal” and a toss zone around the periphery of the walk/work space is where debris thrown so that it does not impede the continuation of the activity (Binford 1983:169). Both the walk/work area and the debris ring around the activity area are clearly evident characteristics of the activity area in this component.

The tool found with the closest association to this activity area is a denticulate from the northeast section of the activity area. According to Andrefsky, a denticulate is a “serrated or tooth edged flake tool” which could have been used in the processing of a carcass, or cutting of meat (2005:255). The large number of scrapers found also indicates that the processing of animals was occurring at this site; though only a couple can be spatially associated with the activity area.

The faunal remains that are found at a site not only reflect what hunter-gatherers were consuming, but they are the result of “an initial deposition as a part of selective
procurement and processing activities” and “as such, they are direct products of man’s patterned interaction with aspects of his particular environment” (Straus 1977:42). This means that the types of bones brought back to, and preserved at the site can provide specifics about the individual hunt.

Butchery and transport decisions were often made based on a number of different factors such as, distance to camp, time of day, the number of people available to carry the animal, and the size of the carcass. Based on these factors, Bartram et al. (1991:101) identified five potential results of a hunt; first, the entire carcass could be carried, intact, back to the camp, second, the entire carcass is carried back to the camp in sections, third, only selected parts are carried back to the camp, fourth, the meat is cached, and fifth, the camp is moved to the kill site. Since the mandible was brought back to the site I would suggest that the kill was made relatively close to the camp and that a majority of the carcass was brought back for processing.

The relatively small amount of faunal remains within this activity area is most likely a result of cleanup activities, since there are faunal remains found in the nearby midden, possible additional processing and cooking of the animal near the hearth area, and the poor quality of soil, which aided in the rapid disintegration of the bones. The rapid disintegration of bone could have been made faster by the heavy fragmentation of the bone which is usually from an effort by hunter-gatherers to “extract the maximum nutritional benefit from the carcass they obtained (Bartram et al. 1991:110).

In between the hearth and activity area is a zone consisting of a large amount of FCR, lithics, and faunal remains that I believe to be a midden containing the excess garbage from both the hearth and the activity area. According to Bartram et al.
“middens were usually located near the camp’s periphery”, but at 24HL1085 the midden in this component seems to be more centrally located. The midden comprised of a single circular displacement zone, and contains the highest density of cobbled size FCR in this component. The midden also has one of the densest concentrations of lithic and faunal debris. A majority of the artifacts associated with the midden fall into a four by four meter area.

Another interesting thing about the midden is the variety of tools that were found within its boundaries. According to the tool map, out of the seven types of tools found in this component, five of the types were found within the midden area. All seven types of tools can be found within or in the near vicinity of the midden. This coincides with research done by Boismier, who suggests occupation areas and their associated middens should share the number of types of tools found, and those tools from both occupational areas and their middens should be similar in functional use (1991:200). Schiffer (1995:33) promotes a similar theory that when the types of activity are consistent at a site and there is only one midden, “the ratios of elements in that area will correspond to their relative replacement frequencies”. Based on this high degree of mixing, not only between lithic types, but with faunal remains and FCR I believe that this area can be nothing other than a midden, and its placement between both the hearth and activity area suggests that it was as a dumping place for debris from both areas.

Discussion of Density Maps

Overall, the data from the density maps seems to coincide with the conclusions presented in the previous section. The lithic debitage was found across most of the site, but in small enough quantities that indicate the spreading of these artifacts from site
formation processes, natural and human, rather than intentional distribution. One of the areas of the densest lithic concentration coincides with the toss, displacement, and drop zones around and through the hearth (see Figure 14). This indicates that the manufacturing, and/or repair of tools was probably taking place here, and from the variety of tool types nearby that this area may have been used as a general tool repair area.

The second area with a dense lithic cluster is the identified midden. A large cluster of lithics in this area supports my hypothesis that this area was in fact used as a dump and coincides with the large variety of tools found there. This dense cluster seems to extend to the northwest, above the activity area. This could be either an extension from the midden, or representative of an area used to sharpen tools that were to be used in association with the butchering occurring in the activity area; further work looking at the lithic types and raw materials present could provide a more concrete conclusion.

There are also two outlying concentrations of lithics that could be indicative of later activity areas that were not initially visible in the point plotted maps. One of these areas is directly south of the large activity area and is accompanied by a small outlying cluster of cobble sized FCR. I had initially identified this area as belonging to a toss zone south of the activity area, but based on the density maps, I would propose that this area is an overlapping activity area where lithics were being worked. The second area is located directly south of the test excavation unit and is also associated with a small cluster of FCR (see Figure 14). These areas may be representative of activity areas that were created during the abandonment phase of this camp, which would explain their lack of cohesiveness with the rest of the component.
Unlike the lithic debris, which are scattered across the site, the faunal remains from this component are clustered into three distinct areas. The largest cluster of faunal remains is located across the hearth covering the displacement, drop, and toss zone on the southeast side; this is a pattern similar to the heavier lithic concentration (see Figure 13). This pattern is indicative of meat cooking activities at the hearth, and is probably associated with activities taking place after the initial butchering of the bison in the adjacent activity area.

The second cluster of faunal remains is within the center of the activity area itself, which would make sense as an animal had been butchered here. The third cluster of faunal remains is located in the midden area, and could be representative of debris from the hearth, activity area, or a combination of both. There is an outlying area of faunal remains at the southwest corner of the site, but without further excavation in that area it is hard to determine if this is indicative of another activity area, or just the result of displacement due to site formation processes.

The distinct clusters of faunal remains in this component are typical of hunter-gatherer sites where cleanup activities were occurring. During his work with the Alyawara, Binford (1987:475) noted that “domestic areas, the main shelter, the swept area, and all the male activity areas” contained a low density of faunal remains. When compared to a Woodland site in Illinois, the same pattern was noted and it is believed that at hunter-gatherer sites most activity areas can be located on the margins of areas with many cultural items.

In order to compensate for the large variation in size among many of the FCR pieces uncovered at the site, and the preferential treatment given to the cobble size pieces
that were mapped, tallies of both cobble size and pebble size FCR were taken. As a result, I created both a cobble and pebble FCR density map, which reveal spatial patterns that would be almost impossible to identify if the data had been clumped together. The midden shows the highest density of cobble size FCR, with the actual hearth area and immediate toss zone showing the second highest density. There seems to be an arc of higher density that follows roughly where I marked the displacement zone around the hearth. There were no FCR cobbles found within the activity area.

In addition to these zones of high density, there are a couple of outlying areas that do not seem to relate to areas that I had previously identified. One of those areas I discussed earlier, because it also contained an outlying cluster of lithic debitage. Again, I would propose that this is a poorly defined activity area/hearth that may be related to the abandonment phase of this occupation. The other outlying area lies east of the hearth and borders the perimeter of the excavated area. This cluster may be related to the adjacent toss zone from the hearth, but unless further excavations extended beyond that unit, it is hard to make an exact determination.

Incongruous to the cobble size FCR density map, the pebble size FCR density map shows these artifacts widely disbursed across the site. As would be expected, there are high densities of the pebble FCR in and around the midden, and the hearth. There is also a fairly dense cluster located south of the activity area where there may have been another activity area/hearth, as discussed above. Similar only to the lithic density map, this map shows a high density of artifacts along the northern most perimeter of the excavated area. This could be a part of the toss area from around the hearth (the smaller
FCR were easier to toss further than larger FCR), or it could be the edge of another feature further north.

Overall, there is very little patterning present within this particular density map, but it does not seem to contradict conclusions made earlier about site use. I would propose that some of the wide dispersal of pebble size FCR is a consequence of the smaller size and lighter weight of these items, making them more easily dispersed by post depositional factors, such as foot traffic by the initial inhabitants. These same factors would also make the pebble FCR more susceptible to site formation processes.

Conclusions

Based on the consistency between the spatial maps and the density maps, I am certain that the Late Archaic component of 24HL1085 is comprised of an activity area, hearth, and associated midden. The distinct clustering and clarity between use areas indicates that this component is the result of a complex organized entity, which created the site as a result of a single, continuous occupation (Kroll and Isaac 1984:14). There may be some minimal mixing with a possible earlier Oxbow occupation, but I do not believe that it has any significant bearing on the results of this study and it was never conclusively determined that an Oxbow occupation was present at the site.

This occupation was most likely a campsite of extended duration during which at least one bison kill was processed. The presence of the midden indicates that this group of people was present for a long enough period of time that they engaged in cleanup activities. There is only one activity area and hearth area present, though there could be others that are contemporaneous and were not excavated. Based on the size of the hearth, it seems that several people were using the area simultaneously. Arguably, the hearth
could be the result of one person moving around the hearth. But, based on the work done by Binford, hunter-gatherers are more likely to construct a new hearth if the wind shifts rather than move themselves and tasks around the already constructed hearth (1983:159).

The assortment of tool types found within this component is not only an indicator of multiple activities taking place at this site, but also suggests the presence of women. A significant number of the tools recovered were scrapers, which is a tool typically associated with activities performed by women. The presence of a family group/s is another characteristic of a residential campsite, and “while Archaic kills clearly involved cooperative behavior, processing and distribution of meat took place at the family level” (Reher 1977:34). The only thing missing from this campsite is the location of the shelter/s. Based on the layout of the use areas in relation to each other, and the distributions of artifacts, I would speculate that the shelter/s were located somewhere to the north of the hearth and activity area.

While we may never know the exact reasons prehistoric hunter-gatherers chose to spend some time in the Bear’s Paw Mountains, I believe that their choice to camp here was a decision based on knowledge they already had about the area, and that this place was a familiar stop in their cyclical movements across the Plains. They came prepared with a large amount of non-local raw material cores and preforms for the making of tools while in the area, knowing that there were no local raw material resources of exceptional quality. Part of what defines a hunter-gatherer group is that “the relations of production are tied to territories or significant sites” (Cribb 1991:372), and so their movements are scheduled in regards to the consumption of a wide variety of plant and animals resources that would have been provided by the Bear’s Paw Mountains.
This area would have been important for resources such as water, timber, and a variety of fauna and flora that could not be found on the Plains. These resources, in and of themselves, would have made this location important and the area would have provided a good base from which hunting and scavenging parties could leave from. These mountains are also important the native plains people for spiritual reasons. This site is located just north of Mt. Baldy, the highest mountain in the range, and after talking to local natives we were informed that the mountain is sacred to them.

**Interpretation of Late Prehistoric Component**

Similar to the Late Archaic component, the Late Prehistoric component can be divided into specific areas of use, but unlike the earlier component, there are a lot more use areas and the remains seem to be representative of two separate occupations. Based on the orientation of different areas and their spatial relation to one another, I believe that the first occupation (A) is comprised of two hearths, two activity areas, a midden, and the remains of a shelter area. The remaining two hearths that were identified belong to Occupation B. Since the two hearths identified for Occupation B are also facing in opposite directions they may represent two separate occupations, but for this study they will be considered jointly.

‘Areas of Interest’

The ‘areas of interest’ identified for this component were much more complex than the earlier component, which is not unexpected considering that Prentiss (2008:59) proposed that this component is made of at least two separate occupations. Ten areas were marked, a large number of the areas made the crescent shapes similar to what would be found around hearths (Stevenson 1985 and Binford 1978). Based on the identified
‘areas of interest’ I would propose that there is a strong possibility that, even with the mixing occurring between two occupations, this component is not representative of just a midden area, but that specific features and activity areas will be clearly identifiable later in the analysis.

**Phase Identification**

The total number of debitage recovered from this component was 401, and of that number 323 pieces (80.5%) were tertiary. Of the tertiary debitage, 68.2% was made of non-local raw materials, a percentage slightly less than in the earlier component, which saw 75% of its debitage from non-local resources. According to Binford, “variability of raw materials found at a given site is primarily a function of the scale of the habitat which was exploited from the site location, possibly coupled with a founder effect resulting from discard on the site of items which had been manufactured previously at some other location” (1979:274). This indicates that compared to the earlier component, the later hunter-gatherers were using slightly more local raw materials, but overall they were still bringing in large numbers of nonlocal cores and performs.

Based on the percentage of tertiary debitage, I believe this campsite to have gone through all three of the phases identified by Stevenson (1985:67-68), ending with the abandonment phase. Evidence for this component going through the abandonment phase can be seen in the high number of discarded tools and tertiary debitage, and at least one area of refuse that does not spatially relate to the other identified use areas. The process of abandoning this site indicates that these people had an idea of where they were headed next and were able to plan in advance for the next site.
**Tool and Faunal Map**

The lithic and faunal remains map that was created for this component shows a wider distribution than was seen in the earlier component. The more random seeming spread of materials in this component is most likely a result of the mixing of two occupations, and site formation processes. Despite the mixing that seems to be evident from this map, I do not see any significant spatial patterns that contradict the ‘areas of interest’ that were marked earlier. This component is a perfect example of why plains archaeologists should not just note the presence of FCR at a site, but also take counts and map it. Without the mapped FCR from this component, the spatial maps would have very little patterning, and use areas would be virtually impossible to identify.

The tool map created for this component was much more interesting and again reflects the mismatching of two occupations, though there are some discernable patterns. Various tools seem to be spread across the site with projectile points, scrapers, cores, and bifaces found primarily within the northeastern end of the site. It should be noted that for every projectile point located within this component there is a core located either in the same unit or an adjacent unit. The southwestern section of the site contains a wider variety of tools including knives, a mano, used flakes, chopper, and pièces esquillé.

**Identification of Zones**

The process of identifying zones and areas for the Late Prehistoric component was much more complex than for the Late Archaic component. Besides the likely mixing of two occupations, there were many more clusters and ‘areas of interest’ that had been originally marked. While similar in many aspects to the areas marked in the earlier component, there were patterns appearing that had not been present before and there is
even variation in recognizable patterns. After considering all of the data presented above, I identified several hearths, activity areas, and the possible location of a shelter (Figure 22).

I believe that there are at least two occupations identifiable from this map and so I have labeled use areas belonging to each occupation as either A or B in the diagram. Occupation A is comprised of two hearths, two activity areas, a midden, and a shelter area. Occupation B is comprised of two hearths. I divided these areas into occupations based on the direction they were oriented in and their spatial relationships with other use areas.

Beginning with Occupation A, there are two hearth areas that are consistent with characteristics identified by Binford and Stevenson. They both have distinct concentric drop, toss, and displacement zones, and are characterized by a significant amount of FCR. Unfortunately, no distinct areas of ash were found to be associated with these areas, so this identification is based solely on the spatial layout of the mapped artifacts.
These hearths are both oriented towards the north and have concentric toss, displacement, and drop zones with a large amount of FCR present. Tools associated with these two areas are primarily projectile points, cores, and bifaces, which could be an indicator of tool maintenance in these areas. Unlike the large hearth area in the Late Archaic component, these hearth areas are much smaller, about a meter in diameter, and seem to be hearths for individual activity.

In between the two hearths there is a small displacement zone that I identified as a small midden. There is little conformity within this area and a variety of artifacts that suggests that it was a used as a dump for debris from both hearths and an adjacent activity area. The dumping of debris from activities located near hearths into one midden, along with the hearth debris, has been documented at the middens found at Verberie, France and other sites in the region (Keeley 1991:265). There were several broken projectile points and a core found within this midden. Even though there is not a much tool variety in this midden, I believe that based on its location and the lack of spatial patterning that this area was used as a dump.

The midden also contained a large fragment of a bison mandible, which was missing all of its teeth. The presence of heads and lower limbs are common finds at kill and butchery sites for hunter-gatherers that are logistically organized, but are not as common at campsites. According to Binford, this is because the heads and lower limbs are unlikely to be carried back to residential camps because they contain poor quality meat and are often consumed at the kill site (1987:456). The presence of an animal head at this site, which is most likely a residential camp, indicates that the kill was made relatively close to the camp and so the whole animal was transported back.
Understanding why and how decisions were made regarding what parts of the animal to transport back to residential camps is important because “the fact that the choices regarding parts to be consumed are conditioned by such prior decisions ensures that, even debris from consumption, anatomical part differentiation will occur as a function of consumer sequencing of food options and will be manifested in terms of anatomical segments” (Binford 1987:491-492). By understanding the sequencing of food options, the archaeologist has another way to get at the underlying cultural factors that influence a particular hunter-gatherer group.

East of the two hearths and the midden is an area identified by a circular toss, displacement, and drop zone. Because these zones are circular in nature I immediately dismissed this area as being a hearth and started to look for evidence that it may have been an activity area. From within this area, a combination of faunal remains, lithics, and FCR were recovered. The only tools found from the perimeter of this area were scrapers and cores, which indicates that this activity area may have been used in the butchering and hide processing of a kill, which coincides with the animal remains found in the nearby midden.

The faunal remains found within this activity area belonged to both bison and bighorn sheep. The Bugas-Holding site in northwestern Wyoming is another Late Prehistoric site where both bison and bighorn remains were found. At that site, the bison remains were highly dispersed and the bighorn was found around individual hearths. Rapson and Todd concluded that this variation was either a result of multiple occupations or that it was a “differential organizational ‘trajectories’ of introduction, use, and disposal of the two species during a single occupation” (in Stevenson 1991:284-285). At
24HL1085, the two types of faunal remains were found together in the same activity area indicating the similar treatment of both animals. Unlike bighorn sheep, bison remains were also found spread throughout the rest of the occupation, but this is not enough evidence for the differential treatment of bison since the taxon could not be identified for many fragments.

I also noted that the two hearths seem to have been placed concentrically around the perimeter of the activity area. This appears to make the activity area the center of the camp. Because of this central location, this area, instead of being an activity area, may instead be the central, communal area of the camp. According to Binford, “the domestic space is focal relative to the rest of the site framework and debris distribution…around or beside the domestic space is a wide band of activity area and debris…” (1987:498). If this were the case with this occupation, I would expect more variety in tool types than just scrapers and cores. I would also expect more displacement of the larger artifacts within the center of this area due to heavy foot traffic.

Binford notes that because “pan-human characteristics may condition very general spatial patterns characteristics and [are] diagnostic of certain types hunter-gatherer settlement”, sites with different focal activities can have different core areas. For example, at a site where butchering is the main activity, the butchering area should be the central aspect of the site with other use areas located peripherally. These butchering sites can still have peripheral residential components that in turn focus around the hearth (1987:501).

Instead of a butchering area, this space could also have been used as a consumption, or roasting area. Kroll and Isaac note that areas where meat is butchered
can be differentiated from areas where meat is consumed because consumption areas tend to have a higher quantity of lithics and bone splinters (1984:27). Part of this area did have one of the denser concentrations of lithics found within this component. Additionally, Navajo outside roasting areas tended to be located adjacent to the dump and the heads often appear in those adjacent dump, which is very similar to the midden adjacent to this use area with the bison head (Binford and Bertram 1977:95).

To the southwest of the hearths and midden is a large circular area of debris with a central drop zone and a toss zone around it. While the initial artifact pattern seemed to be similar to the activity area, there is a significant lack of debris in the central area and a light ring of artifacts around the outside, which made me question whether or not this really was an activity area. Unlike other use areas in this component, there is a notable lack of FCR in the area. There is also an increase in the diversity of tool types found in this area including a chopper, the only one identified from the site. Based on the circular pattern of debris, the lack of FCR, and the lack of cohesion between tool types I propose that this area may have been the location of some type of shelter.

Banguilan (2001:95) describes the location of a shelter as appearing in the archaeological record as an artifact void with a semi-circular arc of debris outlining the exterior walls, which is the spatial pattern that appears in this area. The debris ring around the perimeter of this area would represent the edge of the shelter where debris was moved, either intentionally or unintentionally, as the space was cleared for daily activities creating an outline of the interior walls. This type of refuse pattern is called an O’Connell size differentiation, which means that refuse that has been cleaned and reaccumulated tends to form a crescentric midden around living areas (Kroll and Isaac
Based on research by O’Connell et al (1991), Fischer and Strickland (1991), and Yellen (1977), this cleaning would have occurred regularly in hunter-gatherer communities and refuse was often placed around the exterior of the structure (Banguilan 2001:95). This would explain the wide ring of debris present in this area because it is a combination of artifacts pushed to the interior edge of the structure and placed around the outside after removal.

This shelter area is less than three meters in diameter, which makes it too small to have been a traditional tipi, which are traditionally at least fourteen feet in diameter and can be much larger (Lowie 1963:32). This area could represent where a smaller tipi had been placed. Smaller tipis were used for a number of different reasons including the housing of girls who were going through puberty, housing for women during menses, children’s play tents, and homes for widows or other aged persons (Lowie 1963:88, Hassrick 1964:41, Wedel 1961:121). This area could also have been the location of a sweat lodge, which could be quite small and are usually low, dome shaped structures (Lowie 1963:186-187 and 194). Hassrick (1964:228) also notes that sweat lodges can have large piles of rocks outside of an east-facing door. Interestingly, along the east side of this area is a large pile of rocks that I had originally identified as a hearth, but could instead be rocks associated with a sweat lodge, though this does not necessarily coincide with the numbers and types of artifacts found in association with this FCR cluster.

The relationship of this space to the other identified use areas also supports this hypothesis. The shelter is positioned outside of the main activity area, but with an adjacent hearth. I would also propose that there might be another shelter area next to the northern hearth from this occupation. According to Fletcher, we should expect to find
tipis well spaced from each other because the construction of tipis does not provide much
in the way of a sound barrier. As a result, there tend to be gaps between individual
residences, and in large gatherings, between residence groups (Fletcher 1991:413).

Fletcher also suggests that camps and settlements are often built in a horseshoe pattern
facing a nearby water source, but there is not enough evidence from this site to support or

The final use area that I identify as belonging to Occupation A is just south of the
activity area. Initially, because of the curved shape of the drop and toss zone, I had
labeled this area as a hearth. Upon further examination I began to wonder why this
hearth was larger than the other two identified hearths, and when compared to the other
two areas there is so little FCR present. The tool and faunal map indicates that this area
has very little in the way of faunal remains present and there are no tools that were found
associated with this area. The ring of large FCR rocks also forms an almost uniform line,
which is unlike any other spatial patterns present at this site. Based on Binford’s work
(1983), I would postulate that this area was used to stretch and dry a hide/s from the
butchered animals and should be labeled as an activity area. The Nunamiut would use
stones to weigh down skins for drying and this would create circles, or semi-circles about
1.5 meters in diameter, which is roughly the diameter for this use area (1983:133).

For Occupation B, I have identified the two remaining hearth areas. Both of these
areas are at the southern and southeastern end of the component. Whereas most of the
other use areas of the site seem to be facing the north the southernmost hearth faces the
southwest and the other faces more southeast. Both hearths have the distinctive toss,
drop, and displacement rings, along with a significant number of FCR. Like the hearths
from Occupation A, these hearths are small in size and seem to be hearths used by
individuals, versus hearths used by several people. In regard to associated tools, the
southern hearth has a pièces esquillé, biface, projectile point, and core spatially
associated with it and could be the remains of a short term hunting camp. The eastern
hearth has only a core and mano spatially associated with it. These two, possibly
separate, occupations are compound entities in which separate groups of deposited items
were mixed with previously discarded artifacts (Kroll and Isaac 1984:14).

**Density Maps**

Unlike the faunal remains from the Late Archaic component, the faunal remains
from the Late Prehistoric are spread over a majority of the excavated area. The densest
cluster of faunal remains is located in the central activity area of Occupation A. The
next, most dense concentration falls in the area with the Occupation A hearths and
midden, which would be expected if these use areas are indeed contemporaneous.
Interestingly, areas of dense faunal remains also appear around the toss zone of the
shelter area. These faunal remains could be the remnants of meals eaten within the
shelter, similar to nighttime consumption as described by Bartram, et al. (1991:103)
where the remains end up around the peripheries of structures.

There are also faunal remains found in and around both hearths from Occupation
B. Both areas show a relatively low density, and as such, the remains located there could
be the result of segregated activities taking place at those hearths. They could also be
faunal remains from the activity area and northern hearths that got moved south through
post-depositional forces. There are a variety of forces that can act upon bones before
they are covered with sediment including scavenging dogs, being kicked or trampled by
humans, cleaning of use areas, and the presence of other scavenging animals (Bartram, et al. 1991:103-104). The southern hearth features could have been constructed upon these remains and are entirely unrelated.

Comparable to the map from the lower component, the lithic density map for the Late Prehistoric component shows lithic debitage spread almost uniformly across the site. This spread is probably partially a result of how easily debitage can be spread by post depositional forces because of the relatively small size and light weight of most pieces. There is a denser area of lithic debris that centers around the two Occupation A hearths and midden. This indicates that the sharpening and/or manufacturing of tools was probably taking place in these areas.

Another area with a dense lithic concentration follows, almost exactly, the outer toss zone that marks the location of the structure. This matches the corresponding density pattern in the faunal map. These debris patterns could be a result from activities taking place within the shelter and as people moved about, and moved on to other tasks, the debitage was pushed to the edges of the structure. While arguments could be made that this area was an activity area, instead of a shelter location, the uniformity of the circular debris patterns seems to suggest an intensively used area that was constantly kept free of too much debris so that daily tasks could be performed.

Dense areas of cobble FCR are visible in areas where they would be expected based on the identification of use areas. There is a large linear area that spreads from the northern hearth of Occupation A, through the midden and extends through the second Occupation A hearth. The two other dense clusters appear within the two Occupation B
hearths. The rest of the site has a light spread of cobble FCR across it, but not enough to indicate additional hearths or activity areas.

Unlike the cobble FCR density map, the pebble size FCR density map shows an almost uniform spread of dense FCR across the site. Surprisingly, three of the four hearths represent some of the few areas where there is a lower density of pebble FCR. Another area with a lower density of pebble FCR is the large Occupation A activity area. The only unit with no recorded pebble FCR, and cobble FCR for that matter, is the southern Occupation A activity area that I proposed may have been a hide drying location. If this area were in fact covered with a hide for drying, that would explain the lack of artifacts in the center of that area because the ground would have been covered preventing the spread of artifacts to that location.

As I noted earlier, the more uniform distribution of pebble sized FCR was also a characteristic of the Late Archaic component. This may be because the smaller pebble FCR were easier to toss away from the hearth areas, unlike the heavier and larger cobble sized FCR. I also believe that the pebble size FCR are more susceptible to site formation processes, human and natural, and so were more easily spread across the site. It is important to remember that most of these small pieces were once a part of larger cobbles. The large numbers visible on the density map could be misleading, because instead of five individual FCR being represented, they could have all been a part of one rock, which over time, broke apart.

Conclusions

While there is no doubt that the Late Prehistoric component of 24HL1085 is a mix of at least two separate occupations, I believe that there is enough integrity left of the
site that a fairly accurate interpretation of the spatial patterns can be presented and defended. Based on the orientation of the hearths and their relationship with the other identified areas, I strongly believe that the areas that were identified as Occupation A are contemporaneous. Even though further research regarding specific artifacts and the refitting of FCR could disprove my hypothesis, this paper was a focus on spatial patterns to help in the interpretation of a site, and as such my conclusions are based primarily on those patterns.

Occupation A seems to be representative of a fairly large campsite at which a variety of activities were taking place, which can be seen in the variety of tool types found in the component. These ‘homebase’ campsites, at which multiple activities take place usually result in the “continual resorting and movement of artifacts…so that the association between activities and artifacts resulting from those activities is disturbed” (Hivernel and Hodder 1984:97). Since manos and scrapers were found at the site, women were likely present and besides engaging in the processing of hides may have also been collecting and processing various plants. Since there were women present there were probably also children present.

The large activity area with dense faunal remains and nearby scrapers indicates that the processing of at least one large animal took place. As I suggested above, I believe that the second identified activity area may be where the hide from the processed animal was stretched for drying. The amount of debris left at the site and the presence of a midden indicates that this group of people stayed at the site for an extended period of time before moving on.
Once of the most interesting characteristics of this component is the individualized size of the hearths, especially when compared to the large hearth from the Late Archaic component. This could be indicative of either a larger group of people staying at the camp, and so there was a need for more hearths, or this could represent a social change within the hunter-gatherers on the High Plains in which there is a change from large communal hearths to smaller, individual hearths. It must be kept in mind that this component is representative of at least two occupations and these hearth areas may not be contemporaneous. These use areas, though identified through use of the three ring model as hearths, still lack conclusive evidence as to their function and may not have been hearths at all, though this is what I believed these areas to have been.

**Site Classification**

By completing the three zone model spatial analysis I was able to identify individual use and activity areas for both of the two intact components of 24HL1085. Throughout the analysis I repeatedly mentioned that both components of this site are representative of residential campsites. The last section of this chapter will be focused on explaining why I believe these components to be residential camps as opposed to other types of camps that are commonly found in this region. The identification of site type in this area is especially important because “campsites are part of a wider process of niche construction where landscapes are culturally created through the history of their use and routines of renewal” (Gamble 1991:19), and through them archaeologists are better able to gain a wider understanding of landuse by hunter-gatherer societies.

All types of campsites have the same general components: the dwelling or shelter, the hearth, and the activity areas that encompass these components (Fischer and
Strickland 1991:220). Despite these common elements, archaeologists cannot forget that “camps are never amorphous aggregations of individuals, but always collections of social units arranged in space according to the selective pressure from risk avoidance behaviour” (Gamble 1991:9). As such, camps can come in a variety of different forms, each relating to specific tasks that need to be accomplished.

Based on the Nunamiut, Binford identified three major types of hunter-gatherer sites: base/residential camps, hunting camps, and kill processing sites. There are a variety of smaller site types identified by Binford, but based on the size of 24HL1085, and nature of the debris found, it is highly unlikely that these types of sites are represented at this site and so they will not be discussed. Base, or residential camps, are one of the most common site types for hunter-gatherers, regardless of culture or location. Their spatial locality is usually based on the availability of wood and water, though the presence of wood was probably less of a determining factor for residential camps on the plains. Residential camps are often identified by the presence of shelter areas, activity areas, middens, and a variety of tool types that would indicate not only multiple activities occurring within the site, but also the presence of women and family groups.

The second common type of large site is the temporary hunting camp. These sites can be extremely large, up to half a square kilometer, with an uninterrupted spread of artifacts. This widespread scatter often represents extensive reuse of the site and an overlap of occupations (Binford 1983:118-119). Tool types found at this type of site are more specifically geared to activities that occur during or after hunting, especially if the carcass is prepared for transportation to a residential camp. All things equal, there should be less evidence of women and less distinct use areas.
The final large hunter-gatherer site identified by Binford is the kill-processing site. These sites often have a clear area with a debris circle at the center of site. Debris tends to be mostly animal remains, tools, and evidence of tool retouching. Hearths are common at these types of sites, along with various activity areas, but rarely was there formal cleanup activities taking place at these short-term occupation sites (Binford 1983:120-124). This does not mean that there is not a residential camp nearby, which is common at large bison kill and processing sites in this region.

In addition to the three site types described above, Bartram et al. (1991:134) also identified transient camps while working with the Kua. Transient camps are set up while traveling between more permanent seasonal camps. Faunal remains from transported carcasses and additional small mammals caught while moving are the most common debris found at these camps and often enter the archaeological record as primary refuse. While the spatial patterning of these camps in regard to use areas may be very similar to residential camps, the lack of secondary refuse and very little variety in the types of artifacts found at such sites should be strong indicators that a camp is transient.

While there are a wide variety of camp types among hunter-gatherers, the overall structure of their camps comes from a variation of common use areas: “although modes of procurement, processing, consumption, and discard activities [are] not mutually exclusive by camp type, differences in their intensity and specific combination varied with season, duration, and size of occupation” (Bartram et al. 1991:99). It is up to archaeologists to not only identify the use areas at a site, but through their spatial relationship to each other, and the environment, to determine what type of pattern indicates a specific camp type for a specific region.
Based on the description of camp types provided above, the type of refuse at 24HL1085, and the spatial layout of identified use areas, I would identify the Late Archaic component and Occupation A of the Late Prehistoric component as residential camps. Both components had middens, which is a pile of secondary refuse indicating that the people living there were at the site long enough to engage in cleanup activities. This is different from hunting camps, which are usually composed of primary refuse and rarely have middens (Binford 1987:500). The presence of secondary refuse also indicates a larger population and site size than would be found at kill, butchery, and quarry sites which have mostly primary refuse. These sites will instead tend toward the “repeated clustering of elements in discrete and overlapping location” instead of the more clearly designated use areas of residential camps (Schiffer 1995:32).

During their work at Ngenyn in Kenya, Hivernel and Hodder (1984:114-115) identified the third phase of their site as a home base because it had a higher ratio of tools to cores and a wider range of faunal bone types. In contrast, the first and second phase of the site were labeled as short-term/special activity camps because flakes and cores were more common than tools and the faunal variety was low. Based on their classification of Ngenyn, 24HL1085 would indeed be considered a home base because of the large number of tools present at the site and the variety of faunal remains.

The valley in which 24HL1085 is located would have been an ideal place for a summer residential camp. The Bear’s Paw Mountains would have provided a wide variety of resources that would not have been available on the plains during the intense heat of summer. It would have been the perfect location for a base camp from which hunting and gathering parties could leave from and return to with the resources that were
being collected. Both components of the site show evidence of being occupied for at least several weeks, if not longer, before being abandoned. The non-local lithic raw materials at the site indicate that these people knew this area and they prepared in advance for their stay in the mountains.
CHAPTER 5

CONCLUSION

Humans are creatures of patterns, and because we constantly repeat activities and tasks archaeologists can make determinations about things that happened thousands of years ago with very little physical evidence remaining. Hunter-gatherers in particular seem to follow some specific use of spatial patterns in that they “carry food to special places…feed at those places…sleep at those places…[and] repeatedly make and repair equipment at those same places” (Kroll and Isaac 1984:6). Because hunter-gatherers follow these basic patterns, with variation within their own culture type, completing spatial analyses and understanding spatial patterns is an important step towards a more complete understanding of how people lived their lives.

Oftentimes hunter-gatherer camps leave very little in the way of physical remains. This is the result of smaller populations, shorter occupation times, and often an environment that is not conducive to the preservation of organic materials that are left behind. This is the case at 24HL1085, which is a site with very few archaeological remains. But, size should not be a reason to disregard the potential information that each site can provide, because “at least some archaeological assemblages with low and attenuated archaeological ‘visibility’ may, in fact, carry more information than some better preserved assemblages” (Binford and Bertam 1977:152). For example, Verberie, a hunter-gatherer site in France, was a small, short-term occupation camp that left distinct and identifiable spatial patterns that would provide important information about hunter-gatherer lifestyles in the region, with implications worldwide (Keeley 1991:267).
In order to completely understand the hunter-gatherer way of life and why camps were created in specific ways and in specific places, the entire pattern of land use needs to be understood. Individual hunter-gatherer sites only offer “a limited, biased picture of a whole range of activities, depending upon [their] unique position within a regional system of behavior” (Binford 1983:109). To reconstruct the pattern of land use on the Great Plains, all types of sites need to be excavated and examined, especially the small, mundane campsites, which tend to be ignored. It is only through an examination of the smaller, generic sites that Plains archaeologists will be able to identify the spatial patterns that can be used to identify the specific function of use areas within a site, the purpose of the site, and its place within the entire land use system (Binford 1983:131-132). By doing this, archaeologists should eventually be able to create regional models that will aid in the identification and assessment of sites (Gamble 1991:6).

The entire range of site types for a specific region, and cultural group was labeled a site complex by Binford. Specifically, these sites are “linked together as part of an overall strategy”; for example, the Anavik Springs site complex was used for the hunting of Caribou and contains a hunting camp, kill site, and meat caches. All of these are individual sites connected together by a specific subsistence strategy within a broader spatial area. For the Plains tribes, the hunting of bison is the encompassing subsistence strategy that links individual sites into site complexes. It is the effect of bison upon the hunter-gatherer populations of the Great Plains that “allows us to hypothesize where, when, and how we expect certain types of behavior to be manifested in the archaeological record” (Reher 1977:22).
As a site with two distinct components, separated by thousands of years, 24HL1085 shows how two distinct residential camps were arranged and used in the Bear’s Paw Mountains comparatively over time. The three ring model allowed for known spatial patterns of generic hunter-gatherer sites to be applied to this individual site and then modified to fit the artifacts and spatial patterns present. The identification of residential camps within this region is but one step in a larger understanding of the use of space and subsistence patterns in the region as a whole.

One of the most interesting aspects of this site was the variation in cluster size between the lower and upper component, especially in terms of the hearth areas. The hearth area in the lower component was about three meters wide, while the smaller hearths of the upper component were only about a meter wide. While this type of variation might be expected and more easily explained if each component represented a different type of hunter-gatherer camp, both components were residential camps. This shift from large, communal hearths to smaller individual hearths could be indicative of varying culture groups using the area, or a culture change within one culture group over time. Additional archaeological work in the Bear’s Paw Mountains and a study of hearth size at various hunter-gatherer sites in the region should be a future avenue of research.

By far the most common type of artifact found at 24HL1085 was FCR. FCR has a tendency to be dismissed in Plains archaeology; it may be used to help identify the location of a site, and rough counts of the amount of FCR present may be taken, but rarely is it treated with the same consideration given to lithic debris and faunal remains. I believe that this spatial analysis of 24HL1085 is proof that FCR should be mapped and collected from sites; without the spatial locations of the FCR within each component of
this site, few, if any spatial patterns, would have been identifiable for either component. According to Clarke, “no elements can be understood without investigating the competing requirements of its individual compound structural units and the constraints imposed by the wider system of which it is merely a part” (1977:10-11). In other words, neglecting the spatial patterns of FCR while completing a spatial analysis is like trying to construct a puzzle with only a few of the pieces.

This spatial analysis of 24HL1085 was only a basic review of the spatial patterns within each component based on an adapted three ring analysis. Additional work and review could support the conclusions that I presented in this paper, or they could contradict them. A comprehensive refitting of the lithic debitage and FCR pieces could provide more concrete evidence of how areas were used and debris moved through cleanup activities and site formation processes. Gamble (1991:17) believes that more effort to refit artifacts needs to be made if archaeology is ever going to move beyond “reconstructing individual events and towards the analysis of composite behaviour”. The refit could also provide more evidence as to which use areas within the Late Prehistoric component were created concurrently, and how accurate spatial arrangement can be in determining contemporaneous use areas.

Further excavation of 24HL1085 would also go a long way to a better understanding of this site. Fisher and Strickland believe that the only way to accurately employ a spatial analysis is to excavate sites in their entirety (1991:232). Unfortunately, time and money constraints prevent the full excavation of most sites and so archaeologists are left with only a partial picture of what was taking place. If further excavations were to take place at 24HL1085, I would hope that this spatial analysis could
be used to help archaeologists locate and identify additional use areas, and that any mistakes made in this analysis could be remedied with the additional data.

One of the broader implications of this research project is that the application of Stevenson’s model to prehistoric archaeological sites is a viable option for archaeologists attempting to complete spatial analyses as long as some significant changes are made to the model and its application. The model can be made to accommodate not only lithic spatial data, but also the spatial data of faunal remains and FCR, and it should accommodate all artifact types found at the site to which it is being applied. Only by considering all artifact types found at a site during analysis will archaeologists be able to postulate the best hypotheses about site use. Additionally, this model has no built in process of checks and balances, and by considering the density data, conclusions reached through the application of this model can be checked and adapted if necessary.

This model also allows for a variation of site interpretation from other methods of site analysis. While conclusions reached through the application of this model may not always coincide with earlier, or future conclusions about a particular site, they can serve to stimulate new ways of thinking about the data collected from archaeological sites and open new avenues of research. I believe that only by applying different models and theories to the interpretation of a site, and creating discussion, that archaeologists will be able to gain a more complete understanding of prehistoric sites.

As a residential camp within the Bear’s Paw Mountains, 24HL1085 has the potential, when compared to other sites in the region, to provide important information about subsistence strategies on the Great Plains. This site provides not only a Late Archaic component, but a Late Prehistoric component that can be compared to each other
so that differences through time can be marked. This site also shows how essential it is for archaeologists to begin to consider FCR as important an artifact as lithics and faunal remains. FCR may not be as interesting as stone tools and large bone beds, but as of now they are an untapped resource that can open a whole new door into the understanding of past cultures. I truly believe that without the spatial maps of FCR at 24HL1085, a spatial analysis would have been futile; only by considering FCR, lithics, and faunal remains conjointly could strong arguments be made for the identification of individual use areas.
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